Quantifying the Potential Contribution to Climate Change Mitigation from Temporary Carbon Storage in Hydrochars

Owsianiak, Mikolaj; Renz, Michael

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

Citation (APA):
Owsianiak, M., & Renz, M. (2018). Quantifying the Potential Contribution to Climate Change Mitigation from Temporary Carbon Storage in Hydrochars. 553-553. Abstract from 25th European Biomass Conference and Exhibition, Stockholm, Sweden.

EUBCE 2017

25TH EDITION

European Biomass Conference & Exhibition

BOOK OF ABSTRACT SUMMARIES

12 - 15 JUNE

STOCKHOLM - SWEDEN

Stockholmässan

Status of 01:45 pm, giu 14, 2017

Table of contents

Table of contents

IntRESS - Land as a Resource

Short introductive summary:
The IntRESS project initiated by the German Federal Environment Agency (UBA) and funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety developed new insights, options and recommendations for international sustainable resource use policies through engaging the scientific community and relevant stakeholders. This should further strengthen the profile of resource efficiency and sustainable resource use issues on the European and international policy agenda. The project developed and discussed science-based suggestions for international targets on sustainable resource use and focused on the following key questions: How can one derive internationally accepted, qualitative and quantitative 2050-targets for sustainable resource in land use? What types of indicators could be most suitable to measure progress towards them?

Presenter: **Alexa LUTZENBERGER, ALRENE, Siek, GERMANY**

Presenter's biography:
Alexa Lutzenberger is working in projects for Renewable Energy, Sustainable Agriculture and Resources. Actual, she is general secretary of the Factor-X-Club and member of the resource commission of the german federal environmental agency and some boards of Advisors. She is head of Alrene.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
A.K. Lutzenberger, ALRENE, Siek, GERMANY
F. Lichter, ALRENE, Eisenhüttenstadt, GERMANY

Session reference: 1AO.1.1
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Biogas Transport Grids, Case Study "Province of West-Flanders"

Short introductive summary:

Biogas collection from digesters to a hub supports the efficient use of energy. At a hub there is a scale advantage for the end user, e.g. a CHP. A large improvement of overall efficiency can be achieved when heat generation and heat demand are matched. In a Belgian province 38 digesters were identified. The biogas is used to produce electricity and heat at or close to the digester site. Often the heat is used to dry the digestate before it is transported abroad. However, studies are looking at other potential usages of the digestate which might decrease the demand for heat in the future. Biogas hubs can be an interesting alternative to valorise the biogas. The potential advantages of using a hub have not been fully examined up till now.In this case study the costs (€ct m-3) of biogas transport to a hub were estimated. It is an important first step to evaluate the viability of a business case including a biogas grid in the region. The hub could be situated at one of the digester sites or at a site proposed by experts to be promising for the business case. In the preliminary results biogas transport costs to the hub are in the range from 2.0-6.6 €ctm-3,(digester scale1000 m3/h).

Presenter: **Evert Jan HENGEVELD, Hanze University of Applied Sciences, Hanze Research Centre Energy, Groningen, THE NETHERLANDS**

Presenter's biography:

Evert Jan Hengeveld, MSc in Physics, holds a position as researcher and lecturer at the Hanze UAS in Groningen (NL). The focus of the research is on modeling of a Biogas Infrastructure with a biogas grid.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E.J. Hengeveld, Hanze Reserch Centre Energy, Hanze UAS and University of Groningen, Groningen, THE NETHERLANDS
J. Bekkering, Hanze Research Centre Energy, Hanze UAS, Groningen, THE NETHERLANDS
M. Dael, van, Centre for Environmental Sciences, Hasselt University and VITO, Hasselt and Mol, BELGIUM
W.J.T. Gemert, van, Hanze Research Centre Energy, Hanze UAS, Groningen, THE NETHERLANDS
A.A. Broekhuis, University of Groningen, THE NETHERLANDS

Session reference:	1AO.1.2
Subtopic:	1.1 Biomass Potentials and Biomass Mobilisation
Topic:	1. BIOMASS RESOURCES

Anticipating Climate Change Effect on Biomass Productivity and Vegetation Structure of Mediterranean Forests to Promote the Sustainability of the Wood Energy Supply Chain.

Short introductive summary:

Our study aims to assess the potentiality of biomass production and availability for energy systems based on woody biomass, taking into account the urban dynamics and and the impact of the global warming on the Net Primary Productivity and the vegetation structure towards 2050. Our results show that Mediterranean forest may be more vulnerable due to the increase of temperatures that may affect the mortality of the trees and shrubs, and the structure of the ecosystems due to the colonization of more xerophilous species in the valleys and hills. In some parts of the Alpes-Maritimes (French Riviera), these changes may affect the biomass production and, in consequence, the supply chain. The actual development of the urbanization in the valleys and in the central part of the territory, which will be emphasized in the future, raises the question of the sustainability of energy systems based on woody biomass in such areas due to the potential risk of the increase of trees mortality, changes in vegetation structure with less trees and NPP decrease. At the opposite, in the mountain areas, the NPP will increase and the dynamic of trees will be suitable to the development of forests.

Presenter: **Emmanuel GARBOLINO, Mines Paris-tech, CRC - Centre de Recherche sur les Risques et les Crises, Sophia Antipolis, FRANCE**

Presenter's biography:

Emmanuel Garbolino is an Assistant Professor, expert in the assessment of risk induced by climate change on ecosystems and society. He has a scientific background in ecology (Master degree) and in geography (PhD and Accreditation to supervise research - HDR.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Garbolino, MINES ParisTech/PSL Research University, Sophia Antipolis, FRANCE
W. Daniel, AgroParisTech and MINES ParisTech/PSL Research University, Paris, FRANCE
V. Sanseverino-Godfrin, MINES ParisTech/PSL Research University, Sophia Antipolis, FRANCE

Session reference: 1AO.1.3
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Evaluation of the Present State and Perspectives for the Energy and Energy Carriers Production from Biomass in Poland

Short introductive summary:

The present state and perspectives for the energy and energy carriers production from biomass in Poland have been presented. Poland’s bioenergy sector situation is still under the expected level. The aim of this work was to predict the possibility for biomass sector development by identifying the present bioenergy situation and to foresee the future of this sector in Poland. New coefficients, identificators and also units have been defined for better description of bioenergy sector situation. They can be commonly implemented for bioenergy sector situation description in other regions and countries.

Presenter: **Krystian BUTLEWSKI, Institute of Technology and Life Sciences, Biomass Processing Technologies Dpt., Poznan, POLAND**

Presenter's biography:

Krystian Butlewski is the Polish scientists specialized in utilization of biomass and organic wastes into energy and biofuels. His main interest is to develop the most effective way for converting biomass into energy and energy carriers. He is representative of Poland in IEA Bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Butlewski, Institute of Technology and Life Sciences, Poznan, POLAND

Session reference: 1AO.1.4

Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation

Topic: 1. BIOMASS RESOURCES

Domestic Biomass Resources and Potential Biomass Demand for Co-Firing in the EU

Short introductive summary:

Co-firing biomass with coal constitutes an attractive near term alternative for bioenergy implementation. We employ a spatially explicit modelling framework to assess the availability of residue in agriculture and forestry, and the profitability of using these residues to meet the potential biomass demand for co-firing in the existing coal power plants in the EU. We also analyze how policies can affect this biomass demand and in turn supply side responses in the agriculture and forest sector. More specifically, we analyze: (i) volume demand and willingness to pay for biomass across regions and over time for different scenarios concerning key factors such as fuel prices and policy development;(ii) geoexplicit residue supply potentials in agriculture and forestry; (iii) CO2 balances associated with utilization of the residues for co-firing; (iv) cost of collecting and transporting residue biomass to power plant gates; and(v) economic potential of biomass co-firing in coal power plants for the scenarios. Based on the analyses, we will discuss the possible role of biomass co-firing in different EU member states, biomass demand-supply balances, and climate mitigation benefits

Presenter: **Olivia CINTAS SANCHEZ, Chalmers University of Technology, Energy and Environment Dpt., Göteborg, SWEDEN**

Presenter's biography:

.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Cintas Sanchez, Chalmers Univerisity of Technology, Göteborg, SWEDEN
G. Berndes, Chalmers Univerisity of Technology, Göteborg, SWEDEN
L. Cutz, Chalmers Univerisity of Technology, Göteborg, SWEDEN
O. Englund, Chalmers Univerisity of Technology, Göteborg, SWEDEN
F. Johnsson, Chalmers Univerisity of Technology, Göteborg, SWEDEN

Session reference: 1AO.1.5
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Development of a New Micro CHP Pellet Stove Technology

Short introductive summary:

Biomass based room heating systems are very common for space heating throughout Europe. In Austria, biomass stoves represent 40% of the total number of installed single room heaters. In the resent 15 years pellet stoves became more and more popular due to their advantages regarding automatic control, user friendliness (automated ignition, easy and clean fuel handling) and their low emissions in comparison to logwood stoves. The current market for pellet stoves in Europe is in the range of 200,000 units per year. However, the need of an external electric power supply to provide electricity for the control system, the ignitor and the flue gas fan is a disadvantage of pellet stoves especially with regard to fail-proof and independent heating systems. Thus, new and innovative solutions to overcome this deficiency of pellet stoves are required to further support CO2-neutral room heating technologies with high efficiencies and low emissions.

Presenter: **Ingwald OBERNBERGER, Bios Bioenergiesysteme, Graz, AUSTRIA**

Presenter's biography:

Prof. Univ.-Doz. DI Dr. Ingwald Obernberger
Managing Director of BIOS BIOENERGIESYSTEME GmbH
Teaching at the Graz University of Technology
Member of the Editorial Board of the scientific journal Biomass and Bioenergy
Author of 6 books and over 200 scientific publications

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Obernberger, BIOS Bioenergiesysteme, Graz, AUSTRIA
G. Weiss, BIOS Bioenergiesysteme, Graz, AUSTRIA
M. Koessl, RIKA Innovative Ofentechnik GmbH, Micheldorf, AUSTRIA

Session reference:	2AO.2.1
Subtopic:	2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Modifies and Experimental Tests an a Liquid Fuel Micro Gas Turbine Fueled with Pyrolysis Oils and its Blends

Short introductive summary:

The scope of present work was focused on micro gas turbine tests with pyrolysis oil and blends with ethanol, after a complete re-design of the MGT combustor. The test rig includes also two pilot flames for start/stop procedure, a new control system, and a new injection line based on a tri-fuel system. MGT performance and emissions were evaluated and discussed.

Presenter: **Marco BUFFI, CREAR/RE-CORD, DIEF - Industrial Energy Dept., University of Florence, Florence, ITALY**

Presenter's biography:

Marco is a R&D researcher of the University of Florence and RE-CORD consortium. His research areas are focused on biofuels use and production, thermochemical processes, power generation from gas turbines and engines, and biomass cogeneration.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Buffi, CREAR/RE-CORD, University of Florence, Florence, ITALY
A. Cappelletti, CREAR, University of Florence, Florence, ITALY
A.M. Rizzo, CREAR/RE-CORD, University of Florence, Florence, ITALY
F. Martelli, CREAR, University of Florence, Florence, ITALY
D. Chiaramonti, CREAR/RE-CORD, University of Florence, Florence, ITALY

Session reference: 2AO.2.2

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Renewable Residential Heating with Fast Pyrolysis Bio-oil: Residue2Heat

Short introductive summary:

The goal of EUH2020 Residue2Heat (2016-19) project is to use various streams of biomass waste for residential heat generation. The aim is, by means of a liquid fuel produced in a sustainable manner from agricultural and forestry biomass residues to considerable reduce the CO2 emissions in the heating market compared to fossil fuels. This 2nd generation bio-fuel is being produced employing a fast pyrolysis process in which organic material is heated in the absence of oxygen to about 500 °C within a few seconds.
Significant progress has already been made. Good quality fast pyrolysis bio-oil (FPBO) has been produced from pine, bark, straw, and Miscanthus grass. A 20 kWth laboratory-scale burner was developed. Various nozzle configurations were tested. Stable combustion of 100% fast pyrolysis bio-oil was achieved without any coke residue. Combustion modelling is on-going and includes single droplet combustion tests with crude and conditioned FPBO as well as bio-oil fractions. Standards and norms for bio-oil and combustion systems will be assessed. The environmental and societal sustainability of the studied production chains will be evaluated.

Presenter: **Roy HERMANNS, OWI Oel-Waerme-Institut, Herzogenrath, GERMANY**

Presenter's biography:

combustion

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Hermanns, OWI Oel-Waerme-Institut, Aachen, GERMANY
T. Ruetten, OWI Oel-Waerme-MEKU Energie Systeme GmbH & Co. KG Institut GmbH, Aachen, GERMANY
B. van de Beld, Biomass Technology Group. me-Institut, Hengelo, THE NETHERLANDS
A. Oasmaa, VTT, Espoo, FINLAND
P. Massoli, Istituto Motori, Consiglio Nazionale delle Ricerche, Napoli, ITALY
A. Frassoldati, PTM Politecnico di Milano, Milano, ITALY
A. Toussaint, BTG BioLiquids, Hengelo, THE NETHERLANDS
H. Insam, University of Innsbruck, Institute of Microbiology, Insbruck, AUSTRIA

Session reference: 2AO.2.3
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Measurements of Full-Combustion-Cycle Emissions from Peat and Wood in a Domestic Stove

Short introductive summary:

This study focusses on full-combustion-cycle particulate and gaseous emissions from peat and wood in conventional domestic-scale stove. These biomass fuels are commonly used in Ireland, and there has been an increase in their use in recent years. This has lead to concerns over potential negative health effects. However there is a lack of emission data for these fuels in the Irish context, and also for the full combustion cycle. Thus, this study attempts to address this paucity of data and quantitatively compare these biomass fuels.

Presenter: **Cian QUINN, University College Dublin, Mechanical and Materials Engineering Dpt., Dublin, IRELAND**

Presenter's biography:

In 2015 I completed my PhD on the fluid dynamics and heat transfer characteristics of mist jets at Trinity College Dublin, the University of Dublin. I am currently undertaking postdoctoral research in University College Dublin on the emissions from residential scale room-heater stoves.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Quinn, University College Dublin, IRELAND
W.J. Smith, University College Dublin, IRELAND

Session reference: 2AO.2.4

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Performance Evaluation of a Modern Wood Stove When Using Charcoal

Short introductive summary:

The combustion of two types of charcoal was tested in a commercially available wood stove at various loads, with and without a retrofitted custom-design catalytic converter. The test campaign demonstrates that higher emission performance, combustion stability improvement and reduced heat output can be achieved by using charcoal in a wood stove, and highlights the need for operational changes. The tested catalytic converter is one-of-a-kind and has significant potential for further development. In the future, for wood stoves to adapt to modern types of buildings with reduced space-heating needs and requiring a more stable and homogeneous heat supply due to thermal comfort issues, burning charcoal or wood logs combined with charcoal, stand for a solution with great potential.

Presenter: **Alexis SEVAULT, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Alexis is a Research Scientist at SINTEF Energy Research (Norway). He got his PhD in laser diagnostics and combustion. His current work focuses on combustion and bioenergy, esp. wood biomass conversion to energy and emissions. He works as well on thermal energy storage with phase change materials.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Sevault, SINTEF Energy Research, Trondheim, NORWAY
R. Khalil, SINTEF Energy Research, Trondheim, NORWAY
B.C. Enger, SINTEF Materials and Chemistry, Trondheim, NORWAY
O. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
F. Goile, SINTEF Energy Research, Trondheim, NORWAY
L. Wang, SINTEF Energy Research, Trondheim, NORWAY
M. Seljeskog, SINTEF Energy Research, Trondheim, NORWAY
R. Kempegowda, SINTEF Energy Research, Trondheim, NORWAY

Session reference: 2AO.2.5

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biorecover: Biomass Residue Conversion & Valorisation for an Economic Refinery

Short introductive summary:

The purpose of BIORECOVER is on the creation of novel product recovery and upgrading concepts that enable a faster route to commercial applications for lignin pyrolysis products. It is envisaged that this can be achieved via a flexible cascading approach that involves dedicated catalytic pyrolysis and direct fractionation of the hot pyrolysis products into a limited set of fractions that are suitable for direct applications or (simplified) further down-stream-processing.

Presenter: **Paul DE WILD, Energy Research Centre of the Netherlands, Biomass & Energy Efficiency Dpt., Petten, THE NETHERLANDS**

Presenter's biography:

Paul works as senior scientist biorefinery at the Energy research Centre of the Netherlands (ECN), where his main activities deal with innovative thermochemical conversion technologies for biomass within the framework of the biorefinery approach.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P.J. de Wild, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS

Session reference: 3AO.3.1

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Drop In Potential of Upgraded Fuels Produced at Pilot Scale Via Hydrothermal Liquefaction of Different Biomass Feedstocks

Short introductive summary:

Hydrothermal liquefaction (HTL) is an emerging technology for the production of drop-in biofuels from biomass and organic wastes. Aqueous slurries are processed in hot-compressed water to produce a high energy density bio-crude. The resulting HTL bio-crude requires upgrading via catalytic hydrotreating and produce fuels resembling gasoline, diesel and kerosene. The technology has been shown to result in high mass, carbon and energy yields to upgraded fuel for a variety of feedstocks such as lignocellulosics, wastes and algae. A major bottleneck of the technology is its demonstration on large-scale continuous reactors.

In the current work a state of the art pilot scale continuous HTL facility with a throughput of up to 100 L/h was used to produce bio-crude. Bio-crude was catalytically hydrotreated in batch reactors to reduce heteroatom content. Different biomasses ranging from lignocellulosics to high protein feedstocks were employed to assess the effect of feedstock on drop-in fuel potential.

Presenter: **Patrick BILLER, Aarhus University, Aarhus, DENMARK**

Presenter's biography:

Patrick got his PhD at the Energy Research Institute, University of Leeds in 2013. After his PhD he obtained a EPSRC fellowship in Leeds. In 2015 he started a post-doc position at Aarhus University, Denmark where he currently works as a Marie Curie Co-fund fellow.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Biller, Aarhus University, DENMARK
J. Yu, Aarhus University, DENMARK
R.B Madsen, Aarhus University, DENMARK
J. Becker, Aarhus University, DENMARK
B.B. Iversen, Aarhus University, DENMARK
I. Johannsen, Aarhus University, DENMARK
M. Glasius, Aarhus University, DENMARK

Session reference: 3AO.3.2
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Online Balancing of a Pilot Scale Fast Pyrolysis Plant

Short introductive summary:

The bioliq® process converts fast growing lignocellulosic biomass into synthetic biofuels. Results and mass balances of the fast pyrolysis demonstration (40 kW) and the pilot (2 MW) plant have been published previously. These mass balances are typically determined for a whole fast pyrolysis experiment of up to several days by integrating the input and output streams over the duration of the experiment and analyzing a representative sample of each stream. By doing so, the data will contain start up and shut down procedures as well as discontinuities during operation, which affect the outcome. It is desirable to understand fast pyrolysis process performance on the basis of continuous operation to put an evaluation of this technology, e. g. in techno-economic studies, on a more reliable basis.

The scope of this study is to analyse online balancing of a fast pyrolysis pilot plant with the aim of evaluating data sensitivity in regard to the reliability of the produced results. The results of this study will allow better understanding of the scientific data basis for future techno-economic studies based on fast pyrolysis technology and hence add to their significance.

Presenter: **Nicole WEIH, Karlsruhe Institute of Technology, Institute of Catalysis Research and Technology, Eggenstein-Leopoldshafen, GERMANY**

Presenter's biography:

Nicole Weih (née Tröger), Dipl-Eng.
Diplom-Engineer for ecology and protection of environment
member of bioliq-team since 2012 at Karlsruhe Institute of Technology – Institute of Catalysis Research and Technology
research activities: fast pyrolysis of biomass
2010-2012 project: BioWaste to liquid

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Weih, Karlsruhe Institute of Technology, GERMANY
A. Funke, Karlsruhe Institute of Technology, GERMANY
C. Pfitzer, Karlsruhe Institute of Technology, GERMANY
A. Niebel, Karlsruhe Institute of Technology, GERMANY
N. Dahmen, Karlsruhe Institute of Technology, GERMANY

Session reference: 3AO.3.3
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Pyrolysis of Residual Biomass in a Thermo-Catalytic Reforming Plant an Experimental Investigation of Sewage Sludge

Short introductive summary:

Producing energy from residue and waste biomass is essential for a sustainable bioenergy supply. An organic waste with certain problematic issues is municipal sewage sludge, which is mainly disposed by landfill, landspreading, and incineration depending on local regulations. The Thermo-Catalytic Reforming (TCR®) is an intermediate pyrolysis and reforming process for the energetic utilization of this kind of waste biomass. The aim herein was to test and characterize the TCR® process and its variable parameters for the feedstock sewage sludge and its products for bioenergy applications. The parameters of the TCR® plant were varied with focus on the gaseous and liquid product quality. Pre-dried sewage sludge was tested in the reactor and the products were analyzed by different methods. The bio-oil produced revealed a high thermal stability during distillation by forming low viscous distillate and a high viscous residue which could be easily liquefied again by heating up. Overall sewage sludge showed a high potential as feedstock for higher quality products like renewable fuel as well as combined heat and power applications.

Presenter: **Johannes NEUMANN, Fraunhofer-Institut UMSICHT, Renewable Energy Dpt., Sulzbach-Rosenberg, GERMANY**

Presenter's biography:

Project Manager at Fraunhofer UMSICHT

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Hornung, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
J. Neumann, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
A. Apfelbacher, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
R. Daschner, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY

Session reference: 3AO.3.4
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Experiences of Pilot Scale Cyclone Pyrolysis

Short introductive summary:

Fast pyrolysis is a promising thermochemical technology for converting biomass to energy, chemicals and fuels. At SP ETC, Sweden, an industrial relevant pyrolysis pilot plant based on an externally heated cyclone reactor has been designed, constructed and operated since 2011. The main purpose of the work was to be able to efficiently pyrolyse biomass according to the ablative cyclone reactor concept in an industrial relevant scale into liquid pyrolysis oil with low inorganic content. The purpose was also to build up a platform that could be used in further pyrolysis research and to build up competence in the pyrolysis area.

Presenter: **Ann-Christine JOHANSSON, RISE ETC AB, Piteå, SWEDEN**

Presenter's biography:

Ann-Christine Johansson is a senior research engineer at RISE Energy Technology Center AB. Johansson is involved in projects related to thermal conversion technologies, such as gasification and pyrolysis, of mainly biomass .

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.-C. Johansson, SP Energy Technology Center, Piteå, SWEDEN
L. Sandström, SP Energy Technology Center, Piteå, SWEDEN
H. Wiinikka, SP Energy Technology Center, Piteå, SWEDEN
O. Öhrman, SP Energy Technology Center, Piteå, SWEDEN

Session reference:	3AO.3.5
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Building Up Local Bioenergy Value Chains Based on Fruit Tree Residues from Pruning and Uprooting Operations: The Boosting Role of Regional Stakeholder Networks

Short introductive summary:

“uP_running” is an EU H2020 project (LCE “Market uptake and emerging sustainable bioenergy) currently in progress whose extended title is “Take-off for sustainable supply of woody biomass from agrarian pruning and plantation removal”). The project goal is to set out the path in developing bioenergy value chains based on fruit tree residues from pruning and uprooting operations. Despite many technical difficulties have been solved in past years and significant improvements from the technological side have greatly improved the feasibility and the economical affordability of this kind of business, still a frustrating immobility is detected and, apart just a few virtuous exceptions, a “wait-and-see” standpoint is generally detected. A “stakeholders’ network” (to be created in each project Demo Region) is the instrument considered the most fruitful to overcome “internal” barriers and promote the building up of a productive sector able to valorize residual feedstock such as pruning/uprooting. Results about the project activities are reported, focused in supporting local supply bioenergy chains and preparing a “Sector Analysis” and a consequent “Action Plan” at regional scale.

Presenter: **Massimo MONTELEONE, University of Foggia, STAR Research Unit - Agriculture Dpt., Foggia, ITALY**

Presenter's biography:

Associate professor in Agronomy at University of Foggia (Italy).
Research topics: crop irrigation, crop water and salt stresses; modelling agro-biological processes; crop ecology; environmental analysis and agro-ecosystem planning; agricultural planning; biomass and bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Monteleone, University of Foggia, Foggia, ITALY

Session reference: 4AV.1.1

Subtopic: 4.1 Market implementation, investments & financing

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Pyrolysis and The Price of Carbon - The Value of Biochar

Short introductive summary:

Pyrolysis systems are a means to produce bioenergy products that can replace fossil fuels as well as produce biochar. Biochar can be used as a soil amendment, where it also has a purpose as carbon sequestration. Although pyrolysis is a promising technology, it has not seen the large scale implementation that one might expect. This might however change if there was economic compensation
for the carbon sequestration service supplied by biochar. The purpose of the present work was to investigate at what carbon (C) price levels pyrolysis systems with combined biochar and heat generation would become an economically feasible option in the Swedish agricultural sector. Furthermore, an objective of the study was to investigate under what conditions the introduction of such a system would actually remain C negative, taking indirect land use change effects into account. The results for the studied hypothetical case studies, indicated that a carbon price of approximately €900 per ton C was necessary if pyrolysis is to be economically viable. Concerning indirect effects, a land use change causing losses more than 120 t CO 2 /ha and year would make the pyrolysis system a net emitter of carbon

Presenter: **Niclas ERICSSON, Swedish University of Agricultural Sciences, Energy and Technology Dpt., Uppsala, SWEDEN**

Presenter's biography:

Researcher working in the field of bioenergy system studies, with a focus on life cycle thinking.
My main area of research has been the inclusion and interpretation of time dependent processes in the climate impact characterisation used in life cycle studies, focusing especially on biogenic carbon.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Ericsson, Swedish University of Agricultural Sciences, Uppsala, SWEDEN
S. Ahlgren, Swedish University of Agricultural Sciences, Uppsala, SWEDEN

Session reference: 4AV.1.2
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

A Generalised Model for the Calculation of Capital and Electricity Production Costs with Special Empahsis on Co-Digestion Biogas Chains in Spain

Short introductive summary:

Production costs are calculated for Reneable Energy Systems (RES) in southern Europe with special focus on capital costs. The concept of Levelized Cost of Electricity (LCOE) is used as this allows comparison of production costs from fossil and renewable alternatives. LCOE calculations are presented for biogas co-digestion installations in Spain, using a generalised model for investment, feedstock production and operation and maintenance (O&M, financing, feedstock transport, taxes and insurances) costs. Biogas and electricity output are derived from installation size, production process, feedstock, load hours and heat utilisation. Installation lifetime costs (including feedstock transport but not its production costs) was defined as 25.5 * e(-0.12MW) . Using this model, LCOE of a hypothetical 0.5 MW installation in Galicia fed with maize straw and cow manure was calculated at €222/MWh which is at the higher end of the values found in literature. A learning curve for biogas installations suggests that investment costs are not expected to decrease in the (near) future. Reducing capital costs by attracting private investments can be an alternative strategy.

Presenter: **Hans LANGEVELD, Biomass Research, Bennekom, THE NETHERLANDS**

Presenter's biography:

Over 25 years of experience in analysing and modeling of sustainable cropping systems, land use practices and renewable energy. Background in agronomy, soil science, communication science and development economics; specialised in sustainable land use and bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.S. Breure, Biomass Research, Wageningen, THE NETHERLANDS
J.W.A. Langeveld, Biomass Research, Wageningen, THE NETHERLANDS
J. Pombo, Universidade da Coruña, Santiago de Compostela, SPAIN

Session reference: 4AV.1.4
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

The Least Desirable Option - Consumers - Attitudes Towards Biomethane as a Raw Material for Green Packaging Solutions

Short introductive summary:

Biomethane production has been growing in many countries around the world in the last years, especially Germany. Apart from using it for producing electricity and heat it can also serve as a renewable raw material in the chemical industry. The intermediary products based on biomethane can be used for producing e.g. plastic packaging material and help consumer goods manufactu-rers to improve the ecological sustainability of their products. In an international survey covering seven countries we have investigated how consumers perceive packaging solutions based on biomethane. Analyzing the results from Germany, the US and France, it turned out that biomethane-based materials are the least desirable option. It seems that consumers are more concerned about the end of the life-cycle, i.e. recycling and disposal, than about the beginning of the life cycle, namely the question if the raw material is renewable or not. Moreover, German consumers are concerned about using land for growing energy crops for biogas. US and French consumers perceive health issues and US consumers also report a feeling of disgust due to the fact that biogas is also produced using manure.

Presenter: **Carsten HERBES, Nuertingen-Geislingen University, ISR Dpt., Nuertingen, GERMANY**

Presenter's biography:

Carsten Herbes is a professor of International Management and Renewable Energy at Nuertingen-Geislingen University (NGU) and former CFO of a bioenergy company. His main research areas are marketing and acceptance of renewable energy, especially biogas.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Herbes, Nuertingen-Geislingen University, Nuertingen, GERMANY
C. Beuthner, Nuertingen-Geislingen University, Nuertingen, GERMANY
I. Ramme, Nuertingen-Geislingen University, Nuertingen, GERMANY

Session reference: 4AV.1.6
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Prospects for Renewable Marine Fuels - The Potential Role of Biofuels

Short introductive summary:

In order to reduce the environmental and climate impact of shipping the introduction of alternative fuels is required. There is a need for more knowledge on alternative marine fuels. For example, what is the potential role of biofuels as marine fuels? The overall aim of this study is to assess the role of renewable fuels in the shipping sector. The study includes (i) a synthesis of knowledge on alternative marine fuels and a mapping of ongoing activities, (ii) an initial assessment of factors influencing the choice of marine fuel, and (iii) a multi-criteria analysis of selected alternative marine fuels including some types of biofuels. At present, liquefied natural gas (LNG) and fossil based methanol are used in a few ships. Initial findings indicate that it is cost-effective to start the phase out of fuel oil from the shipping sector in the next decade and natural gas based fuels (such as LNG and methanol) are the most probable initial substitutes. However, the role of biofuels in the shipping sector depends on the available amount of biomass, the competition for bioenergy from other energy sectors and the potential supply of oil resources and certain technology costs.

Presenter: **Julia HANSSON, IVL Swedish Environmental Research Institute, Climate & Sustainable Cities, Stockholm, SWEDEN**

Presenter's biography:

Dr Julia Hansson at IVL Swedish Environmental Research Institute, Sweden aims to provide perspectives on future bioenergy use and trade and renewable fuels for transport in a European policy context using energy system and policy analysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Hansson, IVL Swedish Environmental Research Institute/Chalmers University of Technology, Stockholm, SWEDEN
S. Brynolf, Chalmers University of Technology, Göteborg, SWEDEN
M. Grahn, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 4AV.1.7
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Techno-Economic Feasibility of Pennisetum X Purpureum (Elephant Grass) Substitution for Charcoal in Haiti Using Monte Carlo Simulation in Net Present Value Analysis

Short introductive summary:

Haiti is extensively deforested, largely due to charcoal production. This deforestation might be mitigated by utilizing renewable fast growing crops for charcoal production rather than using trees, as is the current widespread practice. The present study evaluates the potential for renewable crops to replace trees for charcoal production through logistical and economic assessments. Crops of interest and relevance to Haiti include Pennisetum X Purpureum (elephant grass), which is hardy and fast growing. Techno-economic analysis is conducted to evaluate the logistical and economic feasibility of using elephant grass as a feedstock for charcoal production in Haiti. The objective of the study is to evaluate the potential for a self-sustaining industry based on grass-derived charcoal. Self-sustenance is defined as a positive return on capital investment as determined by net present value (NPV) modeling. Monte Carlo simulation of NPV is performed using @Risk software, and the probabilistic NPV output of plant profitability is presented with consideration given to uncertainty in and sensitivity to model variables.

Presenter: **Erica BELMONT, University of Wyoming, Mechanical Engineering Dpt., Laramie, USA**

Presenter's biography:

Erica Belmont received her B.S. in Chemical Engineering and M.S. in Mechanical Engineering from Tufts University in Medford, MA, and her Ph.D. in Mechanical Engineering from the University of Texas at Austin in Austin, TX. She now lives in Laramie, WY and is a faculty member at the University of WY.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Balogun Mohammed, Department of Mechanical Engineering The University of Wyoming, Laramie, USA
S. Vijlee, Donald P. Shiley School of Engineering The University of Portland, USA
E. Belmont, Department of Mechanical Engineering The University of Wyoming, Laramie, USA

Session reference:	4AV.1.8
Subtopic:	4.1 Market implementation, investments & financing
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Bioplastics: A Good GHG Mitigation Strategy - the Case of Brazil

Short introductive summary:

Replacing fossil based plastics by bioplastics can result in a reduction of greenhouse gas (GHG) emissions. However, an often unforeseen feedback of the production of bioplastics is that they require land, what also can be used to produce food or bioenergy. If both demand for bioenergy and bioplastics is growing this can also result in land use change (LUC) related GHG emissions. The aim of this study is to show whether or not bioplastics can be a good GHG mitigation strategy considering the competition for biomass feedstock and land use change. Brazil is used as a case study because of its established bioeconomy and land resources. We use a linear optimization model (TIMES) to assess the competition between biomass end-use applications (electricity, fuel, plastics) and non-biomass applications (fossil based plastics, but also renewable energy). Preliminary results show us that the demand for bioenergy and bioplastics is increasing. Therefore LUC related emissions are likely to appear.

Presenter: **Tjerk LAP, University of Groningen, Institute for Energy & Environmental Sciences, Groningen, THE NETHERLANDS**

Presenter's biography:

Check

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Lap, University of Groningen, THE NETHERLANDS
A. Koberle, Federal University of Rio de Janeiro, BRAZIL
L. Nogueira, Federal University of Rio de Janeiro, BRAZIL
F. van der Hilst, Utrecht University, THE NETHERLANDS
R. Benders, University of Groningen, THE NETHERLANDS
A. Szklo, Federal University of Rio de Janeiro, BRAZIL
R. Schaeffer, Federal University of Rio de Janeiro, BRAZIL
A. Faaij, University of Groningen, THE NETHERLANDS

Session reference: 4AV.1.9
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

RESOURCE MANAGER-FOOD: Reducing Avoidable Food Losses in Gastronomy

Short introductive summary:

Food losses and food waste originate within the food value chain in agriculture, industry, retail, restaurants and canteens and from consumption in households. Through the food value chain, we draw upon natural resources and consume considerable amounts of them. Therefore, discarded food means negative impact on the environment (e.g. land use, eutrophication, adverse effects on biodiversity, CO2 emissions, etc.). Methods and measures for more sustainability in the food supply chain are demonstrated at the example of the feedback tool called “RESOURCEMANAGER-FOOD” - developed at University of Stuttgart. Its integration in a restaurant kitchen led to a reduction of food waste for more than 80 % due to improved resource management in the kitchen.

Presenter: **Dominik LEVERENZ, University Stuttgart, Institute for Sanitary Engineering, Water Quality and Solid Waste Management, Stuttgart, GERMANY**

Presenter's biography:

PhD student at the ISWA of the University of Stuttgart
Since 2012 involved in several studies and projects dealing with municipal waste management and resource management - especially food waste management. Development of the feedback tool called RESOURCEMANAGER-FOOD.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Leverenz, University of Stuttgart, GERMANY
P. Pilsl, University of Stuttgart, GERMANY
G. Hafner, University of Stuttgart, GERMANY

Session reference: 4AV.1.11
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Agrocycle - A Blueprint and EU Policy-Forming Protocol for the Recycling and Valorisation of Agri-Food Waste

Short introductive summary:

The AgroCycle project will further develop, demonstrate and validate novel processes, practices and products for the sustainable use of agricultural wastes in applications such as fertilisers, bio-polymers and novel chemicals as well as developing technology and policy guidelines for the bioeconomy.

Presenter: **Giuliano GRASSI, Secretary General, European Biomass Industry Association, Brussels, BELGIUM**

Presenter's biography:

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Ward, UCD School, Dublin, IRELAND
C. Burns, NNFCC, York, UNITED KINGDOM
G. Hanley, UCD School, Dublin, IRELAND
A. Salimbeni, EUBIA, Brussels, BELGIUM
G. Grassi, EUBIA, Bruxelles, BELGIUM

Session reference: 4AV.1.12
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

A Fossil Fuel Independent Swedish Transport Sector 2030 - The Role of Industry and District Heating Systems as Hosts for Biofuel Production

Short introductive summary:

Sweden has set ambitious targets for renewable energy in the transport sector, with the aim of being fossil fuel independent in 2030. This will e.g. require large-scale implementation of advanced biofuels from woody biomass. Integration with other parts of the energy system is vital, in order to accomplish efficient use of the limited biomass resources. In this study we apply a geographically explicit energy systems analysis approach, which accounts for local circumstances, to investigate if and how targets for advanced biofuels in Sweden can be met by biofuel production integrated into existing industry or district heating systems.
The results show that domestic woody biomass resources can be used to produce more than 10 TWh of biofuels in integrated new production facilities. The integrated production will allow for high overall efficiency, but will also lead to more complex business situations and higher stress on local biomass resources, in cases where the host sites or adjacent industries already utilise biomass.

Presenter: **Elisabeth WETTERLUND, Luleå University of Technology, Energy Engineering, Div. of Energy Science, Engineering Sciences and Mathematics Dpt., Luleå, SWEDEN**

Presenter's biography:

Assistant Professor in Energy Engineering at Luleå University of Technology (Sweden), as well as Guest Research Scholar at the International Institute for Applied Systems Analysis (Austria). Main research focus is on forest based bioenergy systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Wetterlund, Luleå University of Technology, SWEDEN
K. Pettersson, SP Technical Research Institute of Sweden, Göteborg, SWEDEN

Session reference: 4AV.1.13
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessing the Social, Economic and Environmental Effects of "Integrated Manure Management" as Low-Carbon Transition Pathway in the Livestock Sector in the Netherlands

Short introductive summary:

Our study focusses on low carbon transitions in areas with high livestock densities in the Netherlands. The study assesses the risks and uncertainties in relation to two alternative transition pathways that can be implemented in order to meet climate and other environmental objectives. The following two pathways are considered. 1. Integrated Manure Management; IMM, and Reduction of Livestock; RL). The study is one of the case studies of the EU funded (H2020) project, TRANSrisk (www.transrisk-project.eu) that aims to identify and assess the risks and uncertainties related to implementing low carbon transition pathways in various countries.

Presenter: **Eise SPIJKER, Stichting Joint Implementation Network, Research Dpt., Groningen, THE NETHERLANDS**

Presenter's biography:

Researcher at Joint Implementation Network (JIN) in Groningen (NL). Extensive background in international climate policy, emissions trading, JI and CDM. Advanced knowledge on the economics of bioenergy, energy market policies and -system analysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Spijker, Joint Implementation Network, Groningen, THE NETHERLANDS
A. Anger-Kraavi, Cambridge Econometrics, Cambridge, UNITED KINGDOM

Session reference: 4AV.1.15
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Socio-economic Assessment including Feedstock Supply and Marketability Concept of HTC/HTL-Products

Short introductive summary:

Hydrothermal liquefaction (HTL) and hydrothermal carbonization (HTC) appear to be effective conversion techniques to produce energy dense biofuels and high value biochemicals. Both processes avoid the energy penalty of drying the biomass feedstock by processing the whole wet feedstock in hot compressed water. This work presents a socio-economic assessment and comparison of a HTL and HTC-biorefineries and evaluates the appropriateness of different feedstocks and the marketability concept of different HTC/HTL-products. The whole value chain (cradle-to-gate) is assessed in this study, from the cultivation/collection of feedstocks to the hydrothermal conversion to bioproducts. The results indicate that the production of bioproducts from different feedstock via hydrothermal conversion processes follow economies-of-scale and can have a significant positive social impact especially in rural areas.

Presenter: **Kay SUWELACK, Fraunhofer INT, Euskirchen, GERMANY**

Presenter's biography:

Kay Suwelack is a scientist and deputy head of business unit at the Fraunhofer INT. His research comprises renewable energies, production of platform chemicals from lignocellulose, and life-cycle assessment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Suwelack, Fraunhofer Institute for Technological Trend Analysis INT, Euskirchen, GERMANY
A. Kruse, Conversion Technology and Life Cycle Assessment of Renewable Resources, Institute of Agriculture, Stuttgart, GERMANY
N. Dahmen, Institute for Catalysis Research and Technology, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, GERMANY

Session reference: 4AV.1.16
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessing A Bioeconomy Network from an Integrated Life Cycle Perspective

Short introductive summary:

This work deals with the introduction of a evaluation procedure for bioeconomy networks based on life-cycle-thinking methods, such as Life Cycle Assessment (LCA(, Life Cycle Costing and Social LCA. The proposed methodology is evaluated in a bioeconomy region in Germany.

Presenter: **Alberto BEZAMA, Helmholtz Centre for Environmental Research, Bioenergy Dpt., Leipzig, GERMANY**

Presenter's biography:

Dr. Alberto Bezama leads the working group “Bioeconomy and Biomass Resources” at the Department of Bioenergy. He has worked in the areas of Waste Management, Cleaner Production and Sustainability Management for the past 15 years, and has worked in the bioeconomy field for the past five years.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Bezama, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY
M. Budzinski, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY
J. Hildebrandt, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY
A. Siebert, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY
D. Thrän, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY

Session reference: 4AV.1.21
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Monitoring Material Flows in a Bioeconomy Region

Short introductive summary:

This work presents the development and first results of a multi-criteria approach that allows the integration of technical, ecologic and socio-economic indicators for monitoring the performance of a bioeconomy region. The tool has been tested in a bioeconomy region in Germany, in order to compare a set of its characteristic bio-based products against their reference fossil-based and sector-internal products.

Presenter: **Alberto BEZAMA, Helmholtz Centre for Environmental Research, Bioenergy Dpt., Leipzig, GERMANY**

Presenter's biography:

Dr. Alberto Bezama leads the working group “Bioeconomy and Biomass Resources” at the Department of Bioenergy. He has worked in the areas of Waste Management, Cleaner Production and Sustainability Management for the past 15 years, and has worked in the bioeconomy field for the past five years.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Hildebrandt, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY
D. Thrän, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY
A. Bezama, Helmholtz Centre for Environmental Research - UFZ, Leipzig, GERMANY

Session reference: 4AV.1.22
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Common Goods - A New Concept for Land Management

Short introductive summary:

Natural resources and their services are the basis of human well-being. This project reviewed in this connection, if common goods can contribute to a sustainable resource management, to avoid intraand intergenerational resource conflicts with their institutionalization and regulation.

Presenter: **Alexa LUTZENBERGER, ALRENE, Siek, GERMANY**

Presenter's biography:

Alexa Lutzenberger is working in projects for Renewable Energy, Sustainable Agriculture and Resources. Actual, she is general secretary of the Factor-X-Club and member of the resource commission of the german federal environmental agency and some boards of Advisors. She is head of Alrene.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.K.L. Lutzenberger, ALRENE, Siek, GERMANY
F.L. Lichter, ALRENE, Eisenhüttenstadt, GERMANY
S.H. Holzgreve, ALRENE, Levenhagen, GERMANY

Session reference: 4AV.1.23
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

An Appraisal of the Use of Domestically Grown Feedstock Compared with Imported Feedstock of Biofuel Powered Locomotives: A Case Study of Indian Railways

Short introductive summary:

Indian Railways in investigating the use of biodiesel in its fleet of locomotives. The biodiesel being used in is produced from palm stearin which is imported from Malaysia. This raises the question of whether this is the most economic feedstock to use and whether India should be growing their own feedstock. They buy imported because of the cost, but this is just the monetary cost. What about the true cost? This can include environmental tariffs, lack of control over the quality and the lost economics opportunities. Therefore, an environmental, financial and economic appraisal is needed to ascertain the true difference between imported and domestically grown feedstocks.

Presenter: **Charlotte STEAD, University of Leeds, Pontefract, UNITED KINGDOM**

Presenter's biography:

Charlotte Stead is a PhD researcher in the Bioenergy Centre for Doctoral Training at the University of Leeds. Having a background in economics her thesis is appraising the use of biodiesel for Indian Railways from an environmental and economic perspective.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Stead, University of Leeds, UNITED KINGDOM
Z. Wadud, University of Leeds, UNITED KINGDOM
H. Li, University of Leeds, UNITED KINGDOM
C. Nash, University of Leeds, UNITED KINGDOM

Session reference: 4AV.1.24
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Impact of Alternative Forest Biomass Demand and Supply Scenarios on the Regional Economy in Finland

Short introductive summary:

The study produced new information and a novel method of using the detailed forest management simulations combined with the advanced regional general equilibrium model.

Presenter: **Kalle KARTTUNEN, Lappeenranta University of Technology, School of Energy, Mikkeli, FINLAND**

Presenter's biography:

Dr. Kalle Karttunen has been working as a project researcher in Lappeenranta University of Technology since 2006. He has been leading many research and developing projects concentrating on forest biomassused for energy purposes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Karttunen, Lappeenranta University of Technology, Mikkeli, FINLAND
A. Ahtikoski, Natural Resources Institute Finland, Oulu, FINLAND
H. Salminen, Natural Resources Institute Finland, Rovaniemi, FINLAND
J. Hynynen, Natural Resources Institute Finland, Vantaa, FINLAND
S. Kujala, University of Helsinki, Seinäjoki, FINLAND
H. Törmä, University of Helsinki, Seinäjoki, FINLAND
J. Kinnunen, Statistics and Research Åland, Mariehamn, FINLAND
T. Ranta, Lappeenranta University of Technology, Mikkeli, FINLAND

Session reference: 4AV.1.28
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Integrating Miscanthus into Arable System to Secure Sustainable Feedstock Supply for Lignocellulosic Succinic Acid Production

Short introductive summary:

To secure the Carbon emission mitigation potential, sustainable supply of lignocellulosic feedstocks (LF) is required for succinic acid (SA) production. To estimate the potential availability of LF and environmental impacts associated with their supply, and to explore the potential impacts arising from integrating perennial crops into the arable system, catchment scale scenarios were simulated for a predominantly arable area in England, process-based models were used to estimate the availability and Carbon balance of LF supply from both current arable and a proposed mixed arable-perennial system. The Carbon balance results were further integrated with a 'cradle to grave' life cycle assessment (LCA) to compare the overall GHG emission performance of the final products Polybutylene Succinate (PBS) from different feedstock supply scenarios. Results show that by adapting the mixed feedstock scenario, sustainability benefits can be gained through increasing LF supply, reducing N emissions and increasing C stocks from perennials. LCA results show 30 to 177% GHG emission savings from mixed feedstock scenario, depending on conversion processes and end-of-life assumptions.

Presenter: **Yuanzhi NI, Imperial College, Center for Environmental Policy, London, UNITED KINGDOM**

Presenter's biography:

Yuanzhi Ni is a third year PhD student in Center for Environmental Policy, Imperial College London. Her current research is focused on sustainability assessment of lignocellulosic feedstock supply for European Bio-succinic acid production.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y. Ni, Imperial College, London, UNITED KINGDOM
O. Mwabonje, Imperial College, London, UNITED KINGDOM
G.M. Richter, Rothamsted Research, Harpenden, UNITED KINGDOM
K. Yeung, Imperial College, London, UNITED KINGDOM
A. Qi, Rothamsted Research, Harpenden, UNITED KINGDOM
J. Woods, Imperial College London, London, UNITED KINGDOM
M.K. Patel, University of Geneva, SWITZERLAND

Session reference: 4AV.1.29

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Possibilities of Creating Fossil Free Region - Case South Savo

Short introductive summary:

Aim of this study is to evaluate the how much and where it is possible to reduce the use of fossil fuels in regional level by 2030. Study focuses on reducing the use of light and heavy fuel oil.

Presenter: **Antti KARHUNEN, Lappeenranta University of Technology, LUT Energy, Lappeenranta, FINLAND**

Presenter's biography:

Antti Karhunen, M. Sc. (eng.), works as a projects researcher at Lappeenranta University of Technology. His main research subjects are biomass availability and utilization, and analyzes concerning regional and national energy supply.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Karhunen, Lappeenranta University of Technology, FINLAND
M. Laihanen, Lappeenranta University of Technology, FINLAND
T. Ranta, Lappeenranta University of Technology, FINLAND

Session reference: 4AV.1.32
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Comparative Analyses of Current Biobased Economy Policies and Strategic India-EU Partnership

Short introductive summary:

Both India and Europe still depend heavily on fossil fuels and both face the controversial challenging trade-off between the food supply on the one side, and biomass production on the other. The present studies show that both regions share a similar idealistic view when it comes to sustainability – both striving towards a low-carbon economy with emphasis on “green” energy. The government policy on bioenergy and bio-based products plays an important role in the development and transition towards a bio-based economy in both the regions. The significance of the cooperation will be influenced by policies affecting multiple sectors such as agriculture, resources, research, industry and trade. The study will help in identifying relevant policies and quantifying their specific impacts on market including its effects on bilateral sustainability relationship.

Presenter: **Neeta SHARMA, ENEA Research Centre, Sustainable Production and Territorial Systems,Biotechnology and Agro-Industry Division, Matera, ITALY**

Presenter's biography:

Dr. Sharma has been associated with ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) for the last more than two decades. At present she has been working as the Responsible for National/International Projects at the Dip. BIOAG-SSPT.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Sharma, ENEA C.R, Matera, ITALY
D. Claps, ENEA C.R., Matera, ITALY
P. Joshi, UCOST, DST, Govt. of India, Uttrakhand, INDIA

Session reference: 4AV.1.36
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Regional Added Value of Refining Forest Biomass for Energy Purposes in Finland

Short introductive summary:

The economic advantages brought by the forest-based bioeconomy appear to be positive, however, those may be distributed unevenly in the society depending on the forest resources from regional areas and demand potential by user sides. The aim of the study was to compare the regional significance of small diameter pulpwood from young birch dominated stands to traditional chemical pulping outside of region with the hypothetical refining investment in processing plant of forest biomass for energy purposes at the region. The financial investments in the forest sector have been missing at the study area of South Savo in recent years, although it comprises more than 10 percent of total wood supply in Finland. Following scenarios were studied: 1. Traditional industrial use; young birch pulpwood is transported to neighborhood regions for chemical pulping (BAU), 2. Traditional energy use; young birch biomass goes to traditional CHP plant at the region, 3. Novel refining process; young birch biomass is used for the biorefining process at the region. These alternative scenarios were compared with each other in the added value point of view to compare cash flow influences at the region.

Presenter: **Jarno FÖHR, Lappeenranta University of Technology, Laboratory of Bioenergy, Mikkeli, FINLAND**

Presenter's biography:

Jarno Föhr is a project researcher in the bioenergy research group at Lappeenranta University of Technology. His purpose is to produce new information about biomass handling and transportation methods and to analyze biomass quality within supply chains.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Föhr, Lappeenranta University of Technology, Mikkeli, FINLAND
K. Karttunen, Lappeenranta University of Technology, Mikkeli, FINLAND
R. KC, Lappeenranta University of Technology, Mikkeli, FINLAND
T. Ranta, Lappeenranta University of Technology, Mikkeli, FINLAND

Session reference: 4AV.1.38
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

How are the EU Member States Contributing to the 27% Target for EU's Renewable Energy Consumption; the Role of Woody Biomass.

Short introductive summary:

The study was done. Poster and conference paper will presents the resuls. They are also in http://www.sciencedirect.com/science/article/pii/S0961953416303063

Presenter: **Svetlana PROSKURINA, Lappeenranta University of Technology, Laboratory of Sustainable Energy Systems, Lappeenranta, FINLAND**

Presenter's biography:

Svetlana Proskurinais a PhD student of Laboratory of Sustainable Energy Systems, Lappeenranta University of Technology, Finland. Research focuses the international trade of biomass and bioenergy products, which will continue to have a significant impact on the bioenergy development in the world. Wood pellets and other biofuels, which are made through gasification, torrefaction and pyrolysisand its markets and applications.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Proskurina, Lappeenranta University of Technology, Lappeenranta, FINLAND
R. Sikkema, European Commission - Joint Research Centre (EC-JRC), Directorate Sustainable Resources, Bio-economy, Ispra, ITALY
J. Heinimö, Mikkeli Development Miksei Ltd, Mikkeli, FINLAND
E. Vakkilainen, Lappeenranta University of Technology, Lappeenranta, FINLAND

Session reference: 4AV.1.42
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biomass Heat Scenarios in Germany

Short introductive summary:

Purpose of this work is to define future heat scenarios in Germany, and thus to describe possible future developments in the heat sector, in order to support decision making. Five scenarios have been developed with the use of a scenario planning method. These resulting scenarios will be implemented in a simulation model for Germany.

Presenter: **Katalin Nora SZARKA, DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt., Leipzig, GERMANY**

Presenter's biography:

Ms Szarka is an environmental engineer, Holding a PhD in the subject of modelling of regional energy systems. She has been working in Austria, Chile and currently leading a working Group in Germany in the subjects of Integration of biomass into the energy system.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Szarka, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
D. Thrän, DBFZ-German Biomass Research Centre, Leipzig, GERMANY

Session reference: 4AV.1.43

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Sweet Energy -Bioenergy Integration Pathways from Sugarcane Residues in South Africa

Short introductive summary:

This research investigated sustainability challenges of integrating bioenergy pathways into the South African sugar sector by using cane residues. Results from a stakeholder engagement process showed that the use of cane residues could make a valuable contribution to waste management and energy provision at the same time. Nonetheless, such a transition presents several practical, economic, political and societal challenges, which must be addressed to integrate the bioenergy pathway into existing cane production in a sustainable manner.

Presenter: **Mirjam ROEDER, University of Manchester, Manchester, UNITED KINGDOM**

Presenter's biography:

Mirjam Röder is a Research Fellow at the Tyndall Centre for Climate Change Research at The University of Manchester. Her research interests focus on bioenergy and climate change impacts and related enviromental and sustainability aspects, global challenges and development of bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Roeder, Univeristy of Manchester, UNITED KINGDOM
N. Stolz, RCL Foods Sugar & Milling (Pty) Ltd, Malalane, SOUTH AFRICA
P. Thornley, Univeristy of Manchester, UNITED KINGDOM

Session reference: 4AV.1.44

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessing the Optimal Mix of Bioenergy Feedstock In Europe: A Spatial Explicit Approach

Short introductive summary:

A geographic explicit techno-economic model, BeWhere (www.iiasa.ac.at/bewhere), has been developed at the European scale (Europe 28, the Balkans countries, Turkey, Moldavia and Ukraine) at a 40km grid size, to assess the potential of bioenergy from non-food feedstock. Based on the minimization of the supply chain from feedstock collection to the final energy product distribution, the model identifies the optimal bioenergy production plants in terms of spatial location, technology and capacity. The feedstock of interests are woody biomass (divided into eight types from conifers and non-conifers) and five different crop residuals. For each type of feedstock, one or multiple technologies can be applied for either heat, electricity or biofuel production.
The model is run for different policy tools such as carbon cost, biofuel support, or subsidies, and the optimal mix of technologies and biomass needed is optimized to reach a production cost competitive against the actual reference system which is fossil fuel based. The preliminary results show that large scale biofuel production based on woody biomass plants are mainly located in the northern part of Europe at high carbon t

Presenter: **Sylvain LEDUC, IIASA, Ecosystems Services and Management, Laxenburg, AUSTRIA**

Presenter's biography:

Dr. S. Leduc is a research scholar at the International Institute for Applied Systems Analysis, IIASA, Austria. He is the main developer and coordinator of the BeWhere model, an optimization tool to identify location of renewable energy systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Leduc, IIASA, Laxenburg, AUSTRIA
P. Patriyio, IIASA, Laxenburg, AUSTRIA
S. Mesfun, IIASA, Laxenburg, AUSTRIA

Session reference: 4AV.1.46
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

IEA Bioenergy Technology Collaboration Programme

Short introductive summary:

IEA Bioenergy is an international collaboration platform with a mission to increase the knowledge and understanding of bioenergy systems in order to facilitate the commercialisation and market deployment of environmentally sound, socially acceptable, and cost-competitive bioenergy systems and technologies, and to advise policy and industrial decision makers accordingly.

Presenter: **Kees KWANT, Netherlands Enterprise Agency, Ministry of Economic Affairs, RVO, Utrecht, THE NETHERLANDS**

Presenter's biography:

Kees W. Kwant has a background in Fluid Dynamics and Technology Development from the Technical University Twente.
He worked at industry DSM to develop fermentation processes and was programme manager of the national solar energy programme of the Netherlands.
He has extensive experience in developing and implementation of bioenergy in the Netherlands and abroad, develop sustainability and chaired the working group on the GHG calculation methodology. At present he is Liaison Biobased Economy and the linking pin between research and implementation in the framework of the Biobased and Renewable Energy Programs of RVO in the Netherlands. He participates in the EU programs: www.biomasspolicies.eu and Bioenergy for Business. He holds the Chair of the IEA Bioenergy Implementing Agreeement and is Executive member and for the Netherlands www.ieabioenergy.com Winner of the Dutch Bioenergy price 2009 of the Platform Bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Kwant, RVO.nl, Utrecht, THE NETHERLANDS
L. Pelkmans, Caprea, Mol, BELGIUM
P Buckley, ODB Technologies, Dublin, IRELAND

Session reference: 4AV.1.47
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Development of Forest Chips Use and Price in the Nordic Countries: A Comparative Analysis

Short introductive summary:

The role of bioenergy and forest biomass in energy production varies in the Nordic Countries depending on the existing energy infrastructure and support schemes for renewable energy. Differences stem from variations in natural resources and from the success of national climate and energy policies, such as feed-in tariffs, grants, tax credits and quota systems. This has also effect on the role of the main bioenergy applications as heating/cooling, electricity generation and transport fuels in each country. Norway is famous for hydro (90.1% share of RES in 2014) and Denmark with wind production (35.8% share of RES in 2014), whereas Finland and Sweden use lot of biomass for heating (51.9% and 68.1% in 2014) and have high share of biofuels in transportation (21.6% and 19.2% in 2014). In total, 22.0 Mtoe bioenergy was used in the Nordic Countries in 2014, which was 25% of the final energy consumption, 87.5 Mtoe. Especially in Finland and Sweden the share of bioenergy was high (36% and 33%) compared to Denmark and Norway (14% and 6%). The Nordic Countries represented for 17% of the total use of bioenergy in EU-28, 123.6 Mtoe.

Presenter: **Tapio RANTA, Lappeenranta University of Technology, School of Energy Systems, Lappeenranta, FINLAND**

Presenter's biography:

Tapio Ranta holds a professorship in Bioenergy Economics and has been working in Lappeenranta University of Technology at the School of Energy Systems since 2003. He has specialized in forest biomass supply systems and logistics, biomass markets, and trade.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Ranta, Lappeenranta University of Technology, Lappeenranta, FINLAND
O. Olsson, Stockholm Environment Institute, SWEDEN
W. Stelte, Danish Technological Institute, Taastrup, DENMARK
E. Tromborg, Norwegian University of Life Sciences, Oslo, NORWAY

Session reference: 4AV.1.48
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biomass Supply for Energy Use in the European Union

Short introductive summary:

The European Commission has set a long-term goal to develop a competitive, resource efficient and low carbon economy by 2050. Under existing renewable energy polices, biomass plays a significant role in the achievements of renewable energy 2020 targets in the European Union. Currently the contribution of biomass in the achievements of these targets reached more than 103 Mtoe in bioelectricity, bioheat and biofuel production, with almost 60% of the final renewable energy mix in the European Union. Final consumption of biomass for electricity and heating/cooling purposes alone will increase to 110.5 Mtoe in 2020 representing more than 45% of final renewable energy mix. The total biomass supplied in the European Union in 2014 for electricity and heating/cooling and biofuels production reached almost 130 Mtoe as primary energy expected to reach 180 Mtoe in 2020.

Presenter: **Manjola BANJA, European Commission, JRC, Renewable and Energy Efficiency, Ispra, ITALY**

Presenter's biography:

Manjola Banja studied Chemical Engineering and obtained her PhD in Atmospheric Physics at Faculty of Natural Sciences, Tirana University. From 1990-2003 she worked as a scientific researcher in the field of air and water pollution at Hydrometeorological Institute, Academy of Sciences of Albania. From year 2003 till 2008 she was Deputy Director of Hydrometeorlogical Institute, Academy of Sciences of Albania being coordinator of many national projects in the field of hydrometeorology, air and water pollution. In 2011 she starts working as Seconded National Expert at Renewable Energy Unit of Institute for Energy and Transport, Joint Research Centre, European Commission. Since 2014 she is a Scientific/Technical Officer working at Energy Efficiency and Renewables Unit, Directorate for Energy, Transport and Climate, JRC, EC. She is working on monitoring of European Union progress in the development of renewable energy according to Renewable Energy Directive. She is involved in the JRC 'Scientific Support to the Danube Strategy' initiative, Bioenergy nexus cluster providing scientific analysis on bioenergy deployment in this region. She is author and co-author of peer review papers as well as papers published in proceedings of national and international conferences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Banja, DIR.C, C.2, EC, JRC, Ispra, ITALY
N. Scarlat, DIR.C, C.2, EC, JRC, Ispra, ITALY
R. Sikkema, DIR.D, D.1, EC, JRC, Ispra, ITALY
J.F Dallemand, DIR.C, C.2, EC, JRC, Ispra, ITALY

Session reference: 4AV.1.50
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Overview of Advanced Biofuels Technologies: Current Status and Challenges

Short introductive summary:

In the last decades, the EU has consistently supported research and development (R&D) in the sector and there also have been Member States (MS) initiatives and significant investments globally. Consequently, advanced biofuels are expected to play an increasing role in the coming years. Their supply technologies comprise a range of thermochemical and biochemical conversion pathways with varying maturity levels, including for example direct conversion of sugar and/or alcohol to paraffinic hydrocarbon biofuels, and conversion of biodegradable substrates to gaseous fuels through microbes and other microorganisms, among others.
The aim of this study is to provide an up-to-date overview of the status of advanced biofuels conversion technologies, research efforts and research needs. We focus on technologies characterized by pilot, demonstration or pre-commercial readiness levels. The assessment was primarily based on an in-depth review of major EU funded R&D initiatives, international projects, reports and patent filings.

Presenter: **Adrian O'CONNELL, European Commission, JRC, Ispra, ITALY**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Rocca, European Commission, Joint Research Centre (JRC), Petten, THE NETHERLANDS
M. Padella, European Commission, Joint Research Centre (JRC), Ispra, ITALY
A. O'Connell, European Commission, Joint Research Centre (JRC), Ispra, ITALY
J. Giuntoli, European Commission, Joint Research Centre (JRC), Petten, ITALY
M. Kousoulidou, European Commission, Joint Research Centre (JRC), Ispra, ITALY
L. Marelli, European Commission, Joint Research Centre (JRC), Ispra, ITALY

Session reference: 4AV.1.51
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Establishing Regional Bioenergy Concepts in Southeast Europe to Speed-Up the Market Uptake of Sustainable Bioenergy

Short introductive summary:

Many Southeast European countries have high biomass potentials, but they are often not or inefficiently used for local energy supply and regional economic development. In order to facilitate the market uptake of sustainable bioenergy, the development and implementation of regional bioenergy concepts such as bioenergy villages are needed. A bioenergy village is a village, municipality, settlement or community which produces and uses most of its energy demand from local biomass sources as well as from other renewable energy sources. The objective of the BioVill project is to support the development of regional bioenergy concepts and the establishment of bioenergy villages in Croatia, Macedonia, Romania, Serbia and Slovenia. This will be achieved by identifying suitable biomass value chains according to local and regional needs and transferring existing experiences gained in Austria, Germany and other European countries to the South-Eastern European partners. Thereby the market uptake of domestic bioenergy supply chains will be increased and the role of locally produced biomass as a main source of energy supply and added value for the local and regional economy will be strengthened.

Presenter: **Jens ADLER, GIZ- German Development Cooperation, Landesbüro Sachsen, Dresden, GERMANY**

Presenter's biography:

1995: graduated as Agricultural Economist (M.Sc.) at Martin Luther University Halle-Wittenberg/Germany
1995-1999: Research fellow at the Institute of Agricultural Development in Central and Eastern Europe (IAMO) Halle/Saale
1999 up to now: Project manager at GIZ

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Adler, DBFZ-German Biomass Research Centre, Dresden, GERMANY
D. Rutz, WIP, Munich, GERMANY
K. Stein, Klimaschutz- und Energieagentur Baden-Württemberg, Karlsruhe, GERMANY
M. Höher, Austrian Energy Agency, Vienna, AUSTRIA
M. Krizmaniæ, Regional Energy Agency of North-West, Zagreb, CROATIA
N. Markovska, International Centre for Sustainable Development of Energy, Water and Environment Systems, REPUBLIC OF MACEDONIA
D.-A. Cosnita, Green Energy Agency, ROMANIA
N. Krajnc, Standing Conference of Towns and Municipalities, REPUBLIC OF SERBIA
M. Gluscevic, Slovenian Forestry Institute, SLOVENIA REPUBLIC

Session reference: 4AV.1.52
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Well to Wheel Energy Analysis of Biomass Pellets Made from Agro Waste to Generate- 'village Level Entrepreneurship' in India

Short introductive summary:

In an Agro based country like India 500 million tons of agro waste is generated annually out of which around 70% is used for domestic purposes such as fodder and fertilizer in farms. But around To utilise the humongous amount of agro waste in India in an efficient way and a step towards developing a robust biomass market in India an innovative business model 'Village Level Entrepreneurship' was devised and implemented.

'Village level entrepreneurship' gives an opportunity to farmers to become an entrepreneur. It entails three main elements- farmers, eco pellet maker and industries .Farmer buys eco pellet maker (machine which can process agro waste to produce pellets) from an industry with a buy back guarantee of 100% on pellets produced from the machine. Industries will use these pellets for their heating applications instead of using conventional fuel. In this process farmers will generate an additional assured income; industries will reduce carbon emissions, save on fuel bills as pellets are cheaper than fossil fuels. Industries will also be eligible for trading carbon credits .This win-win situation is a step towards inclusive growth of all the stake holders

Presenter: **Miheer VAIDYA, Shree Ganesh Press-N-Coat, Non Conventional Energy Dpt., Aurangabad, INDIA**

Presenter's biography:

Entrepreneur - Working on bio economy business models
patent owner of pellet making machine in India
International paper Published in Venice Symposium 2016
Msc Sust. Energy technology , Delft University
Bachelors in Mechanical Engineering

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Vaidya, Shree Ganesh Pres-n-Coat Pvt. Ltd., Aurangabad, INDIA
R. Vaidya, Shree Ganesh Pres-n-Coat Pvt. Ltd, Aurangabad, INDIA
S. Vaidya, MIT college of engineering, Aurangabad, INDIA

Session reference: 4AV.1.54
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Value Reflective Design Space, an Approach for Incorporating Sustainability in Early Stages of Biorefinery Design

Short introductive summary:

Sustainable development has become a sought value in our society. However, the meaning of sustainability and how it should be operationalized is a complex issue that depends on subjective beliefs and values. In order to advance towards sustainable biorefineries, we propose an approach for considering stakeholder’s values and perspectives for setting the design space of
biorefinery projects. A biojet fuel production case in the Brazilian states of Minas Gerais and Sao Paulo is used to develop the approach based on elicited norms and values of stakeholders, which include food and energy security, efficiency, and distributive justice. Design propositions that consider the interaction between biorefinery systems and the elicited values are used to suggest a design space boundary. These propositions are indicative, allowing for deliberation during their implementation. Thus, with this approach the design team can address the interaction between biorefinery systems and the socioeconomic and environmental context around them.

Presenter: **Mar PALMEROS PARADA, Delft University of Technology, Biotechnology Dpt., The Hague, THE NETHERLANDS**

Presenter's biography:

Mar Palmeros Parada is doing her PhD at the Delft University of Technology. She decided to embark on an academic adventure for sustainability after having worked as Process Engineer for bio-based systems. She's enthusiastic about creating bridges for the social and natural sciences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Palmeros Parada, TU Delft, Delft, THE NETHERLANDS
L. Asveld, TU Delft, Delft, THE NETHERLANDS
P. Ossewijer, TU Delft, Delft, THE NETHERLANDS
J.A. Posada Duque, TU Delft, Delft, THE NETHERLANDS

Session reference: 4AV.1.55
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Environmental Education Related to Municipal Solid Waste at ABC Region (Brazil)

Short introductive summary:

The proper disposal of municipal solid waste is now one of the biggest challenges faced by the Brazilian authorities. Whereas waste is a biomass, there are different methods that allow a provision combined with treatment and energy use, minimizing its negative impacts on the environment. However, one of the major difficulties in the implementation of new technologies for treatment is in the public awareness of the correct way to deal with waste. This work aimed to enhance environmental education related to municipal solid waste (MSW) towards the principles of the National Policy on Solid Waste - PNRS (Law No. 12,305 / 10) of Brazil. The target audience was diverse, consisting of: the Federal University of ABC community (teachers, students and administrative staff) and community in the ABC region (high school teachers, general public, garbage collectors and members of cooperatives).

Presenter: **H. V. MARCELO, Universidade Federal da Integração Latino-Americana, Foz do Iguaçu, BRAZIL**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.T.C.L. Toneli, UFABC, Santo André, BRAZIL
H.V. Marcelo, UFABC, Santo André, BRAZIL
G. Martins, UFABC, Santo André, BRAZIL
G.C. Antonio, UFABC, Santo André, BRAZIL

Session reference: 4AV.1.56
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

IP Strategies in the Global Bio-based Marketplace

Short introductive summary:

Global competition for clean and sustainable processes using renewable resources as raw material drives many companies to biotech routes. European and U.S. companies alone contribute more then €2.5 trillion annually to the global bio-economy and employ nearly 30 million people. Patents play a key role supporting the companies operating in these regions.
As the global bio-based economy grows, so should your plan for global IP protection in key markets. But much is in flux. US IP has experienced significant upheaval following the America Invents Act (AIA). Any company operating in Europe must be considering the impact of the Unified Patent system when tailoring its patent strategy for Europe. Brazil, once criticized for lax intellectual property rights protection, has been stepping up implementation and enforcement. Indeed, in December 2016, the Brazilian Patent Office established a fast track examination of ‘green inventions’. And some global indexes indicate that the trend of IP creation is shifting toward Asia. This talk provides key considerations for navigating global IP markets with a goal of maximizing your return on IP investment.

Presenter: **Deborah STERLING, Sterne, Kessler, Goldstein & Fox, Washington DC, USA**

Presenter's biography:

Dr. Sterling is a Director in the Biotechnology/Chemical Group. Her practice is focused in the biotechnology and pharmaceutical industries, where she is involved in all areas of patent procurement, exploitation and enforcement.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Frueauf, Sterne, Kessler, Goldstein & Fox, Washington D.C., USA

Session reference: 4AV.1.57

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Co-Gasification of Black Liquor and Pyrolysis Liquids for Biofuel Production - Evaluation of Economic Viability from a National Systems Perspective

Short introductive summary:

Catalytic co-gasification of black liquor (BL) and pyrolysis liquids (PL) with down-stream biofuel synthesis has been demonstrated in experimental and pilot scale. In this study we apply a national systems analysis approach to evaluate the economic viability of large-scale methanol production via BL/PL co-gasification, for the case of Sweden. Focus is on trade-offs related to (i) high resource efficiency of biofuel production from BL only vs. economies of scale of PL/BL co-gasification; and (ii) centralized vs. decentralized upgrading of biomass to PL.

The results show that BL/PL co-gasification results in lower specific investment requirement but higher specific biomass demand compared to pure BLG, for a given biofuel production volume. Centralized PL production is in general preferred at lower biofuel targets, while also decentralized intermediate biomass upgrading can be beneficial at very high biofuel production levels. Catalytic BL/PL co-gasification enables resource efficient high-volume biofuel production from a limited amount of BL feedstock, which results in fewer pulp mills needing to be upgraded to biofuel production to meet a given biofuel production target.

Presenter: **Jonas ZETTERHOLM, Luleå University of Technology, Energy Science/Energy Engineering Dpt., Luleå, SWEDEN**

Presenter's biography:

PhD-student at the subject of energy engineering at Luleå University of Technology. My research is centred around biorefinery adoption and analysis of biorefinery technologies from a national systems perspective.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Zetterholm, Luleå Univerisity of Technology, SWEDEN
E. Wetterlund, Luleå Univerisity of Technology, SWEDEN
K Pettersson, SP Technical Research Institute of Sweden, Gothenburg, SWEDEN
J. Lundgren, Luleå Univerisity of Technology, SWEDEN

Session reference: 4AV.1.58
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Smart Regional Planning: Unlocking Innovative Resource Use and Economic Competitiveness- A Look at Biomass Energy Infrastructure Provision at Local Municipal Scale in Ethekwini and Ilembe, South Africa

Short introductive summary:

The sustainable generation and use of innovative energy alternatives continues to be the contested dominant discourse for local municipalities and communities. Key objectives for regional development planning are the need to support economic competitiveness, territorial cohesion and sustainability. In the global context of climate change, dwindling and increasing costs of fossil fuels, growing urban populations and affordability challenges, unlocking innovative energy infrastructure at a regional scale has the potential to support competitive and affordable energy supply. The aim of the paper is to use regional planning concepts and tools to redefine traditional views on resource use in infrastructure provision with specific focus on biomass energy infrastructure.

Presenter: **Liesel BEIRES, CSIR, Energy Centre, Durban, SOUTH AFRICA**

Presenter's biography:

Liesel Beires has been employed as a Macro Energy Economist in the CSIR's Energy Initiative since March 2016. Her role is to build the energy economics and policy research agenda within the CSIR. Her current projects involve developing a sustainable energy masterplan for one of the large munic

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Beires, CSIR, Durban, SOUTH AFRICA
G.M. Lincoln, Durban University of Technology, Durban, SOUTH AFRICA

Session reference: 4AV.1.59
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Sectorial Indicators for the Monitoring of the European Bioeconomy Strategy

Short introductive summary:

This study has been conducted by the European Commission Joint Research Center (JRC) it connects investigation on the quantification of socio-economic indicators and on estimation of job multipliers in EU MS and Bioeconomy sub-sectors. A Member State typology can be derived from these indicators in order to highlight the interest of differentiated Bioeconomy policy approaches according to Member States'characteristics.

Presenter: **Tévécia RONZON, European Commission, JRC, JRC.D.4 Economics of Agriculture, Seville, SPAIN**

Presenter's biography:

Tévécia Ronzon is doing research on the quantification of physical and socio-economic Bioeconomy-related indicators in the EU Member States at the European Commission, Joint Research Centre (Seville).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Ronzon, European Commission Joint Research Center (JRC), Seville, SPAIN
A. Mainar Causape, European Commission Joint Research Center (JRC), Seville, SPAIN
R. M'barek, European Commission Joint Research Center (JRC), Seville, SPAIN
E. Ferrari, European Commission Joint Research Center (JRC), Seville, SPAIN

Session reference:	4AV.1.61
Subtopic:	4.4 Resource efficient bioeconomy and social opportunities
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

New And Emerging Trends in Flocculants from Cellulosic Biomass in a Colombian District.

Short introductive summary:

Our main purpose was to develop a simple process for the chemical modification of cellulose nanofibrils obtained from agricultural residues from a Colombian district, through different substitution and modification reactions. The modified products were tested against kaolin under laboratory conditions vis-a-vis polyacrylamide based synthetic flocculant. The anionic derivatives of dialdehyde cellulose flocculant (ADACs) was produced by chemical modification of cellulose obtained from agricultural residues, and represents many advantages: natural, renewable, non-toxic and biodegradable. The effectiveness of a combined coagulation-flocculation treatment based on alum and soluble or nanoparticular anionic derivatives of dialdehyde cellulose, ADAC, was evaluated by studying the removal of colloidal material in a model suspension containing kaolin.

Presenter: **Oscar MEDINA, Universidad Pedagógica Y Tecnológica de Colombia, Chemistry Dpt., Tunja, COLOMBIA**

Presenter's biography:

I have been Physical-chemistry teacher for more than 30 years and during the last 12 years I have promoted and developed research projects in biomass and bioenergy. Our main goal is to sintetize new cationic or anionic flocculants from biomass produced from industrial processess.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O.J. Meedina, Universidad Pedagógica Y Tecnológica de Colombia, Tunja, COLOMBIA
L.M. Moreno, Universidad Pedagógica Y Tecnológica de Colombia, Tunja, COLOMBIA

Session reference: 4AV.1.63
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Jatropha Curcas Production Cost Analysis and Sustainability in Egypt

Short introductive summary:

JatroMed (www.jatromed.aua.gr) is a 5-year demonstration project aiming to reinforce and upgrade the natural and socioeconomic conditions of depressed rural areas of North African countries. Four Jatropha curcas L. genotypes collected from Mexico (non-toxic), Brazil and two from India have been established in a 4-ha demonstration field in Egypt (Borg El Arab, Alexandria district) in order to introduce this crop and the profits from its cultivation to local farmers and population. The seed yield taken for the economic analysis starts from 0.5 ton/ha and reaches 3.5 ton/ha after the 6th year of cultivation. Considering a jatropha seed selling price equal to 300 €/ton results in an annual income of about 900 €/ha/year for local, small farms. Careful examination is needed for the sustainable establishment of the crop.

Presenter: **Eleni KOUKOUNA, Agricultural University of Athens, Crop Science Dpt., Athens, GREECE**

Presenter's biography:

I have a background in supply chain and industrial management, with a Master's degree in Industrial Ecology. I have specialized myself on Life Cycle Assessment (LCA) of crops and bioenergy and I am currently working as a data analyst and consultant on the agri-food sector.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Koukouna, Agricultural University of Athens, GREECE
G. Kosmadakis, Agricultural University of Athens, GREECE
ES.. Ragkousi, Agricultural University of Athens, GREECE
M.A. Stoupas, Agricultural University of Athens, GREECE
N. Robolakis, Agricultural University of Athens, GREECE
E.G. Papazoglou, Agricultural University of Athens, GREECE

Session reference: 4AV.1.65
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

A Roadmap for Poplar and Willow to Provide Environmental Services and Produce Renewable Fuels in the United States

Short introductive summary:

Poplar (Populus spp.) and willow (Salix spp.) are fast growing trees that can be used for a variety of purposes including biomass for bioenergy. Recent research in the United States (US) has focused on growing these trees as short rotation woody crops to provide biomass for renewable fuels and bio-based chemicals and products; however, domestic bioenergy markets have been inconsistent. In April 2016, a small National Working Forum was held in Portland, OR, USA to discuss how to bring together the environmental uses of poplar and willow with the production of biomass for fuel. This paper will provide a summary of information and recommendations derived from the forum including: 1) benefits, both environmental and otherwise, of growing poplar and willow and opportunities for using the biomass from these plantings 2) barriers to this new endeavor and 3) solutions to link biomass from poplar and willow grown for environmental applications to bioenergy markets.

Presenter: **Leslie BOBY, Southern Regional Extension Forestry, College of Agriculture and Environmental Sciences, Athens, USA**

Presenter's biography:

Leslie Boby works as a forestry Extension Associate in the southern region of the United States, for a 13-state region. Her primary areas of work are Extension in bioenergy, forest economics and climate change. She holds a Masters of Science in Forest Ecology from the University of Florida.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Boby, Southern Regional Extension Forestry, Athens, GA, USA
P. Townsend, Washington State University, Seattle, WA, USA
T. Miller, City of Springfield, Springfield, OR, USA
N. Haider, Washington State University, Seattle, WA, USA
J. Heavey, Syracuse University, Syracuse, NY, USA
T. Volk, Syracuse University, Syracuse, NY, USA

Session reference: 4AV.1.66
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Market and Carbon Sequestration Impacts of Wood-based Biofuel Production

Short introductive summary:

An increasing interest in reviving the timber industry in the most forested state in the US, Maine, motivates studies to asses the economic viability and environmental integrity of potential developments in the field. Investors in Maine already have plans to rebuild obsolete paper mills into bio-refineries for wood-based bio-fuel production. This study presents an integrated market model and forest ecosystem assessment to help develop and inform policy on how to create an economically and environmentally sustainable renewable diesel industry in Maine. Preliminary results suggest that Maine's mostly naturally regenerating forests could supply nearly 4 million dry metric tons of biomass per year to approximately 10 medium-sized bio-refineries, resulting in an annual production of about 100 million gallons of 'drop-in' renewable diesel. We also find that while Maine's forest carbon stocks are reduced slightly in the initial years of the expansion, market signals encourage improved forest management and resource utilization, and thus could increase carbon stocks over the long-run.

Presenter: **Ariel LISTO ARGUL, University of Maine, School of Economics Dpt., Orono, USA**

Presenter's biography:

Graduate Research Assistant at The University of Maine.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.A. Listo, University of Maine, Orono, USA
A.J. Daigneault, University of Maine, Orono, USA

Session reference: 4AV.1.67

Subtopic: 4.1 Market implementation, investments & financing

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Innovative Biomass Conversion in Africa

Short introductive summary:

Transforming the African agroprocessing sector so that it effectively adds value to the primary production and converts waste to valuable products in an environmentally friendly manner will be central in improving agricultural productivity in Africa. A dynamic, resource efficient agroprocessing sector is also important for creating new jobs and raising profitability for farmers and agribusinesses in the region. A transformation of the African agro and bioprocessing sector will require conducive policy regimes, investments, functional business models, innovation and technology adoption.

The purpose of this paper is to describe a selection of agroprocessing technology cases in East Africa and their corresponding emerging innovation systems, On the basis of these technological innovation systems, the paper will identify barriers and enabling conditions for developing and adopting agroprocessing innovations in east Africa. Three BioInnovate technological innovation systems are analysed in this paper with the focus on agrowaste conversion(banana, tannery and slaughterhouse waste) in Tanzania, Ethiopia and Uganda.

Presenter: **Ivar VIRGIN, Stockholm Environment Institute, Resources and Develpment Dpt., Stockholm, SWEDEN**

Presenter's biography:

Ivar Virgin, Senior Researcher at the Stockholm Environment Institute (SEI) is one of the main architects and initiators of the two largest bioscience innovation programs in Africa, the BIO-EARN and BioInnovate. He is the editor of the Routledge book Creating Sustainable Bioeconomies

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Virgin, Stockholm Environment Institute(SEI), Stockholm, SWEDEN
J. Ecuru, Icipe, BioInnovate, Kenya, KENYA
A.J. Komakech, Makerere University, Kampala, UGANDA
S. Leta, Addis Ababa University, Addis Ababa, ETHIOPIA

Session reference:	4AV.1.68
Subtopic:	4.4 Resource efficient bioeconomy and social opportunities
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Promoting Energy Efficiency in Finland South Savo Region’s Small and Medum-Sized Enterprises

Short introductive summary:

The aim of the project “Promoting energy efficiency in the South Savo region’s small and medium-sized enterprises” is to create new practices to improve energy efficiency and to increase the awareness of renewable energy forms in South Savo. Finland has committed to a significant reduction in its carbon dioxide emissions during the next decades. The work is based on an EU decision, and it is controlled nationally with, for example, climate and energy-strategy measure programmes and legislation. Emission reductions are also sought out by using voluntary energy-efficiency agreements and energy reviews. Especially for small-sized and micro companies, the conventional energy review will mean plenty of work and excessive costs. This is why many smaller companies have been left out of the work to promote energy efficiency and they will also miss out on significant potential cost savings. The project will result in an adaptable model for small and medium-sized enterprises to use in the implementation of measures promoting energy efficiency and in the introduction of renewable energy forms and solutions. The model can be used for surveying the current use of energy in a company

Presenter: **Riikka TANSKANEN, South-Eastern Finland University of Applied Sciences, Forest, the Environment and Energy, Mikkeli, FINLAND**

Presenter's biography:

Riikka Tanskanen (M.Sc) is a Project Manager at South-Eastern Finland University of Applied Sciences. The current projects concentrate on renewable energy sources and possibilities, as well as, promoting energy efficiency in South Savo Finland.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
R. Tanskanen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND

Session reference: 4AV.1.69
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biocoal for a Cleaner Environment and New Business in South Savo

Short introductive summary:

88% of South Savo's surface area is covered by forest. Forests have a significant effect on the economy of the South Savo region as the yield capacity of forests in the area is better than average when compared to the rest of Southern Finland. There is also potential to increase the utilisation rate of forests. Bioenergy is a growing sector which has the potential to bring new business to the South Savo region. The project to create a cleaner environment with the use of biocoal and new business operations in South Savo will promote business based on biocoal by developing and testing new commercialisable biocoal products and solutions.

Presenter: **Niina LAURILA, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND**

Presenter's biography:

Project Manager in South-Eastern Finland University of Applied Sciences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Laurila, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
J. Heinimö, Mikkeli Development Miksei Ltd,, Mikkeli, FINLAND

Session reference: 4AV.1.71

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Boosting Water Protection Efficiency by Means of Biofilters in Forestry

Short introductive summary:

The aim of the ‘Boosting water protection efficiency by means of biofilters in forestry’ project was to develop filters for the purpose of decreasing the nutrient and solid-matter load washing into water systems. It is difficult to completely prevent the transfer of solids and nutrients to lower water systems with traditional water protection methods in forestry, such as sedimentation tanks. Filter tests were used to find a solution which would complement and enhance the existing methods.

Presenter: **Hanne SOININEN, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND**

Presenter's biography:

Research Manager in South-Eastern Finland University of Applied Sciences

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Karosto, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
L. Lukkarinen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
T. Ranta-Korhonen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
K. Kontinen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND

Session reference: 4AV.1.72
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Locally Produced Bioenergy Can Replace 5-13% of Danish Energy Consumption in 2020 without Introduction of iLUC

Short introductive summary:

Here we show how increased bioenergy production can be targeted through changes in management of rainfed, temperate agriculture and forestry. Bioenergy production can be substantially increased with reduced environmental impacts and minor effects on food and feed production. Even though global net primary production (NPP) may constitute a planetary boundary for bioenergy production, we show that at regional scale NPP can be increased and the human appropriation hereof (HANPP) may be sustainably increased. If this biomass is used for bioenergy in the form of highly relevant energy carriers, greenhouse gas emissions can be significantly reduced.

Presenter: **Søren LARSEN, Danish Energy Association, Frederiksberg C, DENMARK**

Presenter's biography:

Very short biography

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Larsen, Danish Energy Association, Frederiksberg C, DENMARK
N. Bentsen, University of Copenhagen, Frederiksberg C, DENMARK
T. Dalgaard, Aarhus University, Tjele, DENMARK
U. Jorgensen, Aarhus University, Tjele, DENMARK
J. Olesen, Aarhus University, Tjele, DENMARK
C. Felby, University of Copenhagen, Frederiksberg C, DENMARK

Session reference: 1AO.4.2
Subtopic: 1.6 Integrated Biomass Production for Energy Purposes
Topic: 1. BIOMASS RESOURCES

Biomass Residues as Electricity Generation Source in Low HDI Regions of Brazil

Short introductive summary:

Currently, there are 1.3 billion people with no access to electricity worldwide. Almost 1 million of those are in the Brazilian Amazon region. Yet, electricity access to allow basic needs is not enough to ensure a sustainable development. Hence, it is important to understand linkages among poverty alleviation, energy access, and carbon footprint of future energy consumption patterns. The paper focuses on municipalities with the lowest HDI so as to increase energy access for households and for productive use since they are fundamental factors for income generation in poor regions. The study's objective was to analyze the use of biomass residues as electricity generation source for productive purposes among poor households in isolated areas of Brazil. The study's main contribution is to enable local sustainable development in low HDI regions of Brazil by using local biomass residues as primary energy source

Presenter: **Alessandro SANCHES-PEREIRA, University of Sao Paulo, Institute of Energy and Environment, São Paulo, BRAZIL**

Presenter's biography:

Research Fellow at Research Group on Bioenergy, Institute of Energy and Environment, USP University of São Paulo. ORCID: orcid.org/0000-0001-9905-8824

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Teixeira Coelho, University of São Paulo, BRAZIL
A. Sanches-Pereira, University of São Paulo, BRAZIL

Session reference: 1AO.4.4
Subtopic: 1.6 Integrated Biomass Production for Energy Purposes
Topic: 1. BIOMASS RESOURCES

Grass Biomass as Biofuel Feedstock-Environmental and Economic Sustainability

Short introductive summary:

For a large part of the Swedish food production, low carbon input due to increasing specialization, intensification and reduced use of bio-fertilizer, leads to soil organic carbon (SOC) decreases in arable land. This is an emerging problem in Europe, where 45% of the EU soils have low or very low (0-2%), and declining, SOC content. SOC content in agricultural soils strongly influences soil fertility, nutrient holding capacity, risk for soil compaction and subsequently crop yields. Loss of soil fertility puts food security at risk, and declining SOC contributes to greenhouse gas (GHG) emissions. A short sighted agricultural practice rendering loss of SOC is thus not sustainable in the long term, and measures must be taken to reverse this trend.

One way of integrating food, feed and fuel production in agriculture would be to cultivate more grass crops. Grass crops are good break crops and contribute to soil organic carbon build-up, especially in cereal-dominated regions. These regions often lack a market for grass crops as feed. Instead, biogas plants can offer a demand for grass feedstock and at the same time deliver digestate as biofertilizer back to crop cultivation. The aim of this study was to assess the diversification of cereal dominated crop rotation by integration of grass, and evaluate the application of this grass as biofuel feedstock, in terms of economic viability and climate impact from a crop rotation perspective

Presenter: **Lovisa BJÖRNSSON, Lund University, Environmental and Energy Systems Studies Dpt., Lund, SWEDEN**

Presenter's biography:

Lovisa Björnsson is a professor of environmental and energy systems studies, specializing in environmental biotechnology with focus on biofuel systems. With a background in engineering and biotechnology her main research focus is on the role of agriculture in biomass supply for energy and materials.

Other tasks include working with gender and equality issues at the technical faculty of Lund University and teaching related to renewable energy and sustainability for engineering students.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Björnsson, Lund University, SWEDEN
M. Lantz, Lund University, SWEDEN
T. Prade, Swedish University of Agricultural Sciences, Alnarp, SWEDEN

Session reference: 1AO.4.5
Subtopic: 1.6 Integrated Biomass Production for Energy Purposes
Topic: 1. BIOMASS RESOURCES

Development and Validation of a Combined 1D-Fuel-Bed- and 3D-CFD-Model for the Simulation of Moving Grate Boilers

Short introductive summary:

The paper presents a 1D fuel bed model of a moving grate boiler which predicts gas species and temperature profiles followed by 3D CFD calculations. The model is validated by measurements of pyrolysis gas profiles above the fuel bed of a 150 kW prototype grate boiler and with measurements in the flue gas. A good qualitative agreement is found and the model is applied for boiler optimization.

Presenter: **Gabriel BARROSO, Lucerne University of Applied Sciences, Thermal Energy Systems and Process Engineering Dpt., Horw, SWITZERLAND**

Presenter's biography:

Gabriel Barroso graduated in Mechanical Engineering at the Swiss Federal Institute of Technology in Zürich (ETH Zürich). He helds a PhD in chemical kinetic mechanism reduction, multizone and CFD simulation of combustion processes. His research focus is biomass pyrolysis, gasification and combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Barroso, Lucerne University of Applied Sciences, Horw, SWITZERLAND
S. Roth, Lucerne University of Applied Sciences, Horw, SWITZERLAND
T. Nussbaumer, Lucerne University of Applied Sciences Horw and Verenum Zurich, Horw, SWITZERLAND

Session reference:	2AO.5.1
Subtopic:	2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

New CFD based Model for the Design and Optimisation of Porous Burners for Biomass Combustion Plants

Short introductive summary:

Porous burners can be used in combustion plants for emission and combustion chamber volume reduction purposes, if they are applied correctly. Their application in biomass combustion plants is new, as porous burners need a rather dust free flue gas in order to avoid plugging. New low dust biomass boiler technologies fulfil these demands and, thus, open the possibility to apply porous burners. The main targets of the work presented in this paper were, thus, to extend the application of porous burners to biomass boilers and to support the burner development by Computational Fluid Dynamics (CFD) simulations. As no reliable CFD models for porous burners are available, a respective model has been developed that allows a realistic three-dimensional calculation of the combustion processes inside porous burners. The motivation for this work is to enable a targeted and cost-efficient computer-aided design and evaluation of porous burners. Porous burners can contribute to a considerable reduction in furnace volume needed, as well as to the avoidance of local hot spots, due to their good heat conductivity.

Presenter: **Gerold THEK, Bios Bioenergiesysteme, R&D Dpt., Graz, AUSTRIA**

Presenter's biography:

2000 - 2006 Scientist at BIOS BIOENERGIESYSTEME GmbH
2006 - 2010 Project manager R&D at BIOS BIOENERGIESYSTEME GmbH
Since 2010 Project engineer in the field of CFD modelling at BIOS BIOENERGIESYSTEME GmbH

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Knauss, BIOS Bioenergiesysteme, Graz, AUSTRIA
G. Thek, BIOS Bioenergiesysteme, Graz, AUSTRIA
F. Biedermann, BIOS Bioenergiesysteme, Graz, AUSTRIA
I.. Obernberger, BIOS Bioenergiesysteme, Graz, AUSTRIA

Session reference: 2AO.5.2
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

A Theoretical and Experimental Study of the Formation of Aromatic Hydrocarbons (BTX/PAH) as Soot Precursors from Biomass Pyrolysis Products

Short introductive summary:

In the present work, a novel detailed gas phase kinetic mechanism capable of predicting the formation of PAHs and complex aromatics as the main precursors of soot formtaion is introduced. The novel gas phase reaction kinetic mechanism is validated with experimental data from literature for anisole (a representative phenolic compound) decomposition under pyrolysis conditions as well as experimental data performed at a single particle reactor (SPR) of BE2020+. It is shown that the model can predict with a reasonable accuracy the total yield of each main family of aromatic compounds (phenolics, BTXs and PAHs) during the pyrolysis of woody biomass. It is a significant step towards modeling the formation of organic particulate emissions in biomass combustion. In the next step, the current kinetic mechanism will be extended to account for the relevant soot formation kinetics from their main precursors, i.e. aromatic compounds.

Presenter: **Ali SHIEHNEJAD-HESAR, Bioenergy 2020+, Graz, AUSTRIA**

Presenter's biography:

Dr. Ali Shiehnejadhesar is researcher in the field of turbulent gas phase combustion, NOx formation, algorithm for speed-up of calculation time of reaction kinetics, reduction of detailed reaction mechanism, biomass conversion including (pyrolysis,and combustion) as well as CFD simulations.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Bahramian, Bioenergy2020+, Graz, AUSTRIA
A. Shiehnejadhesar, Bioenergy2020+, Graz, AUSTRIA
R. Mehrabian, Bioenergy2020+, Graz, AUSTRIA
A. Anca-Couce, Institute of Thermal Engineering, Graz University of Technology, AUSTRIA
P. Sommersacher, Bioenergy2020+, Graz, AUSTRIA
C. Hochenauer, Institute of Thermal Engineering, Graz University of Technology, AUSTRIA
R. Scharler, Institute of Thermal Engineering, Graz University of Technology, AUSTRIA

Session reference: 2AO.5.3
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Reduction of Particle Emissions from Wood Combustion Exhaust Gases with High Particle Number and Mass Concentrations

Short introductive summary:

Combustion of wood in boilers is characterized by particle emissions which reduction is a stringent task. The purpose of the work is to develop the scientific and technological approaches for effective control of emissions from biomass combustion facilities characterized by high particle number and mass concentrations in exhaust gases. The approach supposes the use of compact space charge electrostatic precipitators (ESP). The scientific innovation task relates to the study of ESP operation stability and its parameters self-control and optimization. The technological innovation task relates to the development of compact and cost effective ESP, using electrostatic pre-agglomeration phenomena and multi-stage compact collection modules.

Presenter: **Andrei BOLOGA, Karlsruhe Institute of Technology, Institute for Technical Chemistry, Eggenstein- Leopoldshafen, GERMANY**

Presenter's biography:

Andrei Bologa has authored over 200 publications and holds over 50 patents His current research interests include high voltage engineering technologies, cleaning of industrial gases by use of electrostatic precipitators, charged aerosol generation and control.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Bologa, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, GERMANY
M. Ecker, HDG Bavaria, Massing, GERMANY
H.-P. Rheinheimer, CCA Carola Clean Air, Eggenstein-Leopoldshafen, GERMANY
H.-R. Paur, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, GERMANY

Session reference: 2AO.5.4
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Experimental Study on the Biomass-biomass Co-combustion for Reducing NOx in a Fluidized-bed Combustor: A Comparison between the Co-firing Techniques

Short introductive summary:

This work was performed to explore the potential of three co-firing methods for the reduction of NOx in a fluidized-bed combustor. Pelletized rice husk (as a base fuel) was co-combusted with moisturized rice husk (secondary fuel) in this reactor using silica sand as bed material. Besides the test series for individual burning pelletized rice husk at conventional (bottom) air injection, three groups of co-firing tests aimed at reducing the NO emission from the combustor were performed in this work: (1) co-firing pre-mixed pelletized and moisturized rice husks (using bottom air injection), (2) co-firing of the selected fuels using fuel staging (with bottom air injection), and (3) co-firing these fuels using a reburning technique (combining fuel staging and air staging).

As compared to the conventional combustion of pelletized rice husk alone, a noticeable/substantial reduction of the NO emission from the combustor can be achieved (depending on the co-firing method): by 15% when co-firing the fuels as a pre-mixed feedstock, by 40% for fuel-staged co-combustion with bottom air injection, and by about 50% when using the reburning technique.

Presenter: **Vladimir KUPRIANOV, Thammasat University, Sirindhorn International Institute of Technology, Pathum Thani, THAILAND**

Presenter's biography:

Prof. Vladimir Kuprianov received his doctoral degree from Moscow Power Engineering Institute. His research expertise is related to combustion and emission control in fossil fuel-fired boilers and biomass-fuelled fluidized-bed systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Kuprianov, Sirindhorn International Institute of Technology, Thammasat University, Pathum Thani, THAILAND
P. Ninduangdee, Phetchaburi Rajabhat University, THAILAND

Session reference: 2AO.5.5

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Slurry Hydrocracking for Upgrading of Lignocellulosic Biomass to Transportation Fuels in Existing Refineries

Short introductive summary:

The work will describe a new pilot plant that will be used to study co-feeding of lignin-based feedstock with fossil feedstock for conversion to transportation fuels. The unit is a slurry hydrocracker pilot plant and will be located at an independent research institute in Sweden.

Presenter: **Olov ÖHRMAN, RISE Energy Technology Center, Piteå, SWEDEN**

Presenter's biography:

Prof. Öhrman has led both fundamental research projects and pilot scale projects (TRL 5) in e.g. areas including biomass gasification, syngas cleaning, catalyst preparation and characterization, catalytic conversion and slurry hydrocracking.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Öhrman, SP Energy Technology Center, Piteå, SWEDEN
F. Weiland, SP Energy Technology Center, Piteå, SWEDEN
H. Hedman, SP Energy Technology Center, Piteå, SWEDEN
M. Gullberg, SP Energy Technology Center, Piteå, SWEDEN
C. Hulteberg, SunCarbon, Tygelsjö, SWEDEN

Session reference:	3AO.6.1
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrothermal Liquefaction of Raw and Components-Extracted Microalgae with Assist of Pulsed Electric Field Pretreatment

Short introductive summary:

The objective of this research is to investigate the effects of pulsed electric field（PEF）pretreatment on microalgae extraction and its further hydrothermal liquefaction behavior for biofuels production.

Presenter: **Bingfeng GUO, Karlsruhe Institute of Technology, Institute for Catalysis Research and Technology, Stutensee, GERMANY**

Presenter's biography:

PhD student, studying on Biorefinery of Microalgae by means of Hydrothermal Liquefaction

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B.F. Guo, Karlsruhe Institute of Technology, GERMANY
A. Silve, Karlsruhe Institute of Technology, GERMANY
C. Gusbeth, Karlsruhe Institute of Technology, GERMANY
W. Frey, Karlsruhe Institute of Technology, GERMANY
U. Hornung, Karlsruhe Institute of Technology, GERMANY
N. Dahmen, Karlsruhe Institute of Technology, GERMANY

Session reference: 3AO.6.2

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

H2CAP - Hydrogen Assisted Catalytic Biomass Pyrolysis for Green Fuels

Short introductive summary:

This contribution reports the first results of the H2CAP project at DTU Chemical Engineering. A bench scale setup for catalytic hydropyrolysis with downstream hydrodeoxygenation (HDO) has been constructed. At the time of this report four experiments of hydropyrolysis of beech wood at 400 to 470 °C and 25 barg in a fluid bed reactor using a CoMo/MgAl2O4 catalyst and downstream HDO at 350 to 400 °C using a NiMo/Al2O3 catalyst have been performed. The catalysts were sulfided before experiments and the hydropyrolysis was performed in a gas containing 470 ppm H2S, 6 % N2 balance H2.

Up to 22.4 wt.% C4+ oil yield, corresponding to 39 % carbon atom yield and 53 % energy yield has been achieved. The produced oil contained approximately 30 wt. ppm oxygen and simulated distillation by GC showed that it was a mixture of gasoline and diesel boiling point hydrocarbons. This shows that catalytic hydropyrolysis with downstream HDO is an attractive route for conversion of biomass to liquid hydrocarbons.

The yield of oil may be further optimized by choice of catalyst and reaction conditions, which is the focus of ongoing work.

Presenter: **Martin HØJ, Technical University of Denmark, Chemical and Biochemical Engineering Dpt., Lyngby, DENMARK**

Presenter's biography:

Martin Høj is an assistant professor at DTU Chemical Engineering, Technical University of Denmark. His field of expertise is heterogeneous catalysis. His research interest are production of bio-fuels and biomass derived chemicals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Zingler Stummann, DTU Chemical Engineering, Kgs. Lyngby, DENMARK
M. Høj, DTU Chemical Engineering, Kgs. Lyngby, DENMARK
J. Gabrielsen, Haldor Topsøe, Kgs. Lyngby, DENMARK
P. Arendt Jensen, DTU Chemical Engineering, Kgs. Lyngby, DENMARK
A. Degn Jensen, DTU Chemical Engineering, Kgs. Lyngby, DENMARK

Session reference: 3AO.6.3

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrodeoxygenation of Pre-Treated Black Liquor on a Bimetallic Catalyst: Evaluation of Catalyst Performance

Short introductive summary:

Hydrodeoxygenation (HDO) is considered as important reaction in the conversion of biomass-derived oxygenates to fuels and chemicals. In former model studies, we developed a bimetallic supported NiCo/HZSM-5 catalyst which successfully converts model substance phenol to oxygen-free products under mild conditions. This catalyst is able to upgrade wood-based pyrolysis oil at a good degree of deoxygenation (DOD). Catalyst activity is preserved under harsh hydrothermal conditions independently from a partly change in its structure. In this study we focus on the evaluation of the catalyst in the HDO of more complex model compounds (guaiacol etc.), Organosolv lignin and pre-treated black liquor. The HDO of pre-treated black liquor with heterogeneous catalysts is challenging because the feed material has several features which seem to deactivate the catalyst (high sodium content, high pH value).

Presenter: **Christin ANACKER, Leibniz Institute for Catalysis at the University of Rostock, Rostock, GERMANY**

Presenter's biography:

PhD in chemistry

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Anacke, Leibniz Institute for Catalysis at the University of Rostock, Rostock, GERMANY
U. Armbruster, Leibniz Institute for Catalysis at the University of Rostock, Rostock, GERMANY
A. Martin, Leibniz Institute for Catalysis at the University of Rostock, Rostock, GERMANY

Session reference: 3AO.6.4

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Alternatives to Zeolites for Catalytic Fast Pyrolysis of Biomass: Molybdenum Carbide and Pt/TiO2

Short introductive summary:

The deoxygenation of biomass pyrolysis vapors is necessary to produce drop-in hydrocarbon transportation fuels. Zeolites, such as HZSM-5, are often utilized to achieve this deoxygenation, but suffer from poor carbon yields and high rates of catalyst deactivation due to coking. In this work, we will discuss molybdenum carbide (Mo2C) and platinum supported on titanium dioxide (Pt/TiO2) as potential alternatives to zeolites for ex-situ catalytic fast pyrolysis of biomass. In the presence of co-fed low-pressure H2 at 400°C, Mo2C and Pt/TiO2 achieved near complete deoxygenation of pine pyrolysis vapors at low biomass-to-catalyst ratios, producing predominantly paraffinic and aromatic molecules and demonstrating hydrocarbon yields considerably higher than those typically observed for HZSM-5. The enhanced carbon yields and reduced oxygen content of the upgraded fuel-range products over Mo2C and Pt/TiO2 as compared to HZSM-5 suggest that these materials could significantly improve the overall economics for transportation fuel production from the catalytic fast pyrolysis of biomass.

Presenter: **Joshua SCHAIDLE, National Renewable Energy Laboratory, National Bioenergy Center, Golden, USA**

Presenter's biography:

Josh Schaidle is a director of the Chemical Catalysis for Bioenergy (ChemCatBio) Consortium and is the manager of the biomass thermochemical conversion platform within the National Bioenergy Center at the National Renewable Energy Laboratory.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Mukarakate, National Renewable Energy Laboratory, Golden, USA
M. Xu, National Renewable Energy Laboratory, Golden, USA
M. Griffin, National Renewable Energy Laboratory, Golden, USA
C. Nash, National Renewable Energy Laboratory, Golden, USA
E. White, National Renewable Energy Laboratory, Golden, USA
K. Iisa, National Renewable Energy Laboratory, Golden, USA
M. Nimlos, National Renewable Energy Laboratory, Golden, USA
D. Ruddy, National Renewable Energy Laboratory, Golden, USA
J. Schaidle, National Renewable Energy Laboratory, Golden, USA

Session reference:	3AO.6.5
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sustainable Raw Material Supply For Biomethane - Cross-Sectoral Sustainability Criteria & Indicators Discussion

Short introductive summary:

BIOSURF (BIOmethane as Sustainable and Renewable Fuel) started in January 2015 as an EU-funded project under the Horizon 2020 program for research and innovation. The presentation will show the results and recommendations from BIOSURF how to achieve and improve sustainability for an extended biomethane production and use in Europe.

Presenter: **Diego PIEDRA-GARCIA, FNR - Agency for Renewable Resources, European and International Cooperation Dpt., Gülzow-Prüzen, GERMANY**

Presenter's biography:

2016-present FNR - Agency for Renewable Resources
2011-2015 PhD Scholarship of the Cusanuswerk Foundation
2010-2011 Scientific assistant at the University of Rostock, Crop Health Department
2007 - 2010 Studies of Agroecology at the University of Rostock, Master degree (M. sc. agr.)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Piedra-Garcia, FNR - Agency for Renewable Resources, Gülzow-Prüzen, GERMANY
A. Kovacs, EBA - European Biogas Association, Brussels, BELGIUM
S. Majer, DBFZ - German Biomass Research Centre, Leipzig, GERMANY
S. Proietti, ISINNOVA - Institute of Studies for the Integration of Systems, Rome, ITALY

Session reference: 4AV.2.1
Subtopic: 4.2 Sustainability, certification and standards
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Certification of Biomethane as Transport Fuel - Implementation of GHG Emission Savings form the Use of Manure for Biogas Production

Short introductive summary:

The use of manure from livestock production for biogas/biomethane production can help to avoid emissions form the conventional storage and handling of manure. To implement the GHG savings in the calculations, two issues are important. First step is the calculation of appropriate emission factors for the avoidance of emissions as a result from the anaerobic digestion of manure. Secondly, the question how these effects can be considered and incorporated under the methodology of the EU RED for GHG accounting has to be discussed. Options for including emission savings from the use of agricultural residues and wastes are not clearly described or defined. As part of the H2020 project Biosurf, we have developed an approach to solve the above mentioned methodological challenges while remaining consistent and conform with the EU RED approach. Furthermore, Biosurf has completed a comprehensive overview on the best available scientific data for the quantification of emission savings from the use of agricultural residues and wastes. We will present the methodology and a case study and a number of exemplary calculations.

Presenter: **Katja OEHMICHEN, DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt., Leipzig, GERMANY**

Presenter's biography:

Katja Oehmichen has joined the DBFZ in 2008. Since 2012 she is part of the department Bioenergy systems.Her expertise is carbon footprinting of biofuels and bio-based materials and the development and standardisation of methodologies for sustainability assessment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Oehmichen, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
S. Majer, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
D. Thrän, UFZ, Leipzig, GERMANY

Session reference: 4AV.2.2

Subtopic: 4.2 Sustainability, certification and standards

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessing the Effects of Different Amounts of Sugarcane Straw on Temportal Variability of Soil Moisture and Temperature

Short introductive summary:

Since the Brazilian Sugarcane Mills have adopted the practice of mechanized harvesting, the large amounts of straw on the fields have become an important issue to be investigated. This residue represents a feedstock for 2G ethanol production and bioelectricity cogeneration while benefits many soil quality parameters and crop productivity. This study is a part of the Sugarcane Renewable Electricity project and aims to investigate the effects of different amounts of sugarcane straw on the soil moisture, temperature and productivity. A field trial was installed at Boa Vista Mill, Goiás, Brazil, with three treatments: bare soil; 50% and 100% straw mulch. The MPS-2 measured soil water potential and temperature in two crop seasons 2014-2015 and 2015-2016. In the first 120-days, both treatments 50% and 100% recorded, average for two-crops, 9% and 10% lower soil temperatures and 26% and 36% higher soil moisture, respectively, compared to the bare soil. The 100% straw recorded 18% and 28% higher yields compared to the bare soils in both seasons. More field trials are in progress, covering different conditions (soil, climate, harvesting periods) aiming to complement these results.

Presenter: **Thayse HERNANDES, CTBE - Brazilian Bioethanol Science and Technology Laboratory, Agricultural Division, Campinas, BRAZIL**

Presenter's biography:

Agricultural Engineer from Unicamp with specialization in Environmental Engineering by the École Supérieure d’Agronomie de Rennes. Currently, is a PhD candidate at the Energy Systems Planning (Unicamp) and biomass production specialist at the Brazilian Bioethanol Science and Technology Lab.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Toni Ruiz Correa, CTBE, Campinas, BRAZIL
T. Aparecida Dourado Hernandes, CTBE, Campinas, BRAZIL
J. Luis Nunes Carvalho, CTBE, Campinas, BRAZIL
L. Maine Santos Menandro, CTBE, Campinas, BRAZIL
L. Carneiro Barbosa, CTBE, Campinas, BRAZIL
M. Regis Lima Verde Leal, CTBE, Campinas, BRAZIL

Session reference: 4AV.2.6
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Life Cycle Assessment of Environmental Impact for Cornstalk Briquette Fuel Used in Gasification and Combustion System

Short introductive summary:

The novelty of the present research in life cycle assessment (LCA) of cornstalk briquette fuel conducted on the basis of a detailed demonstration project of large-scale cornstalk briquette fuel production system. The study presented herein follows the methodology of the ISO standards and studies from the global environmental viewpoint. A model of an LCA for environmental impacts was built and the key stages, including cornstalk growth and collection, cornstalk and briquette fuel transportation, briquette fuel production, briquette fuel gasification and combustion, were investigated.

Presenter: **Zhiwei WANG, Henan Academy of Sciences, Energy Research Institute Co.LTD, Zhengzhou, P.R. CHINA**

Presenter's biography:

Dr. WANG has more than ten years research experience in the area of bioenergy. He has always been devoting himself to conversion of biomass into gas, liquid and briquetting fuels, and bioenergy utilization.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Z. Wang, Energy Research Institute, Henan Academy of Sciences, Zhengzhou, P.R. CHINA

Session reference: 4AV.2.8

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Life Cycle Approach for Energy and Environmental Analysis of Biomass and Coal Co-Firing in Different Large Scale Co-Generation Units

Short introductive summary:

Research described in this paper focuses on the life cycle analysis for hard coal and two biomass sorts of different origin (willow crops chips and forest wood chips) requiring a diverse approach for their upstream inventory of non-renewable energy resources depletion and GHG emission. Allocation of the burdens basing on the principle of the avoided process has been proposed in this work. The empirical correlations concerning the electricity consumption of boiler auxiliaries' and boiler energy efficiency along with the increasing share of biomass in the fuel blend were applied in the calculations after they have been elaborated basing on long term operation of biomass co-firing units. The functional units chosen to compare the results were 1 TJ of heat and 1 MWh of electricity. Sensitivity analysis was carried out to bring the final conclusions and recommendations. The conducted research revealed that both environmental burdens (non-renewable resources depletion and the greenhouse effect) are depending on the share of biomass in the combusted fuel mix. Forest wood chips showed its advantages over dedicated energy crops.

Presenter: **Jaroslaw ZUWALA, Institute for Chemical Processing of Coal, Zabrze, POLAND**

Presenter's biography:

Mr. Jaroslaw Zuwala holds the positions of R&D Deputy Director and Associate Professor in Institute of Chemical Processing of Coal (IChPW) in Zabrze. He is an experienced project management in cross-functional environments, especially in the field of biomass and waste based renewable energy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Zuwala, ICHPW, Zabrze, POLAND

Session reference: 4AV.2.9

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Real Scale Biomass Burning of Miscanthus Grown on Contaminated Site

Short introductive summary:

This work aims to study the use of miscanthus grown on soils contaminated by Cd, Pb and Zn as biomass for energy production, in order to find new income sources for local farmers who own fields that are no more usable to grow vegetables dedicated to human or animal consumption. First analyses were performed during the harvesting phase to assess if this step could have an impact on the air quality at a local scale. Then an extensive set of tests has been conducted in real condition on a multi-fuel burner used to produce heat in a local agricultural secondary school. Miscanthus, combustion gases (O2, CO/CO2, NOx, SO2, THC), particles and ashes have been analysed in order to control the quality of the emissions and in particular to check if contaminated dusts were emitted by the burner.

Presenter: **Dorothee DEWAELE, Université du Littoral Côte d'Opale, CCM Dpt., Dunkerque, FRANCE**

Presenter's biography:

Dorothée Dewaele get a Master in Chemistry and Physics in 1994 at the Université du Littoral Côte d’Opale (ULCO). She is in charge of the inorganic analysis by inductively coupled plasma, ionic chromatography and elementary analysis at the ULCO’s Common Center of Measurements (CCM-ULCO).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Dewaele, CCM - ULCO, Dunkerque, FRANCE
F. Cazier, CCM - ULCO, Dunkerque, FRANCE
P. Genevray, CCM - ULCO, Dunkerque, FRANCE
E. Therssen, PC2A - USTL, Villeneuve d'Ascq, FRANCE
J. Blarel, Chambre d'agriculture, Lille, FRANCE
F. Douay, ISA, Lille, FRANCE

Session reference: 4AV.2.13
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Development of Soil Amendments Produced from Municipal Organic Waste Digestate During a Two-Year Field Study

Short introductive summary:

The structural degradation of agricultural soils is an increasing problem of our times caused by intense land use. The treatment of soils with organic amendments shall maintain and improve long-term soil fertility. Solid residues from anaerobic digestion of municipal organic waste (MOW) are rich in nutrients and organic matter and have a promising potential to be used as soil amendment. Our research investigates the characteristics of differently treated amendments produced from MOW digestate. We want to know how long these amendments are present in the soil and how their characteristics change over time. During a bag experiment on grassland four different amendments of one origin (loose, pelletised and agglomerated) have been buried in the soil and subsequently sampled over two years. Preliminary results show that all four amendments are still present in the soil after 24 months but the distribution of amendment particle sizes is different. After 17 months the highest share of fine particles can be found in bags containing loose amendment. Further investigations on amendment characteristics will be made to evaluate the obtained results.

Presenter: **Christine KNOOP, Brandenburg University of Technology, Geopedology and Landscape Development, Cottbus, GERMANY**

Presenter's biography:

Christine Knoop is doing her PhD on the Anaerobic Digestion and Conditioning of Organic Waste at Brandenburg Technical University of Cottbus-Senftenberg in Germany. She has a degree in International Forest Ecosystem Management (BSc.) and Environmental and Resource Management (MSc.).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Knoop, Brandenburg University of Technology, Cottbus, GERMANY
N. Dietrich, Brandenburg University of Technology, Cottbus, GERMANY
M. Heinrich, Brandenburg University of Technology, Cottbus, GERMANY
C. Dornack, Technische Universität, Dresden, GERMANY
T. Raab, Brandenburg University of Technology, Cottbus, GERMANY

Session reference: 4AV.2.14
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Comparison of Sweet Sorghum, Giant Reed and Poplar as Soil Nitrate Scavengers with Cattle Manure Application

Short introductive summary:

In the years from 2008 to 2012 three field experiments on cattle manure applications on energy crops have been carried out at the experimental station of CRA located in Anzola dell'Emilia (Bologna), Low Po Valley, Northern Italy (Lat. 44°32'N, Long. 11°80'E, 38 m a.s.l.). The soil of the site is silt loam, classified as Udifluventic Haplustepts fine silty, mixed mesic. The following energy crops, one for each experiment, were investigated: the herbaceous annual sweet sorghum (Sorghum bicolor L. Moench); the herbaceous perennial giant reed (Arundo donax L.,) and the woody poplar (Populus sp.). The fertilization treatments applied to the three species were: two rates of liquid cattle manure, named as M10 and M20, corresponding to 10 and 20 mm, respectively; one rate of industrial fertilizers, named as IF, corresponding to 120 kg N ha-1 year-1, applied in the form of urea, + 120 kg P2O5 ha-1 year-1, applied in the form of superphosphate; and one unfertilized control, named as Control.

Presenter: **Enrico CEOTTO, CREA- Council for Agricultural Research and Economics, Research Center for Agriculture and Environment, Bologna, ITALY**

Presenter's biography:

Enrico Ceotto is Senior Researcher Agronomist at the Research Center Agriculture and Environment, located in Bologna, Northern Italy. Currently, his research activity is focused on perennial energy crops and their ecosystem services. E-mail address: enrico.ceotto@crea.gov.it.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Ceotto, CREA, Bologna, ITALY
F. Castelli, CREA, Bovolone, ITALY
R. Marchetti, CREA, Modena, ITALY

Session reference:	4AV.2.16
Subtopic:	4.3 Environmental impacts of bioenergy
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Forest Biomass in Canada: From Feedstock Availability to Climate Change Mitigation Potential

Short introductive summary:

Jérôme Laganière obtained his Ph.D. in Environmental Sciences from Université du Québec à Montréal, where he studied the soil carbon dynamics in boreal forest ecosystems. Dr Laganière then joined an interdisciplinary research team at Memorial University of Newfoundland to investigate the impacts of climate change on boreal forest watersheds and its relevance to the global carbon cycle. He is now a research scientist at the Canadian Forest Service, Natural Resources Canada, and his work focuses on the environmental impacts of forest biomass harvesting and use. Besides his work on bioenergy, he is interested in how global changes (e.g. climate change, biodiversity loss, land-use change) impact soil functioning and productivity.

Presenter: **Jérôme LAGANIÈRE, Natural Resources Canada, Canadian Forest Service, Québec City, CANADA**

Presenter's biography:

Dr Laganière is a research scientist at Natural Resources Canada. His work focuses on the environmental impacts of forest biomass harvesting and use. Besides his work on bioenergy, he is interested in how global changes impact soil functioning and productivity.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Laganière, Natural Resources Canada, Québec City, CANADA
D. Paré, Natural Resources Canada, Québec City, CANADA
P. Bernier, Natural Resources Canada, Québec City, CANADA
E. Thiffault, Université Laval, Québec City, CANADA
N. Mansuy, Natural Resources Canada, Québec City, CANADA
J. Barrette, Natural Resources Canada, Québec City, CANADA

Session reference: 4AV.2.17
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Environmental and Economic Performances of Cereal Straw End-Practices

Short introductive summary:

GHG emissions and eco-efficiency performances of cereal straw end-practices are estimated. Straw incorporation in the soil and baling were the two end-practices considered. The environmental and economic assessment compared two scenarios that were drawn from a direct survey to cereal farms located in Southern Italy.

Presenter: **Luigi PARI, CREA- Council for Agricultural Research and Economics, Unità di Ricerca per l'Ingegneria Agraria - CREA-ING, Monterotondo RM, ITALY**

Presenter's biography:

Dr. Luigi Pari has a PhD in Agricultural Engineering in 1990 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). In 2002 he became Scientific Director of the Non Food Agriculture - Energy Crops Group (PANACEA), coordinating the activities of 18 researchers, which main activity is to develop new agricultural machineries prototype for energy crops harvesting and logistic.
Authors of more than 200 scientific publications, he was scientific responsible of more then 30 research projects, funded by European Union, Italian Ministry of Agriculture and private enterprises

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Palmieri, University of Molise, Campobasso, ITALY
M.B. Forleo, University of Molise, Campobasso, ITALY
G. Giannoccaro, University of Bari, ITALY
A. Suardi, Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria, Roma, ITALY
L. Pari, Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria, Roma, ITALY

Session reference: 4AV.2.18
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Effect of Biochar on Water Retention in Soil, a Comparison Between Two Forms: Powder and Pellet

Short introductive summary:

Biochar, thanks to its porosity, can have a positive effect in water retention on sandy soils. In this work pellet from Arundo Donax L. was produced at the Biomass Research Centre of the University of Perugia (Italy), then it was used to produce biochar in a pyrolytic stove in the laboratories of the Institute of biometeorology in Florence (Italy). This biochar was analyzed and characterized at the laboratory of MAC (Minoprio Analisi e Certificazioni) and soil columns were produced to test its action on water retention. Two forms of biochar were tested: pelletized biochar and biochar in powder. While the effect on soil water retention of biochar in powder has already been tested, the effect of pelletized biochar has not. The retention efficiency of biochar pellet was higher than that of the powder. In fact at field capacity an increase in water retention of 20% was measured with biochar in pellet, while the increase was about 4% with biochar in powder. This can bring important advantages to the crops cultivated with biochar as soil amendment, in terms of their water fooptrint.

Presenter: **Pietro BARTOCCI, University of Perugia, Biomass Research Centre, Perugia, ITALY**

Presenter's biography:

Pietro Bartocci, MS in Agricultural Sciences and PhD in Energy Engineering at the University of Perugia, is a research fellow at the Department of Engineering of the University of Perugia. His research interests are focused on biomass production and resources assessment, micro scale energy conversion from biomass and waste with pyrolysis and gasification technologies, kinetics behavior of biomasses during thermal conversion, syngas and oils use in gas turbines and engines and energy and environmental footprinting.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Bartocci, University of Perugia, ITALY
F.P. Vaccari, IBIMET, Firenze, ITALY
M. Valagussa, MAC, Como, ITALY
A. Pozzi, ICHAR, Firenze, ITALY
S. Baronti, IBIMET, Firenze, ITALY
F. Liberti, University of Perugia, ITALY
G. Bidini, University of Perugia, ITALY
F. Fantozzi, University of Perugia, ITALY

Session reference: 4AV.2.19

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Effect of Wood Pre-Treatment on Operating Conditions, Gaseous and Particulate Emissions of a Pellet Stove - First Analytical Campaign

Short introductive summary:

This work aims at studying the influence of the nature of biomass fuel and its pre-treatment on both emission factors of gaseous and particulate pollutants generated by new domestic heating systems in real use conditions. Indeed, last years, domestic wood heating manufacturers have highly optimised combustion conditions, thanks to new technologies development, to respect the new European legislation proposed in 2022. Furthermore, environmental performance can be improved by modifying biomass properties (type, size, chemical composition, moisture rate, ash content …).

Here, the influence of washing pretreatment process was studied on three different wood varieties: fir, beech, oak and one standard pellet (DIN CERTCO). Both untreated and washed woods were combusted in a pellet stove in order to compare the environmental impact of the wood washing process on gaseous and particulate emissions.

Fuel properties have slightly changed after washing the different woods and impacts have been observed on particulate and gaseous (NOx, CO, PAH) emissions from washed fuels.

Presenter: **Paul GENEVRAY, Université du Littoral Côte d'Opale, CCM Dpt., Dunkirk, FRANCE**

Presenter's biography:

Paul Genevray get the grade of Chemical Engineer of the Ecole Nationale de Chimie de Rennes (ENSCR) in 2009. He is working as an environmental scientist specialized in organic analysis (PAH, pesticides, ...) at the Common Center of Measurement of ULCO.

Co-authors:

P. Genevray, CCM Laboratory, Dunkerque, FRANCE
G. Schmidt, GRE Laboratory, Mulhouse, FRANCE
F. Cazier, CCM Laboratory, Dunkerque, FRANCE
D. Dewaele, CCM Laboratory, Dunkerque, FRANCE
C. Vandenbilcke, CCM Laboratory, Dunkerque, FRANCE
G. Leyssens, GRE Laboratory, Mulhouse, FRANCE
G. Trouvé, GRE Laboratory, Mulhouse, FRANCE
V. Tschamber, GRE Laboratory, Mulhouse, FRANCE
C. Schönnenbeck, GRE Laboratory, Mulhouse, FRANCE
S. Labbé, Lorflam, Caudan, FRANCE
F. Balay, Lorflam/ CCM laboratory, Caudan, FRANCE
Y. Denance, Inovalp, Susville, FRANCE
E. Faivre, Inovalp, Susville, FRANCE
C. Le-Dreff, CSTB Laboratory, Nantes, FRANCE
N. Adam, Agrivalor, Hirsingue, FRANCE

Session reference: 4AV.2.20
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessing Possible Emission Reductions in the Energy Mix: Unconventional Gas or Miscanthus Biomass?

Short introductive summary:

European countries seek to expand their energy mix in an effort to confront resource scarcity, competition for various land-use types and coverage of human needs in a sustainable way. The Polish government aims to replace coal-fired electricity production with modern technologies, such as electricity generated by Miscanthus biomass or shale gas. An attributional life-cycle assessment (LCA) was conducted based on ISO 14040-14044 standard to evaluate the potential environmental impacts of energy production from Miscanthus and Shale gas. The emissions of a 25-year period were measured using GWP100. The functional unit of the assessment was 1 kWh of electricity distributed. Electricity production from Miscanthus generated 0,302 kg CO2e/kWhe distributed compared to 0,833 kg CO2e/kWhe distributed using shale gas. Sensitivity analysis was conducted and possible emission reductions were calculated. This analysis enables Polish legislators to create a more environmentally friendly energy mix, promoting renewable energy technologies.

Presenter: **Iosif GYPARIS, University of Piraeus Research Center, Piraeus, GREECE**

Presenter's biography:

2014 – 2016: Athens University of Economics and Business, Greece: MSc Economic Theory
2013 – 2014: Cranfield University, Bedfordshire, UK: MSc Environmental management for business, Distinction
2009 – 2013: University of Piraeus : BSc Industrial Management and Technology, Distinction

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Gyparis, University of Piraeus Research Center, Piraeus, GREECE
D. Sidiras, University of Piraeus Research Center, Piraeus, GREECE

Session reference: 4AV.2.22
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Environmental Preliminary Results Using LCA Methodology of a Biorefinery Fed with Olive Pruning in Andalusia

Short introductive summary:

An LCA of a local biorefinery located in Andalusia is carried out using biomass residues from olive orchards. Residues collected are free of environmental burdens until the point of collection, only transportation emissions from the field to the transformation facility have been included. A maximum transport distance of 16 km is established. Conversion processes include extraction, pretreatment, saccharification and SSF fermentation. The final products of the biofacility are energy (bioethanol and heat) and biobased materials and chemicals (i.e hydroxytyrosol, oleuropein, mannitol, xylitol). Leaving pruning residues on the field between olive trees rows is not currently the most common procedure. However, this is the recommended practice in organic and integrated production systems; therefore, the study considers it as the reference land use taking into account C and N balance on field when pruning is collected and included in biorefinery chain.
The use of biomass residues in circular economy is aimed to get significant GHG emission reductions to tackle against climate change, so environmental profile of the biorefinery are compared to an alternative fossil system.

Presenter: **Carmen LAGO, CIEMAT, Energy Dpt., Madrid, SPAIN**

Presenter's biography:

Degree in Biological Sciences at the Universidad Autónoma (Madrid). Her most relevant professional experience is focused on environmental, technological and economic assessment of renewable energies versus fossil fuels. During the last years she has been working on Life Cycle Assessment (LCA) of bio

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Lago, CIEMAT, Madrid, SPAIN
I. Herrera, CIEMAT, Madrid, SPAIN
Y. Lechón, CIEMAT, Madrid, SPAIN
P. Manzanares, CIEMAT, Madrid, SPAIN
E. Ruíz, Universidad de Jaén, SPAIN
A.I. Susmozas, CIEMAT, Madrid, SPAIN

Session reference:	4AV.2.23
Subtopic:	4.3 Environmental impacts of bioenergy
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Framework for Bioenergy Implementation in Municipal Buildings

Short introductive summary:

The abstract concerns the presentation of a framework named Klimareg, based on the combination of tools and methodologies: a forest model (GEOSKOG), an environmental methodology (Life Cycle Assessment) and geographical information system tool (GIS) for supporting the implementation of bioenergy in municipal climate and energy planning

Presenter: **Clara VALENTE, Ostfold Research, Kråkerøy, NORWAY**

Presenter's biography:

Graduated in Natural Sciences with MSc in Environmental Analysis and Management from the University of Turin (Italy). I have Phd from Norwegian University of Life Sciences: Life Cycle Assessment of bioenergy in mountain forests. Different projects related to LCA/bioenergy at Ostfold Research

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Valente, Ostfold Research, Kråkerøy, NORWAY
E. Soldal, Ostfold Research, Kråkerøy, NORWAY
F. Moltu Johnsen, Ostfold Research, Kråkerøy, NORWAY
F. Verdú, Geodata, Oslo, NORWAY
H. Lerche Raadal, Ostfold Research, Kråkerøy, NORWAY
O.J. Hanssen, Ostfold Research, Kråkerøy, NORWAY

Session reference: 4AV.2.24
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessment of Biogas Production Pathways: Application to Portugal

Short introductive summary:

Specific EU policies have been designed to promote the use of biogas, produced from waste products, to diversify energy sources. Studies have shown that using waste products in co-digestion, a technique able to improve biogas production due to positive synergies between the co-substrates and enrichment of micro-nutrients in the mixture, result in biogas production yields from 154 to 869 l/kgVS. Nonetheless, the energy and environmental impacts of these energy production pathways must also be accounted for, since the production and upgrading stages can have considerable contributions in the full life cycle evaluation.
In Portugal, the potential of producing biogas has not been extensively studied. In this work, a bottom-up model that quantifies the potential production of biogas using waste products from different sources, as well as the energy, environmental and cost impacts, is presented. This tool is applied to assess the production of biogas in Portugal, considering different waste products (e.g. organic residues, urban solid wastes, residual waters, etc). The results may be used to design specific policies to promote the sustainable production of biogas in Portugal.

Presenter: **Patrícia BAPTISTA, IST-ID, Mechanical Engineering, Lisboa, PORTUGAL**

Presenter's biography:

Dr. Patrícia Baptista received the Chemistry degree in 2006 and the Ph.D. degree in Sustainable Energy Systems within the MIT Portugal Program in 2011 from Instituto Superior Técnico, University of Lisbon, Portugal.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Lopes, IN+, Universidade de Lisboa, Lisbon, PORTUGAL
P. Baptista, IN+, Universidade de Lisboa, Lisbon, PORTUGAL
E. Duarte, ISA, Universidade de Lisboa, Lisbon, PORTUGAL
A. Moreira, IN+, Universidade de Lisboa, Lisbon, PORTUGAL

Session reference: 4AV.2.26
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Fertilizers and Soil Improving Products made of Biowaste Digestates: Results from Pot Experiments with Avena sativa L. and Brassica napus L.

Short introductive summary:

The influence of different processing technologies for the treatment of anaerobically digested and subsequently composted biowaste on plant development and yield formation were tested in two consecutive pot experiments. Both experiments were carried out in a greenhouse and in both experiments oat (Avena sativa L.) and rapeseed (Brassica napus L.) were tested. Based on the results of the first experiment agglomeration was identified as the most promising way of processing digestates. In the second experiment, agglomerates made of biowaste digestate were tested to which different supplemental materials were added (meat-and-bone meal, Calcium ammonium nitrate, clay minerals, straw). The aim of this supplementation was to increase the content of plant available nitrogen and to improve the water absorption of the agglomerates. By adding meat-and-bone meal or Calcium ammonium nitrate the fertilizing effect of the products was significantly increased compared to agglomerates without supplements. Clay minerals and straw further increased the fertilizing value of the agglomerates for oat, but not for rapeseed.

Presenter: **Christina-Luise ROSS, Institut für Agrar- und Stadtökologische Projekte, Biogenic Resources Dpt., Berlin, GERMANY**

Presenter's biography:

Christina-Luise Ross works as a research assistant at the Institute of Agricultural and Urban Ecological Projects (IASP) since 2014. She graduated in agricultural sciences from the Humboldt University in Berlin and currently writes her doctoral thesis about biowaste digestates in agriculture.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.-L. Ross, Institute of Agricultural and Urban Ecological Projects (IASP), Berlin, GERMANY
K. Sensel-Gunke, Institute of Agricultural and Urban Ecological Projects (IASP), Berlin, GERMANY
V. Wilken, Institute of Agricultural and Urban Ecological Projects (IASP), Berlin, GERMANY
U. Herbst, Humboldt University Berlin, Berlin, GERMANY

Session reference: 4AV.2.27
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Bio-CLC, A Novel Approach for Attaining Negative Emissions of CO2 at Reduced Cost

Short introductive summary:

It seems highly unlikely that we will reach the climate goals with reduced emissions only. Consequently, the scenarios of IPCC that meet climate targets include very large negative emissions, typically many hundred Gton of CO2. Negative emissions means removing carbon dioxide from the atmosphere. Most important among negative emission technologies is likely the capture of CO2 from biomass combustion/conversion, i.e. Bio-CCS or BECCS.

Chemical Looping Combustion (CLC), is a novel combustion principle which is expected to give a dramatic reduction in cost and energy penalty of CO2 capture. The paper discusses the use of Bio-CLC in the Nordic Energy system, and involves a techno-economic analysis of the possible design and added costs based on the differences compared to normal combustion in circulating fluidized bed.

Presenter: **Anders LYNGFELT, Chalmers University of Technology, Energy and Environment Dept., Goeteborg, SWEDEN**

Presenter's biography:

Research related to fluidized bed combustion. Presently working on Bio-CLC, i.e. application of Chemical-Looping Combustion with biomass in order to attain "negative emissions". Coordinator of Nordic project Negative CO2.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Lyngfelt, Chalmers University of Technology, Goeteborg, SWEDEN
M. Nieminen, VTT, Espoo, FINLAND

Session reference: 4AV.2.28

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Monitoring of Fugitive Methane Emissions from Biogas Plants

Short introductive summary:

Biogas plants produce methane to supply carbon-neutral energy. However, the storage, transport and combustion of methane within biogas plants cannot be considered as an emission-free process. The emission monitoring of biogas plants is a complex problem due to several possible single sources which either are locally unknown and/or have a time-variant emission characteristic. In general, there are two measurement approaches. The on-site approach investigates the single emission sources and the remote sensing approach determines directly the overall emission from the whole biogas plant. However, the comparison of literature values remains difficult due to different measurement approaches applied on different plant configurations. Though the first intercomparison measurements based on both approaches are carried out thoroughly, the resulting emission factors can be in a comparable range, but the harmonization of the measurement approaches have to be continued. However, both approaches have a right to exist depending on the purpose of the emission monitoring. In Germany a big discussion about the state of the art of emission monitoring, new limits and further regulation has started.

Presenter: **Torsten REINELT, DBFZ-German Biomass Research Centre, Biochemical Conversion Dpt., Leipzig, GERMANY**

Presenter's biography:

Career:
- 2006-09 - 2011-02:
o University of applied sciences Mittweida, Germany
o Degreed engineer of environmental technology
- 2011-05 - today:
o Technical staff member of the Biochemical Conversion Department
o Function: Investigations to methane emissions from biogas plants

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Reinelt, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
J. Liebetrau, DBFZ-German Biomass Research Centre, Leipzig, GERMANY

Session reference: 4AV.2.29
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Environmental Assessment of Black Liquor Co-Gasification with By-Product Biomass Resources

Short introductive summary:

This study assesses the potential environmental benefits of combining black liquor (BL) with by-product biomass resources in co-gasification, leading to increased conversion efficiency. BL is a lignin-rich by-product from the sulfate pulp process which, due to its high alkali content, has a high reactivity in the well proven technology of gasification. However, the availability of BL is limited by pulp production.

BL can be combined with other biomass sources, such as by-products from biodiesel and ethanol production, and with pyrolysis liquid (eg. from forest logging residues), while maintaining the high reactivity. Thus co-gasification of BL with other specific biomass materials can enhance overall system efficiency in conversion of biomass to biofuels, such as bio-methanol.

To assess the environmental sustainability of such integrated systems, the alternative use of the biomass, and the effect on energy balances of individual processes, must be taken into account. This study assesses the greenhouse gas performance of integrating BL and other by-product biomass systems for co-gasification and bio-methanol production, as compared to separate utilization of the biomass resources.

Presenter: **Johanna OLOFSSON, Lund University, Environmental and Energy Systems Studies Dpt., Lund, SWEDEN**

Presenter's biography:

PhD student at Lund University since 2015 with a background in environmental engineering. My area of research is within environmental assessment of biomass valorization systems, and more specifically of low-value residual biomass utilization.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Olofsson, Lund University, SWEDEN
L. Carvalho, Luleå University of Technology, SWEDEN
P. Börjesson, Lund University, SWEDEN
J. Lundgren, Luleå University of Technology, SWEDEN
E. Furusjö, Luleå University of Technology, SWEDEN
E. Wetterlund, Luleå University of Technology, SWEDEN

Session reference: 4AV.2.30
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Waste Generated from Biomass Combustion: Wood Ash Reuse as an Additive in Composting

Short introductive summary:

According to the National Renewable Energy Action Plans (NREAPs) developed by the European Union Member States, biomass consumption is estimated to increase significantly in the next future. This will generate energy, economic, employment and environmental benefits. Nonetheless, the environmental impact is to be considered as well, of which the wastes produced are of major concern.
At present, combustion and CHP based on combustion are the most common biomass technologies, whose residues consist of the ashes, that are expected to dramatically increase. Suitable recovery options are needed to divert it from landfilling and maximise the potential of this waste product. The use of biomass ash as an additive to the organic waste composting could be an adequate option.
In this work, an experimental campaign was conducted where 8% (by weight) of biomass ash was added to composting admixtures with two different organic waste:wood chips ratios. Two main results were obtained: firstly, ash addition was beneficial for the composting process and the final compost quality; secondly, in the ash-amended admixtures the process was improved irrespective of the amount of bulking agent used.

Presenter: **Carla ASQUER, Sardegna Ricerche, Biomass and Biofuel Laboratory, Uta, ITALY**

Presenter's biography:

I'm a senior environmental engineer at the Biomass and Biofuel Laboratory and PhD student from the University of Cagliari (Italy).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Asquer, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, ITALY
G. Cappai, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, ITALY
G. De Gioannis, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, ITALY
A. Muntoni, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, ITALY
M. Piredda, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, ITALY
D. Spiga, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, ITALY

Session reference: 4AV.2.33
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Potential Carbon Dioxide Sequestration Using Biomass Combustion Ash

Short introductive summary:

Biomass combustion is conventionally considered carbon neutral in relation to the direct emissions, because it is assumed that the CO2 generated by thermal plants is counterbalanced by the carbon captured by the next crop. Of greater importance are the indirect emissions generated by the cultivation, harvesting and transport operations, whose impact depends on the biomass supply chain management and contribute to the GHG overall emissions at any scale.
Carbon capture and storage represents an option to reduce the CO2 emissions by means of the carbonation reactions that occur when materials having alkaline properties are exposed to high carbon dioxide concentrations. Selected types of biomass combustion ash could be of interest for this scope, providing the power generation with a higher degree of sustainability.
In order to evaluate the biomass ash potential as a feedstock for CCS, accelerated carbonation tests were conducted in a pressurised reactor with an incoming CO2 flow. The effective carbon dioxide uptake was evaluated, the potential carbon dioxide sequestration assessed, and estimates of the net GHG emissions generated by using biomass to produce energy were made.

Presenter: **Carla ASQUER, Sardegna Ricerche, Biomass and Biofuel Laboratory, Uta, ITALY**

Presenter's biography:

I'm a senior environmental engineer at the Biomass and Biofuel Laboratory and PhD student from the University of Cagliari (Italy).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Asquer, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, Cagliari, ITALY
G. Ca, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, Cagliari, ITALY
G. De Gioannis, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, Cagliari, ITALY
A. Muntoni, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, Cagliari, ITALY
A. Nieddu, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, Cagliari, ITALY
M. Piredda, University of Cagliari, Department of Civil and Environmental Engineering and Architecture, Cagliari, ITALY

Session reference:	4AV.2.34
Subtopic:	4.3 Environmental impacts of bioenergy
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Nitrogen Assessment in Small Scale Biomass Heating Systems

Short introductive summary:

Reactive Nitrogen (Nr), particularly in form of NOx causes big concerns also in biomass heating research and industry since it causes direct and indirect (as particulate matter precursor) harm to society and environment. For Austria the National Emissions Ceilings (NEC) foresee a maximum of 103,000 tonnes NOx to be emitted per year since 2010. This target is still not reached in Europe Austria and Luxembourg are coming in last missing the goals by 26 and 29 %; respectively. Although biomass heating only contributes 4%; to the 130,000 tonnes of NOx emitted in Austria (2014), regulations are very strict and tend to become even stricter on both the European and national level and for both emissions and immissions. In Austria prohibition of biomass heating in certain heavily loaded areas is being discussed. Analogous to the CO2 cycle our hypothesis was that wood in properly cultivated forests can serve as a nitrogen-sink since the nitrogen emitted during wood burning had been taken up by the trees before. We therefore conducted a study based on own data and literature to find out the actual impact of biomass heating within the anthropogenic N-cycle.

Presenter: **Monika ENIGL, Bioenergy 2020+, Wieselburg-Land, AUSTRIA**

Presenter's biography:

Monika Enigl holds a PhD in Agricultural Sciences and is a Senior Researcher at Bioenergy 2020+ (Austria) in the Sub-Area "Sustainable Supply and Value Chains" since 2011. Before she had worked as a Researcher at the University of Natural Resources (BOKU), Vienna and in the cultural and social sector. Her main research interest is on sustainability assessment of bioenergy and biomass based industries.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Enigl, Bioenergy 2020+, Wieselburg, AUSTRIA
C. Strasser, Bioenergy 2020+, Wieselburg, AUSTRIA
E. Hochbichler, University of Natural Resources and Life Sciences, Vienna, AUSTRIA
C. Schmidl, Bioenergy 2020+, Wieselburg, AUSTRIA

Session reference: 4AV.2.37
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Climate Performance of Ligno-Cellulose-Based Biofuels

Short introductive summary:

According to the EU Renewable Energy Directive (RED 2009), biofuel production installations starting operation after October 2015 are required to fulfil the sustainability criteria requiring a GHG saving of at least 60% (EU 2015/1513). According to an updated analysis of the biomass supply potential in Sweden, there is a significant unexploited potential of ligno-cellulosic biomass, both forest-based and deriving from agricultural operations. Depending on the design and location of the production systems, the GHG performance of biofuels may vary greatly. The objective of the paper is to present updated calculations of the GHG performance of emerging ligno-cellulose-based biofuel production systems. Biofuel production pathways considered, include the conversion processes hydrogenation, gasification and fermentation.

Presenter: **Nathalie BECKER, Lund University, Technology and Society Dpt., Lund, SWEDEN**

Presenter's biography:

My academic background consist of subjects from the natural and social sciences. More recent work is concerned with sustainability aspects of biomass to fuel production systems applying a socio-technological perspective.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Becker, Lund University, SWEDEN
P. Börjesson, Lund University, SWEDEN
L. Björnsson, Lund University, SWEDEN

Session reference: 4AV.2.39
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

An Advanced LCA-model Targeted to Bioenergy Systems and Technologies: Recent Developments of the EASETECH LCA-model

Short introductive summary:

The department of Environmental Engineering at the Technical University of Denmark has developed an advanced life cycle assessment (LCA) model specifically dedicated to assessments of bioenergy technologies/systems, namely EASETECH. This study describes the model as such and shows the results of its application to the case of a biorefinery, as an example. It illustrates how the model can be used to describe all the unit-processes of a biorefinery system (e.g. pre-treatment, hydrolysis, fermentation, etc.). The research is an attempt to develop a process-oriented LCA-model, in place of more traditional black-box models, to be used in dedicated assessment of biotechnologies/biosystems. The model is expected to enhance robustness and usefulness of environmental assessment results to better support decision making processes in the field of (bio)energy.

Presenter: **Concetta LODATO, Technical University of Denmark, Environmental Engineering Dp., Kgs. Lyngby, DENMARK**

Presenter's biography:

Concetta Lodato is a PhD student at the Technical University of Denmark (DTU), Department of Environmental Engineering. Her research field is life cycle assessment modelling of bioprocesses using dedicated tools.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Lodato, Department of Environmental Engineering, Technical University of Denmark, Lyngby, DENMARK
D. Tonini, Department of Environmental Engineering, Technical University of Denmark, Lyngby, DENMARK
A. Damgaard, Department of Environmental Engineering, Technical University of Denmark, Lyngby, DENMARK
T. F. Astrup, Department of Environmental Engineering, Technical University of Denmark, Lyngby, DENMARK

Session reference: 4AV.2.40
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Environmental Impact of an Integrated Biorefinery Model Processing Cardoon

Short introductive summary:

This work concerns an integrated biorefinery model which, starting from cardoon, generates oil from seeds, second-generation sugars (2GS) from lignocellulosic biomass, and energy from process waste products. It aims at the optimization of the energy efficiency of the biorefinery processes and evaluation of the environmental sustainability of the whole bioenergy chain in terms of CO2 emissions (carbon footprint) and water used (water footprint). The activity falls within the scope of the REBIOCHEM project, funded by the Ministry of Education, Universities and Research as part of the National Technology Cluster of Green Chemistry SPRING.

Presenter: **Giovanni STOPPIELLO, ENEA Research Centre, Energy Technologies Dpt., Rotondella, ITALY**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.T. Petrone, Italian National Agency for New Technologies, Energy and Economic Sustainable Development, Rotondella, ITALY

Session reference: 4AV.2.41

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

The Occupational Health Effects of Torrefied Biocoal Pellets

Short introductive summary:

The aim of the project was to study the possibilities to use biocoal pellets for small-scale energy production to produce heat and electricity. Biocoal pellets are a new fuel for small-scale usage, and there are no experiences available regarding its use. The occupational health effects of biocoal pellets were assessed by conducting a fluff test. The measurements did not reveal significant difference, in comparison to the tests conducted with white pellets. Neither pellet's inhalable dust exceeded the HTP8h value of 2 mg/m3 determined for wood dust. The only significant difference was the higher amount of bacteria in the torrefied pellets.

Presenter: **Jarno FÖHR, Lappeenranta University of Technology, Laboratory of Bioenergy, Mikkeli, FINLAND**

Presenter's biography:

Jarno Föhr is a project researcher in the bioenergy research group at Lappeenranta University of Technology. His purpose is to produce new information about biomass handling and transportation methods and to analyze biomass quality within supply chains.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.-P. Lemponen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
S. Seppäläinen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
J. Föhr, Lappeenranta University of Technology, Mikkeli, FINLAND
T. Ranta, Lappeenranta University of Technology, Mikkeli, FINLAND

Session reference: 4AV.2.43
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Effect of a Fuel Terminal on the Quality of Stormwater

Short introductive summary:

As the use of wood fuel has grown, the number of fuel terminals in Finland has increased to ensure the availability and quality of wood fuel. The aim with the terminals is to ensure the service performance of wood fuel during consumption peaks and possible problem situations experienced in the supply chain. In addition to acting as storage space, the fuel terminals can also function as a processing facility for wood fuel.

Presenter: **Hanne SOININEN, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND**

Presenter's biography:

Research Manager in South-Eastern Finland University of Applied Sciences

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Laurila, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND

Session reference:	4AV.2.44
Subtopic:	4.3 Environmental impacts of bioenergy
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biomass Accident Investigations - Missed Opportunities for Learning and Accident Prevention

Short introductive summary:

The past decade has seen a major increase in the production of energy from biomass. The growth has been mirrored in an increase of serious biomass related accidents involving fires, gas explosions, combustible dust explosions and the release of toxic gasses. There are indications that the number of bioenergy related accidents is growing faster than the energy production. This paper argues that biomass accidents, if properly investigated and lessons shared widely, provide ample opportunities for improving safety performance of the biomass industry. The paper examines selected serious accidents involving biogas and wood pellets in Denmark and argues that such opportunities for learning were missed because accident investigations were superficial, follow-up incomplete and information sharing absent. Utmost care should be taken to avoid so-called media- shifting i.e. that the resolution of a problem within one domain, the environmental, creates a new problem in another, the workplace safety domain.

Presenter: **Frank H. HEDLUND, COWI, Kongens Lyngby, DENMARK**

Presenter's biography:

Dr Hedlund is Risk Expert at COWI and associate external professor at the Technical University of Denmark (DTU) teaching risk management. He has 25 years of experience, working for clients in industry and government carrying out risk and safety studies and industrial accident prevention work.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F.H. Hedlund, COWI, Kongens Lyngby, DENMARK

Session reference: 4AV.2.45

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Logistical Case Study for the Aragon Region using the LocaGIStics Tool

Short introductive summary:

Paper on cases study with LocaGIStics

Presenter: **Bert ANNEVELINK, Wageningen Food & Biobased Research, Biorefinery & Sustainable Value Chains Dpt., Wageningen, THE NETHERLANDS**

Presenter's biography:

The expertise of Dr Bert Annevelink is logistics, production planning and scheduling in the field of biomass supply chains. He is involved in several studies on the optimization of biomass logistics, e.g. the S2Biom project and the Biomass Yard project.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Annevelink, Wageningen Food & Biobased Research, Wageningen, THE NETHERLANDS
D. Garcia Galindo, CIRCE Foundation, Zaragoza, SPAIN
S. Espatolero, CIRCE Foundation, Zaragoza, SPAIN
I. Staritsky, Wageningen Environmental Research (Alterra), Wageningen, THE NETHERLANDS

Session reference:	1AO.7.1
Subtopic:	1.2 Biomass Feedstock, Residues and By-products
Topic:	1. BIOMASS RESOURCES

Simulation-Based Assessment of the Properties and Performance of a Biomass Terminal

Short introductive summary:

The paper presents a simulation approach to the analysis of biomass terminal's performance and profitability. The paper highlights the importance of time-dependent factors in the analysis, and discusses how the results from simulation runs can support the design and optimization of the entire biomass supply system.

Presenter: **Olli-Jussi KORPINEN, Lappeenranta University of Technology, Laboratory of Bioenergy, Mikkeli, FINLAND**

Presenter's biography:

Olli-Jussi Korpinen, M. Sc. (For.), works as a project researcher at Lappeenranta University of Technology. His main research topics are to analyze biomass availability and sourcing with GIS-based methods and biomass logistics with simulation approach.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O.-J. Korpinen, Lappeenranta University of Technology, Mikkeli, FINLAND
M. Aalto, Lappeenranta University of Technology, Mikkeli, FINLAND
M. Virkkunen, VTT Technical Research Centre of Finland, Jyväskylä, FINLAND
J. Raitila, VTT Technical Research Centre of Finland, Jyväskylä, FINLAND
T. Ranta, Lappeenranta University of Technology, Mikkeli, FINLAND

Session reference: 1AO.7.2
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

The Energetic Recover of Biomass from River Maintenance: the REBAF Project

Short introductive summary:

This paper exposes the first results of an Italian regional project called REBAF. This project concerns the modeling, realization and experimental validation of innovative pathways for the exploitation of grass and woodsy biomasses from river maintenance operations. The final goal is to make the river maintenance operations self-sustainability from the economic and environmental point of views.

Presenter: **Simone PEDRAZZI, University of Modena and Reggio Emilia, of Engineering "Enzo Ferrari" - Bio Energy Efficiency Laboratory (BEELAB), Modena, ITALY**

Presenter's biography:

Simone holds M.Sc. and Ph.D. degrees in Mechanical Engineer at the University of Modena and Reggio Emilia. He works as teaching assistant at the University of Modena and Reggio Emilia and he is a co-founder of the Bio Energy Efficiency Lab (BEELab).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Pedrazzi, University of Modena and Reggio Emilia, Modena, ITALY
G. Allesina, University of Modena and Reggio Emilia, Modena, ITALY
N. Morselli, University of Modena and Reggio Emilia, Modena, ITALY
M. Puglia, University of Modena and Reggio Emilia, Modena, ITALY
L. Barbieri, University of Modena and Reggio Emilia, Modena, ITALY
I. Lancellotti, University of Modena and Reggio Emilia, Modena, ITALY
E. Ceotto, CREA-CIN, Bologna, ITALY
L. Giorgini, University of Bologna, ITALY
A. Malcevschi, University of Parma, ITALY
C. Pederzini, Campogalliano Municipality, Modena, ITALY
P. Tartarini, University of Modena and Reggio Emilia, Modena, ITALY

Session reference: 1AO.7.3
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Analysis of aTransformation Process of Vineyard Pruning into Chips by a Micro Plant

Short introductive summary:

The Italian wine making covers 18.4% of the global production representing the world's largest production. The cultivation of the vineyards foresees the winter pruning that's necessary for the preparation to the next year's production. The annual pruned biomass (1-3 t ha-1) is considered a waste and is removed by shredding or burning. The possibility of take advantage of the pruned material obtaining biomass for heating processes represents an alternative that can turns a waste into a further product of the vineyard. The easiest size to manage the pruned biomass for energy purposes is wood chips; nevertheless it requires specific equipment and has to face the problem of residual humidity. Moreover, the transport to a processing center represents an unsustainable extra cost. A viable solution could be represented by harvesting the pruned biomass in small diameter (450 mm) round-bales, let them dry naturally and then chipping the whole round-bales with a purpose-designed mill, powered by the tractor power take-off (PTO) itself. The present research evaluates the sustainability of such solution and presents a study case carried out in a typical North-West Italy production area.

Presenter: **Carlo BISAGLIA, CREA-ING, Treviglio, ITALY**

Presenter's biography:

Dr. Carlo Bisaglia is a senior researcher at CREA-ING, Research Laboratory of Treviglio, Italy. His research activity concerns mechanization and automation; precision agriculture and livestock farming; safety and ergonomics in agricultural machinery; renewable energy production and use.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Bisaglia, CREA-ING, Treviglio, ITALY
E. Romano, CREA-ING, Treviglio, ITALY

Session reference: 1AO.7.4
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Identification of Energy Hubs for The Exploitation of Residual Biomass in an Area of Western Sicily

Short introductive summary:

The proposed research represents a methodical approach to the development and application of an analysis model; the model focuses on the identification of possible hubs for the energy exploitation of residual biomass from crops grown in Western Sicily.

Presenter: **Salvatore LA BELLA, University of Palermo, Agricultural and Forest Sciences Dpt., Palermo, ITALY**

Presenter's biography:

Prof. Salvatore La Bella works at the university of palermo as resercher, the main topics are: roof garden, energy crops, phytoremediation, aromatic and medicinal plants. He has published more than 30 papers in reputed journals and has been serving as an editorial board member of repute.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Orlando, University of Palermo, ITALY
C. Greco, University of Palermo, ITALY
T. Tuttolomondo, University of Palermo, ITALY
C. Leto, University of Palermo, ITALY
I. Cammalleri, University of Palermo, ITALY
S. La Bella, University of Palermo, ITALY

Session reference:	1AO.7.5
Subtopic:	1.2 Biomass Feedstock, Residues and By-products
Topic:	1. BIOMASS RESOURCES

Low-Temperature Corrosion in Biomass-Fired Combustion Plants - Online Measurement of Corrosion Rates, Acid Dew Points and Deliquescence Corrosion

Short introductive summary:

Modern biomass heating and CHP plants usually feature some kind of heat recovery unit downstream the boiler to improve the energy efficiency of the plant. A common problem for all these systems is that, depending on the operating conditions, corrosion related damages at the heat exchangers may occur. Within a currently ongoing Austrian R&D project the application of a newly developed low temperature corrosion probe to investigate low temperature corrosion mechanisms as well as the development, design and construction of appropriate experimental heat exchangers and long-term test runs with these heat exchangers shall provide fundamental knowledge about acid dew points and critical parameters for deliquescence based corrosion for various biomass fuels and process conditions. The results gathered should form the basis to develop a methodology regarding suitable process control, design concepts and material selection for such heat exchangers.

Presenter: **Thomas BRUNNER, Bios Bioenergiesysteme, Graz, AUSTRIA**

Presenter's biography:

Studied Chemical Engineering at Graz University of Technology
PhD thesis "Aerosols and coarse fly ashes in fixed-bed biomass combustion–formation, characterisation and emissions" at Eindhoven University of Technology.
Since 1995 project manager at BIOS BIOENERGIESYSTEME GmbH, Graz(AT).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Reisenhofer, BIOS Bioenergiesysteme, Graz, AUSTRIA
I. Obernberger, BIOS Bioenergiesysteme, Graz, AUSTRIA
T. Brunner, BIOS Bioenergiesysteme, Graz, AUSTRIA
W. Kanzian, BIOS Bioenergiesysteme, Graz, AUSTRIA
M. Forstinger, BIOS Bioenergiesysteme, Graz, AUSTRIA

Session reference: 2AO.8.1
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Investigations on the Formation and Classification of Slags from Combustion Chambers of BMHP Plants

Short introductive summary:

In the framework of a research project slags on the walls from combustion chambers of dif-ferent biomass heat and power plants (BMHP plants) with locations in Europe and Asia are investigated systematically to find coherences between the biomass input and the resulting slag properties. The investigation results of three BMHP plants of different pollution degrees show different formation velocities, macroscopic appearances and chemical-mineralogical compositions depending on the combusted biofuel. Especially high contents of newly formed silicates and oxides and low melting Si-K-Na melting phases lead to voluminous and hard slags on combustion chamber walls.
On the basis of the test results a model is developed which describes the slag formation and a classification scheme is proposed which allows the evaluation of slags with regard to the pollution potential. The investigation results can be used for an optimized fuel specific design of new BMHP plants as well as the basis for fuel- and process optimization measures for existing plants.

Presenter: **Jürgen REICHELT, IBR, Bruchsal, GERMANY**

Presenter's biography:

Dr.-Ing. Jürgen Reichelt studied geology at the University of Karlsruhe, Germany. He received his doctorate degree at the faculty of civil engineering and worked there until 2004. Since 2004 he is managing director of the engineering consultant IBR.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Reichelt, IBR, Bruchsal, GERMANY
G. Pfrang-Stotz, Karlsruhe Institute of Technology - ITC, GERMANY
B. Bergfeldt, Karlsruhe Institute of Technology -ITC, GERMANY

Session reference: 2AO.8.2
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

A Thermochemical Approach Based on Phase Diagrams to Characterize Biomass Ash and Select the Optimal Thermal Conversion Technology

Short introductive summary:

In the recent years, a growing interest for opportunity solid fuels, such as short-rotation energy crops and agro-biomass, is observed. The combustion (or gasification) of these fuels often leads to operational issues due to theÂ presence of liquid matter, including agglomeration or slag formation in reactors. The characterization of these fuels concerning their ash behaviour is still challenging. In fact, simplified and flexible tools for the fuel screening and applicability are based on semi-empirical approaches. In this study we propose a methodology based on thermodynamicÂ equilibrium computations of ternary phase diagrams of the main oxides in ash, to support an integrated fuelÂ characterization strategy. In the plots the liquidus and solidus (respectively, 100% and 0% liquid limits) isotherms are added. From these results, preliminary information on the appropriate thermal conversion technology to be used forÂ specific solid fuel can be deduced.

Presenter: **Lucio DE FUSCO, Université Catholique de Louvain, iMMC Dpt., Louvain-la-neuve, BELGIUM**

Presenter's biography:

Lucio De Fusco obtained his Ph.D. at the Université catholique de Louvain, Belgium. His research focused on the development of characterization tools for solid biomass fuels and was performed in collaboration with ENGIE.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Defoort, CEA, Grenoble, FRANCE
H. Jeanmart, Université catholique de Louvain, Louvain-la-Neuve, BELGIUM

Session reference: 2AO.8.3
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Chemical-looping Combustion of Biomass in a 100 kW Pilot

Short introductive summary:

Chemical-looping combustion (CLC) is an innovative carbon-capture technology with potential to drastically reduce the cost of capture. By using a circulating bed material to transfer oxygen from the combustion air to the fuel, air and fuel are never mixed and the CO2 can be obtained as a separate flue gas stream, undiluted by N2. In other words, in contrast to other capture technologies, which are burdened with a significant energy penalty, carbon capture is inherent to the CLC process. Chemical-looping combustion of biomass in combination with carbon capture and storage would lead to so called negative emissions.

Manganese ores are highly promising oxygen-carrier candidates due to high reactivity and high availability. Here, we present findings from a 100 kW chemical-looping combustor for solid fuels, using a sintered manganese ore called “Sinaus” as oxygen carrier and two kinds of wood pellets as fuel. Preliminary results from 6 h of operation with steam-exploded wood pellets show fuel conversion up to 78 percent, and essentially complete CO2 capture. The expected lifetime of the oxygen carrier particles was found to be 100-250 hours.

Presenter: **Carl LINDERHOLM, Chalmers Tekniska Högskola Göteborg, Energy and Environment Dpt., Göteborg, SWEDEN**

Presenter's biography:

Linderholm forskar på kemcyklisk förbränning (CLC), vilket är en teknik för CO2-infångning vid storskalig förbränning för tex kraftproduktion. Infångningen åstadkoms med hjälp av en syrebärare - en partikelformig, sand-liknande, metalloxid, som transporterar syre från förbränningsluft till bränsle.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Linderholm, Chalmers University of Technology, Göteborg, SWEDEN
A. Lyngfelt, Chalmers University of Technology, Göteborg, SWEDEN
M. Rydén, Chalmers University of Technology, Göteborg, SWEDEN
M. Schmitz, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 2AO.8.4
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biomass Co-Firing Studies in Pilot Scale Combustion Systems: Effects of Biomass Co-Firing Methods to In-Furnace NOx Reduction

Short introductive summary:

Several options of direct biomass co-firing to pulverized coal power plants -(1) blending biomass and coal before existing coal pulverizers(Method 1), (2) using biomass dedicated mill(s) and injecting the milled biomass to streams of pulverized coal(Method 2) and (3) using a biomass dedicated mill and inject the mill biomass directly to the furnace (separated biomass injection) (Method 3)- were tested and their effects to in-furnace NOx reduction were evaluated in 80 kWt and 1 MWt combustion systems.

Presenter: **Won YANG, Korea Institute of Industrial Technology, Thermochemical Energy System R&D Group, Cheonan-si, REPUBLIC OF KOREA**

Presenter's biography:

Dr. Won Yang received his B.S., M.S. and Ph.D. degrees (1995, 1997, 2004, respectively) in department of mechanical engineering at KAIST. In 2004, he performed researches on modeling of coal combustion in the same department and institute as a post-doctor. He started to study oxy-fuel combustion when he was in KIST (2005), and planned a large-scale oxy-PC demonstration project after moving to KITECH (Korea Institute of Industrial Technology) as a senior researcher (2006). He has performed the oxy-PC demonstration project in KITECH (2007-2012). Currently he is a principal researcher and director of Thermochemical Energy System R&D Group at KITECH, and leading a biomass co-firing project in Korean pulverized coal power plants.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

W. Yang, Korea Institute of Industrial Technology, Cheonan-si, Chunchungnam-do, REPUBLIC OF KOREA
T. Chae, Korea Institute of Industrial Technology, Cheonan-si, Chunchungnam-do, REPUBLIC OF KOREA
J. Lee, Korea Institute of Industrial Technology, Cheonan-si, Chunchungnam-do, REPUBLIC OF KOREA
B. Kang, Institute of Industrial Technology, Cheonan-si, Chunchungnam-do, REPUBLIC OF KOREA
Y. Lee, Korea Institute of Industrial Technology, Cheonan-si, Chunchungnam-do, REPUBLIC OF KOREA
C. Ryu, Sungkyunkwan University, Suwon, Kyunggi-do, REPUBLIC OF KOREA
U. Lee, Korea Institute of Industrial Technology, Cheoan-si, REPUBLIC OF KOREA

Session reference: 2AO.8.5
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Alkane Production from Biomass: A Chemocatalytic Liquid Phase Cellulose-To-Naphtha Process

Short introductive summary:

Lignocellulose is often presented as a renewable carbon source for the production of fuels, chemicals and materials. In an attempt to select the most appropriate biomass source for each specific alkane-based application, a diagram inspired by van Krevelen is applied. As a result of the enormous abundance in nature, (ligno)cellulose seems to be the most appropriate feedstock for short alkanes. Therefore, a one-pot biphasic catalytic system is here described to synthesize light naphtha alkanes from a mildly refined, cheap and raw cellulose feedstock.

Presenter: **Aron DENEYER, KU Leuven, Center for Surface Chemistry and Catalysis, Heverlee, BELGIUM**

Presenter's biography:

- 2014- ... / PhD researcher at KU Leuven / Topic: "Catalytic conversion of lignocellulose into light naphtha"
- 2012-2014 / Master of Science in Bioscience Engineering [Magna cum laude] / Master thesis: "Hierarchical zeolites as potential catalysts in the commercial valorization of terpenes"

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Deneyer, KU Leuven, Heverlee, BELGIUM
M. Dusselier, KU Leuven, Heverlee, BELGIUM
B. Sels, KU Leuven, Heverlee, BELGIUM

Session reference: 3AO.9.1

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Making the Bridge between Biomass and Hydrocarbon in a Standard Refinery

Short introductive summary:

A conventional refinery is based on mature processes that obtain standard products from a large variety of non-renewable feed. Despite enormous benefits to modern civilization, the adopted production and consumption patterns paradoxically put us at environmental risk. Therefore it is mandatory a paradigm shift for decreasing carbon footprint without reducing the energy access to people. Herein, we present the production of green hydrocarbons in two steps: Firstly biomass was transformed in a black bio-crude (density around 1.0-1.3 gmL-1 and CHO composition of 60, 8 and 32 respectively) by the combination of acid catalyzed hydrolysis with organic reactions like ketalyzation in acetone or alternatively by acetylation reactions in acetic anhydride in mild temperature condition (around 100oC). Sequentially, bio-crude and model compounds were transformed by the fluid catalytic cracking and hydrotreatment into monoaromatic and saturated hydrocarbons respectively. As a consequence of bio-crude behaves like hydrocarbons under realistic refinery process, oil could be partially substituted by bio-crude or, in the future; an entirely green refinery could operate using renewable feeds

Presenter: **Marcelo PEREIRA, Universidade Federal do Rio de Janeiro, Chemistry Dpt., rio de janeiro, BRAZIL**

Presenter's biography:

Chemical Engineering at UFRJ in 1991, D.Sc. Degree in COPPE/UFRJ in 1997. Research is focused on applied catalysis in hydrocarbons, emission mitigation, CO2 recycling, biomass, green hydrocarbon production and new routes for catalyst and material preparations.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Pinto, Universidade Federal do Rio de Janeiro, BRAZIL
L. Soter, Universidade Federal do Rio de Janeiro, BRAZIL
M. Pereira, Universidade Federal do Rio de Janeiro, BRAZIL

Session reference: 3AO.9.2

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Carbohydrates and Furans from Seaweeds for Fuels and Chemicals

Short introductive summary:

Seaweed biomass is a renewable carbon source complementary to lignocellulosic and micro-algae biomass to produce fuels and chemicals via biorefinery approaches [1]. As seaweed grows off-shore, it neither competes with the food supply nor has other land use issues. Since about ¾ of the earth is covered by water and seaweeds grow fast, the potential is large. The main constituents of seaweeds are (specialty) carbohydrates, proteins and minerals. The carbohydrates can be used to produce fuels and platform chemicals either biochemically or chemocatalytically. The proteins can contribute to alleviating the growing need for feed protein, whereas the minerals can be recycled into sustainable fertilizers. Finally, the organic process residues could be digested for energy purposes.

As examples of seaweed biorefinery concepts, we will present the isolation of carbohydrates from the green macroalgae Ulva lactuca and the red macroalgae Palmaria palmata. Subsequently, we will discuss conversion of these carbohydrates into furans for application as biofuel or platform chemical. Presented work is part of the EU-H2020 MacroFuels project.

Presenter: **Wouter HUIJGEN, Energy Research Centre of the Netherlands, Biomass & Energy Efficiency Dpt., Petten, THE NETHERLANDS**

Presenter's biography:

Wouter Huijgen works as a research scientist and project leader at the Energy research Centre of the Netherlands (ECN). His research focuses on biorefinery technologies for both seaweeds and lignocellulosic biomass as well as lignin valorisation.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

W.J.J. Huijgen, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
G. van Hees, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
A.T. Smit, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
J.W. van Hal, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS

Session reference: 3AO.9.3
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Fischer-Tropsch Synthesis: Effects of Feedstock Load Changes Regarding Product Quality and Catalyst Attrition

Short introductive summary:

This work is the result from unique research about Fischer-Tropsch synthesis with biomass derived syngas.
As 2015 presented, the Winddiesel project carried out at Güssing, Austria is a promising way to use surplus wind energy to produce hydrocarbon based fuels and bio waxes via water electrolysis and Fischer-Tropsch synthesis. First results are achieved concerning catalyst attrition due to oscillating feed stock in a slurry reactor. Furthermore investigations on product quality are carried out at the moment.

Presenter: **Hannes GRUBER, TU Wien, Institute of Chemical, Environmental & Biological Engineering, Vienna, AUSTRIA**

Presenter's biography:

Phd student at TU Wien since 2016 with research focus on

-Fischer-Tropsch synthesis
-Biorefineries/Biofuels
-Product development

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Gruber, TU Wien, Vienna, AUSTRIA
P. Groß, TU Wien, Vienna, AUSTRIA
R. Rauch, Bioenergy 2020+, Güssing, AUSTRIA
H. Hofbauer, TU Wien, Vienna, AUSTRIA
C. Aichernig, TU Wien, Vienna, AUSTRIA
R. Zweiler, TU Wien, Wien, AUSTRIA
G. Weber, Bioenergy 2020+ GmbH, Güssing, AUSTRIA
J. Loipersböck, 2020+ GmbH, Güssing, AUSTRIA
j. Niel, TU Wien, Wien, AUSTRIA
D. Wahringer, TU Wien, Wien, AUSTRIA
A. Reichhold, TU Wien, Wien, AUSTRIA

Session reference: 3AO.9.4
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of Fuel Ethanol and Higher Alcohols from Biomass Residue

Short introductive summary:

This paper presents interim results from a collaborative effort between US and European researchers to develop MAS synthesis products from biomass.

Presenter: **Matthias BINDER, Bioenergy 2020+, Guessing, AUSTRIA**

Presenter's biography:

Matthias Binder graduated in chemical process engineering at TU Wien. After graduation, he started working for BIOENERGY 2020+ GmbH in the area of biomass gasification systems. In 2015 he started his PhD in the field of biomass to liquids, based on biomass steam gasification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Summers, West Biofuels, Woodland, CA, USA
C. Liao, West Biofuels, Woodland, CA, USA
M. Hoffman, West Biofuels, Woodland, CA, USA
M. Hart, West Biofuels, Woodland, CA, USA
R. Seiser, UC San Diego, La Jolla, CA, USA
U. Neimann, UC San Diego, La Jolla, CA, USA
R. Cattolica, UC San Diego, La Jolla, CA, USA
R. Rauch, Bioenergy 2020+, Guessing, AUSTRIA
M. Binder, Bioenergy 2020+, Guessing, AUSTRIA

Session reference:	3AO.9.5
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Producing Single Phase Fast Pyrolysis Condensates from Straw by Staged Condensation

Short introductive summary:

The study demonstrates the possibility of producing single-phase bio-oils from agriculture feedstocks (like straw) by using a staged condensation of the volatiles. Depending on the application defined single-phase bio-oils can be produced by changing the condensation temperatures.

Presenter: **Stefan CONRAD, Fraunhofer-Institut UMSICHT, Biorefinery and Biofuels Dpt., Oberhausen, GERMANY**

Presenter's biography:

Stefan Conrad is a PhD student and research associate of the group "Thermochemical Processes and Hydrocarbons" at Fraunhofer UMSICHT, Germany. Since 2012 he deals with biomass pyrolysis, especially ablative flash pyrolysis for agricultural residues.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Conrad, Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, Oberhausen, GERMANY
T. Schulzke, Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, Oberhausen, GERMANY
C. Blajin, Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, Oberhausen, GERMANY

Session reference: 3AV.3.1

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

A Combined Process of Acid Extraction and Pyrolysis of Manure to Recover Phosphorus and Obtain Solid Adsorbents

Short introductive summary:

Phosphorus (P), an essential element in organic life, is currently obtained from phosphate rock, a non-renewable source. Due to the likely future scarcity of this non-renewable source, new sources of P are required. Organic residues such as manure appear as a P source. P could be extracted by chemical treatment of manure with acid. However, we have to keep in mind that manure is a waste generated in high quantity which needs to be correctly managed. Pyrolysis seems an interesting technology to manage this kind of wastes, reducing the volume of residue, and producing three potential valuable products (liquid, gas and solid). An acid pre-treatment of the waste before pyrolysis could activate the solid providing adsorbent characteristic to the solid product (char) obtained after the pyrolysis. These two processes (P extraction and acid activation) show some similarities in the operational conditions.

Presenter: **Gloria GEA, University of Zaragoza, Chemical Engineering Dpt., Zaragoza, SPAIN**

Presenter's biography:

phD in Chemical Engineering from the University of Zaragoza since 2001. I work at Thermochemical Processes Group. I have contributed in more than 30 publications

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Atienza-Martínez, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
N. Ruiz-Gómez, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
M. García, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
I. Fonts, Centro Universitario de la Defensa, Zaragoza, SPAIN
J. Ábrego, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
G. Gea, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN

Session reference:	3AV.3.2
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Enhancing Pyrolysis Oils' Thermal Stability by Supercritical Carbon Dioxide as a Solvent

Short introductive summary:

For improving the stabilization of pyrolysis oils the suitability of supercritical carbon dioxide as a solvent will be investigated. For this an apparatus for measuring the carbon dioxide solubility in pyrolysis oils is under construction.

Presenter: **Clarissa BAEHR, Karlsruhe Institute of Technology, Institute of Catalysis Research and Technology, Eggenstein-Leopoldshafen, GERMANY**

Presenter's biography:

Clarissa Baehr holds a Master degree in Chemistry from the University of Göttingen and a Bachelor degree in Chemical Engineering from the University of Darmstadt for Applied Sciences. Since 2016 she is working on her PhD thesis at the Karlsruhe Institute of Technology.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Baehr, Institute for Catalysis Research and Technology, Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, GERMANY

Session reference:	3AV.3.6
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Characterization of Light and Heavy Phase of Pyrolysis-Oils from Distinct Biomass for Further Upgrading Reactions

Short introductive summary:

The composition and physicochemical properties of fast-pyrolysis oil strongly differ depending on the biomass feedstock. Especially if upgrading to a liquid fuel or to platform chemicals are intended, the oil has to be characterized in detail.

In this presentation, bio-oils from wheat straw and beech wood were analyzed by different techniques, in order to investigate the possibility to work with pyrolysis liquids after phase separation into a light and a heavy phase, or with almost homogenous oil. The results are crucial for catalyst selection and will be correlated with the composition of the upgraded products expected.

Presenter: **Caroline CARRIEL SCHMITT, Karlsruhe Institute of Technology, IKFT Dpt., Eggenstein-Leopoldshafen, GERMANY**

Presenter's biography:

.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Carriel Schmitt, KIT IMT, KARLSTUHE, GERMANY
C. Boscagli, KIT IKFT, KARLSTUHE, GERMANY
M. Rapp, KIT IMT, KARLSTUHE, GERMANY
K. Raffelt, KIT IKFT, KARLSTUHE, GERMANY
N. Dahmen, KIT IKFT, KARLSTUHE, GERMANY

Session reference: 3AV.3.15

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Experimental Estimation of the Heat Requirements of Biomass Pyrolysis Under Self-Generated Atmosphere

Short introductive summary:

Pyrolysis under a self-generated atmosphere could allow the use of smaller setups, gives a non-condensable product with greater energy content, and reduces the energy requirements, since there is no need to heat an inert gas flow, and secondary (exothermic) reactions may be favoured due to increased gas residence time. Besides, estimation of the energy requirements of pyrolysis is of utmost importance for the efficient design and scale up of any kind of pyrolysis system. It is important to distinguish between heat 'of' and heat 'for' pyrolysis. The first refers only to the energy required (or given off) to drive the reactions for the conversion of biomass into products. The second also includes sensible heat for heating the feedstock to the pyrolysis temperature. Heat requirements of pyrolysis have been estimated using different methodologies. However, the disparity of experimental conditions, reactors and feedstocks makes it difficult to reach a consensus not only on the value but even on the endothermic or exothermic nature of the process. In this work, product distributions and heat of/for pyrolysis in a fixed-bed reactor under self-generated atmosphere have been investigated.

Presenter: **María ATIENZA-MARTÍNEZ, Universidad de Zaragoza, Aragón Institute for Engineering Research, Zaragoza, SPAIN**

Presenter's biography:

María Atienza-Martínez is a PhD researcher at Universidad de Zaragoza (Spain). Her research activity is related to wastes and biomass thermochemical treatment (pyrolysis and torrefaction). She has so far published 9 scientific papers and participated in numerous international conferences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Abrego, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
F Plou, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
M. Atienza-Martinez, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
I. Fonts, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
G. Gea, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN

Session reference: 3AV.3.17

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Pyrolysis and in-line Reforming of Biomass: Effect of Catalyst Deactivation on Hydrogen Production

Short introductive summary:

The continuous pyrolysis and in-line catalytic steam reforming of biomass is one of the most promising routes to produce hydrogen from a renewable source. Pyrolysis of biomass has been carried out in a conical spouted bed reactor and the volatiles derived from biomass pyrolysis have subsequently reformed in a fluidized bed reactor. High conversion of volatiles to gas (99 %) and hydrogen yields (93 %) are obtained using the two-step pyrolysis-reforming strategy.

Presenter: **Laura SANTAMARIA, University of the Basque Country, Chemical Engineering Dpt., Bilbao, SPAIN**

Presenter's biography:

Chemical Engineer. PhD Researcher in the Chemical Engineering Department of the University of the Basque Country. Research fields: pyrolysis and catalytic steam reforming of biomass and plastic waste.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Arregi, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
G. Lopez, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
M. Amutio, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
M. Artetxe, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
J. Alvarez, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
I. Barbarias, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
L. Santamaria, University of the Basque Country (EHU/UPV), Bilbao, SPAIN
M. Olazar, University of the Basque Country (EHU/UPV), Bilbao, SPAIN

Session reference: 3AV.3.19
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Effect of Promoter La2o3 on Ni/al2o3 Catalysts in the Steam Reforming of Volatiles Derived from Biomass Pyrolysis

Short introductive summary:

Despite the fact there are many different methods to generate hydrogen by direct thermochemical processes, the strategy of biomass fast pyrolysis and in-line reforming of volatile products is one of the most economically-feasible and promising routes.
The pyrolysis of biomass, which takes place in a conical spouted bed reactor (CSBR) and the catalytic steam reforming of the volatiles which occurs in a fluidized bed reactor. The catalysts synthesized have been Ni/Al2O3 and Ni/La2O3-Al2O3 with a nickel content of 10%.
With the results obtained can be concluded that La2O3 provides stability to the Ni/Al2O3 catalyst, thereby attenuating significantly its deactivation, and presents better performance in terms of H2 yield and selectivity.

Presenter: **Laura SANTAMARIA, University of the Basque Country, Chemical Engineering Dpt., Bilbao, SPAIN**

Presenter's biography:

Chemical Engineer. PhD Researcher in the Chemical Engineering Department of the University of the Basque Country. Research fields: pyrolysis and catalytic steam reforming of biomass and plastic waste.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Santamaria, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
G. Lopez, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
M. Amutio, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
M. Artetxe, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
J. Alvarez, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
I. Barbarias, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
A. Arregi, University of the Basque Country (EHU-UPV), BIlbao, SPAIN
M. Olazar, University of the Basque Country (EHU-UPV), BIlbao, SPAIN

Session reference: 3AV.3.20
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Thermochemical Conversion of Textile Waste to Useful Commodities

Short introductive summary:

This research focuses on thermochemical methods for conversion of textile waste to useful commodities. This aim is achieved by an initial comprehensive literature survey on available technologies and consequently selecting the most suitable one and optimizing the process conditions to obtain the optimal quality by-product in the required quantities.

Presenter: **Roozbeh KALATEH, Heriot-Watt University, School of Engineering and Physical Sciences, Edinburgh, UNITED KINGDOM**

Presenter's biography:

I graduated from the University of Edinburgh with a MEng degree in chemical engineering. Following my graduation, I perused a PhD in bio-fuel field. The focus of my research is on thermochemical conversion of textile waste to chemical commodities.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Kalateh, Heriot-Watt University, Edinburgh, UNITED KINGDOM
A. Sanna, Heriot-Watt University, Edinburgh, UNITED KINGDOM

Session reference: 3AV.3.21

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Pyrolysis of Digested and Non-Digested Manure. A Comparative Study

Short introductive summary:

Intensive livestock production has led to increase the localized generation of manure. The inadequate manure storage and land application methods are causing important environmental problems. Composting and digestion anaerobic processes reduce the risk of spreading pathogens with the application of manure to land, but do not avoid the addition of nutrients in excess. The EU Framework Programme for Research and Innovation establishes the need for developing sustainable technologies for the management of manure. The pyrolysis appears as a potential method for valorising these types of residues. The pyrolysis could allow recuperating the nutrients content in the wastes and obtaining renewable energy and added-value products. The yield and the properties of the three product fractions from pyrolysis (gas, liquid and char) are influenced by the origin (digested o non-digested) and the pre-treatments applied to the manure. Therefore, the evaluation of the different alternatives based on pyrolysis for the management of the manure requires the comparative studies on pyrolysis, under the same operating conditions, of different types of manure.

Presenter: **Gloria GEA, University of Zaragoza, Chemical Engineering Dpt., Zaragoza, SPAIN**

Presenter's biography:

phD in Chemical Engineering from the University of Zaragoza since 2001. I work at Thermochemical Processes Group. I have contributed in more than 30 publications

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Ruiz-Gómez, Thermochemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad d, Zaragoza, SPAIN
F. Molinés, Thermochemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad d, Zaragoza, SPAIN
D. Aznar, Thermochemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad d, Zaragoza, SPAIN
J. Ábrego, Thermochemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad d, Zaragoza, SPAIN
M.B. Murillo, Thermochemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad d, Zaragoza, SPAIN
G. Gea, Thermochemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad d, Zaragoza, SPAIN

Session reference:	3AV.3.24
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Phosphorus Recovery from Sewage Sludge and Manure

Short introductive summary:

Phosphorus (P) is an essential element for organic life. P is currently extracted from phosphate rock, a non-renewable source. P extraction costs are increasing due to the decrease in the availability and quality of phosphate rock reserves. These problems make necessary to find new P sources. Organic wastes such as sewage sludge and manure, containing P, could serve as renewable sources of this essential element. P could be recovered from these wastes by an extraction process with acids. This extraction step generates a liquid product that contains the P and an organic solid. The implementation of P recovery from organic wastes by acid extraction would require the establishment of the procedure to be followed to recuperate P from the liquid and also an option to use the organic solid obtained. The chemical and physical characterization of both streams (liquid and solid) generated during the acid extraction is needed in order to advance in the development of a technology that allows recovering P from organic wastes and at the same time use the treated solid correctly. This work is a preliminary study to develop a technology to recover P from organic wastes.

Presenter: **Isabel FONTS, Centro Universitario de la Defensa, Chemical and Environmental Engineering Dpt., Zaragoza, SPAIN**

Presenter's biography:

In 2010 I finished my PhD about sewage sludge valorization by means of pyrolysis. My main research lines are the valorization of bio-wastes (sewage sludge, manure, meat and bone meal, black liquors) by pyrolysis and gasification.I am author of 18 papers and around fourty conference proceedings.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Ruiz-Gómez, Thermo-chemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad, Zaragoza, SPAIN
C. Pina, Thermo-chemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad, Zaragoza, SPAIN
M. Martínez, Thermo-chemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad, Zaragoza, SPAIN
M. Atienza-Martínez, Thermo-chemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad, Zaragoza, SPAIN
L. Lázaro, Thermo-chemical Processes Group (GPT), Aragón Institute for Engineering Research (I3A), Universidad, Zaragoza, SPAIN
I. Fonts, Chemical and Environmental Department, Centro Universitario de la Defensa, Zaragoza, SPAIN

Session reference: 3AV.3.25

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Product Distribution and Heat for Pyrolysis of Dry Sewage Sludge

Short introductive summary:

Pyrolysis of sewage sludge is an emerging alternative for managing this residue and thus would require a good knowledge of the influence of operational parameters on product distribution and characteristics. However, the use of autogenous atmospheres has been seldom investigated, nor has been the experimental determination of the heat involved in the process. Performing pyrolysis under a self-generated atmosphere allows to reduce the energy consumption (no need to heat an inert gas stream). Moreover, the energy use of the gas product would be easier because it is not diluted in inert gas. The fact that the gas surrounding the solid is composed of the vapours produced during the pyrolysis itself could have effect on the products distribution since the residence time of the vapours is increased. Different approaches have been developed to evaluate the heat involved in pyrolysis with high disparity in the results, due to the different experimental conditions and starting material used, and also in the different methodologies followed. Knowledge of the heat requirements is necessary for the design of pyrolysis systems, especially for heat integration and temperature control.

Presenter: **María ATIENZA-MARTÍNEZ, Universidad de Zaragoza, Aragón Institute for Engineering Research, Zaragoza, SPAIN**

Presenter's biography:

María Atienza-Martínez is a PhD researcher at Universidad de Zaragoza (Spain). Her research activity is related to wastes and biomass thermochemical treatment (pyrolysis and torrefaction). She has so far published 9 scientific papers and participated in numerous international conferences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Atienza-Martínez, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
A. Morales, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
J. Ábrego, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
I. Fonts, Centro Universitario de la Defensa, Zaragoza, SPAIN
G. Gea, Aragón Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN

Session reference: 3AV.3.26

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Py-GCxGC MS for Studying Thermal and Catalytic Pyrolysis of Biomass

Short introductive summary:

Comprehensive two dimensional GCxGC offers increased separation capabilities compared to conventional one dimensional GC, which makes the technique suitable for complex samples such as biomass. Pyrolysis GCxGC MS can be used for characterizing biomass and also for studying biomass pyrolysis processes. In the present work Py-GCxGC MS was used to study thermal and catalytic pyrolysis of pine. The results show that when the pyrolysis is performed in the presence of a catalyst, more aromatic hydrocarbons are formed. The recorded chromatograms are complex, demonstrating both the high separation power of the GCxGC method and the necessity for high separation power for this type of samples.

Presenter: **Linda SANDSTRÖM, RISE Bioeconomy, SP ETC, Piteå, SWEDEN**

Presenter's biography:

I have a PhD in Chemical Engineering from Luleå University of Technology (2012). Since 2014 I work as a researcher at SP ETC, with a main focus on pyrolysis, especially characterization of pyrolysis oil.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Sandström, SP Energy Technology Center AB, Piteå, SWEDEN
A.-C. Johansson, SP Energy Technology Center AB, Piteå, SWEDEN

Session reference: 3AV.3.28

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Evaluation of Biochar Based Products as Hydrotreating Catalysts for the Production of Renewable Fuel

Short introductive summary:

Roelf Venter is a Post Doctoral researcher at the School for Chemical and Mineral Engineering at Northwest University in Potchefstroom, South Africa. Roelf is focussing on thermochemical processes which includes hydrothermal liquefaction and hydrotreatment of bio-oils for the production of renewable bio-hydrocarbons. Roelf completed his PhD in 2013 in the field of biodiesel production from non-edible oils.

Presenter: **Roelf VENTER, North West University, Chemical and Minerals Engineering Dpt., Potchefstroom, SOUTH AFRICA**

Presenter's biography:

Roelf Venter is involved as a Post Doctoral Fellow, focussing on the production of Renewable Diesel at the School for Chemical and Mineral Engineering of the North West University in South Africa. Roelf completed his PhD in 2013 in the field of biodiesel production.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.J. Venter, Nortwest University, Potchefstroom, SOUTH AFRICA
S. Marx, Nortwest University, Potchefstroom, SOUTH AFRICA
C. Schabort, Nortwest University, Potchefstroom, SOUTH AFRICA
J.G. Booysen, Nortwest University, Potchefstroom, SOUTH AFRICA

Session reference: 3AV.3.30
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Value Enhancement of Microalgae Utilization Employing Mild Extraction and Hydrothermal Treatment for Protein and Bio-Oil Production

Short introductive summary:

I am a lecturer/researcher in the department of mechanical engineering, Kasetsart University, Thailand. Currently, my scope of research is waste and biomass conversion technology focusing on hydrothermal treatment/carbonization/liquefaction technology, pyrolysis of e-waste, gasification at medium/small/micro scale and other physical conversion of biomass.

Presenter: **Chinnathan AREEPRASERT, Kasetsart University, Mechanical Engineering Dpt., Bangkok, THAILAND**

Presenter's biography:

I am a lecturer/research in the department of mechanical engineering, Kasetsart University. I got my Ph.D. from Tokyo Institute of Technology. Currently, I am working on waste and biomass conversion technology including hydrothermal process, pyrolysis, gasification, and combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Kuhavichanan, Kasetsart University, Bangkok, THAILAND
P. Kusolkumbot, Thailand Institute of Scientific and Technological Research, Pathum Thani, THAILAND
J. Kaharn, Kasetsart University, Bangkok, THAILAND
A. Suemanotham, Thailand Institute of Scientific and Technological Research, Pathum Thani, THAILAND
S. Sirisattha, Thailand Institute of Scientific and Technological Research, Pathum Thani, THAILAND
C. Areeprasert, Kasetsart University, Bangkok, THAILAND

Session reference: 3AV.3.32

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Microwave Pyrolysis of Lignocellulosic Biomass in Solvents to Produce Fuels, Sugars and High Value Chemicals

Short introductive summary:

This paper presents a novel microwave pyrolysis process that uses liquid solvents as an inerting medium to provide improved temperature control and ultimately product quality compared to conventional pyrolysis processes. Varying the solvent type does not affect the quality of the pyrolysis products greatly, and so solvents that allow for pyrolysis to occur well should be chosen. Varying microwave transparent solvents, such as hydrocarbons, does not affect the overarching performance of the microwave pyrolysis process, and so should be chosen in accordance with desired processing parameters such as separation ease, cost, environmental safety, and boiling points. Overall, pyrolysis in a solvent medium was found to produce higher quality products than gaseous-inerted microwave pyrolysis without a significant increase in energy consumption.

Presenter: **Benjamin SHEPHERD, University of Nottingham, Chemical & Environmental Engineering, Nottingham, UNITED KINGDOM**

Presenter's biography:

Benjamin Shepherd is a first year PhD researcher at the University of Nottingham working under the supervision of Dr. John Robinson, utilising novel solvent-inerted microwave pyrolysis methods of lignocellulosic biomass to obtain fuels, sugars and high value chemicals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Shepherd, University of Nottingham, University of Nottingham, UNITED KINGDOM
J. Robinson, University of Nottingham, University of Nottingham, UNITED KINGDOM
E.T. Kostas, University of Nottingham, University of Nottingham, UNITED KINGDOM

Session reference: 3AV.3.33

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Release and Transformation of Chlorine and Potassium During Pyrolysis Of KCl-Loaded Cellulose

Short introductive summary:

There are many factors that could affect the release behavior of Cl and K during biomass thermal conversion process, such as the occurrence forms of K and Cl. It has been reported that K and Cl may exist in raw biomass in the forms of KCl. During biomass thermal conversion, KCl may react with organic functional groups in biomass which will obviously affect their release characteristics. However, the relationship between the interaction extent and the content of KCl in biomass was poorly understood. On the other hand, the occurrence forms of K in char generated after thermal conversion is hard to determine. Char associated K and K2CO3 are both possible to occur and the corresponding ratio remains unclear. Because of the complexity of biomass macromolecular structure and inorganic composition, it's hard to obtain a thorough understanding on K and Cl release and transformation mechanism. In this study, cellulose (a major component in most types of biomass) was used to investigate the transformation and release behavior of Cl and K during pyrolysis process.

Presenter: **Haibo ZHAO, Tsinghua University, Thermal Engineering Dpt., Beijing, P.R. CHINA**

Presenter's biography:

Haibo Zhao is a doctor candidate at Department of Thermal Engineering, Tsinghua University. He works on the migration of AAEM during biomass thermal conversion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H.B. Zhao, Tsinghua University, Beijing, P.R. CHINA
Q. Song, Tsinghua University, Beijing, P.R. CHINA
Q. Yao, Tsinghua University, Beijing, P.R. CHINA

Session reference: 3AV.3.37

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Two-Step Pyrolysis of Biomass as a Method to Enhance Fuel Quality of Pyrolytic Liquids

Short introductive summary:

In this project a novel method to enhance fuel quality of pyrolytic liquids is investigated. The method is based on introducing a low-temperature pyrolyzer (similar to torrefaction) upstream the ordinary pyrolysis unit, in order to reduce content of water, oxygen and acids in the pyrolytic liquid (issues leading to lower fuel quality and thermodynamic instabilities). In this way the demand on downstream processing is reduced and thermodynamic stability as well as fuel performance of pyrolytic liquids are directly enhanced in a simple method.

Presenter: **Henry PERSSON, KTH Royal Institute of Technology, Material Science and Engineering Dpt., Stockholm, SWEDEN**

Presenter's biography:

PhD Candidate in Fast Pyrolysis of Biomass. Research focus on biomass pretreatment together with in-situ upgrading of pyrolytic liquids. Hold a MSc Chemical Engineering, KTH, Stockholm together with BSc Chemical Science and Engineering, KTH.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Persson, KTH Royal Institute of Technology, Stockholm, SWEDEN
P. Evangelopoulos, KTH Royal Institute of Technology, Stockholm, SWEDEN
W. Yang, KTH Royal Institute of Technology, Stockholm, SWEDEN

Session reference:	3AV.3.38
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Characterisation of the Twin Screw Mixing Reactor Used for Fast Pyrolysis of Biomass

Short introductive summary:

This work is focused on the characterisation and optimisation of twin screw mixing reactors, used for pyrolysis of biomass. Going to commercial use, it is necessary to optimise the reactor in terms of product yield and to optimise the plant in terms of stability. A numerical approach was chosen.
At first, DEM-Simulation where done and validated to describe the sold-solid particles interaction.
Further, the DEM-Simulation was extended, using CFD. This way, it is possible to simulate not only the fluid behaviour, but also the fluid-solid interactions.
So far, the DEM-Simulation is set up. With it, it was possible to extinct the solid dead zones, by modifying the reactor geometry, make assumptions on the influence of rotation speed and test different screw geometries.
The CFD-DEM coupling, was extended with Immersed Boundaries to describe the dynamic screw rotation. On time, there will be a simple kinetic added, that improves the accuracy in thermodynamics. This allows to describe heat conduction and convection, mixing of solid and fluid and the fluid velocity, which can be used to prevent fluid dead zones and minimize decomposition and fluid residence time.

Presenter: **Robert GRANDL, Karlsruhe Institute of Technology, IKFT Dpt., Nordheim, GERMANY**

Presenter's biography:

2006-2013 Mathematics at University of Heidelberg
2013- PhD. at Karlsruher Institute of Technology

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Grandl, Karlsruhe Institute of Technology - IKFT, Eggenstein-Leopoldshafen, GERMANY
A. Funke, Karlsruhe Institute of Technology - IKFT, Eggenstein-Leopoldshafen, GERMANY
N. Dahmen, Karlsruhe Institute of Technology - IKFT, Eggenstein-Leopoldshafen, GERMANY
J. Sauer, Karlsruhe Institute of Technology - IKFT, Eggenstein-Leopoldshafen, GERMANY

Session reference: 3AV.3.39
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Alternative Fuels from Biomass and Power (PBtL) - A Case Study on Process Options, Technical Potentials, Fuel Costs and Ecological Performance

Short introductive summary:

Greenhouse gas emissions in the transport sector shall be reduced to reach globally agreed COP21 goals. One option is to replace fossil based fuels with bio-based alternatives. The technical potential of biofuels made from energy crops (1st generation), biomass and waste wood (2nd generation) typically suffer from the limited technical potential of biomass resources in central Europe. Biofuel output can significantly be increased in the Power&Biomass-to-Liquid (PBtL) concept. The main idea is to utilize the large technical exploitation potential of renewable electricity in modified BtL plants. The case study presents detailed results on promising process configurations of Fischer-Tropsch PBtL concepts based on different gasifiers and electrolyzers in terms of fuel production potentials, fuel costs and CO2 footprint.

Presenter: **Friedemann Georg ALBRECHT, DLR - Institut für Technische Thermodynamik, Stuttgart, GERMANY**

Presenter's biography:

2008-2012 Bachelor degree in energy and process engineering from the Technical University of Munich (TUM)
2012-2014 Master degree in renewable energy technologies from the Technical University of Denmark (DTU)
2015- now Research Assistent at German Aerospace Center (DLR)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F.G. Albrecht, German Aerospace Center (DLR), Stuttgart, GERMANY
R-.U. Dietrich, German Aerospace Center (DLR), Stuttgart, GERMANY

Session reference: 3AV.3.42

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biomass Pyrolysis: A Set of Complementary Analytical Methods Available at CNRS

Short introductive summary:
In this poster, we will present the analytical methods developed at CNRS Nancy in collaboration with numerous institutions (CNRS Mulhouse and Strasbourg; Rostock, Hefei & Nottingham Universities, Photonion company, etc.). Cutting-edge methods have been combined for a comprehensive analysis of biomass pyrolysis products (gas, tar, char) under well defined pyrolysis conditions.
Tar are analysed on-line by photoionisation mass spectrometry and GC*GC/MS-FID.
Char are analysed by quantitative solid-state NMR.
In-situ analyses (1H NMR, rheology) are developed to study in real time the formation of intermediate species during biomass pyrolysis.

Presenter: **Francis BILLAUD, CNRS-LRGP, Process Engineering Biomass Dpt., Nancy, FRANCE**

Presenter's biography:
biomass valorization

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y. Le Brech, CNRS, Nancy, FRANCE
A. Dufour, CNRS, Nancy, FRANCE
F. Billaud, CNRS, Nancy, FRANCE

Session reference: 3AV.3.45
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Characterization of De- and Repolymerization Products from Lignin Hydrothermal Treatment by Analytical Pyrolysis

Short introductive summary:

The purpose of this work is to better understand lignin reaction paths during hydrothermal treatment. This is achieved using molecular mass fractionation combined with pyrolysis-GC-MS, which results in an increased fraction of lignin HTT products available for chemical analysis.
The improved pyrolysis-GC-MS methodology enabled monitoring differences in the aromatic substitution between low and high molecular mass products. The results indicate that lignins with high syringol content are less prone to repolymerize during HTT.

Presenter: **Mads JENSEN, Aarhus University, Dpt. of Chemistry, Aarhus C, DENMARK**

Presenter's biography:

PhD student with project entitled "Chemical analysis of products from hydrothermal treatment of lignin".

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.M. Jensen, Department of Chemistry, Aarhus University, Aarhus, DENMARK
R.B. Madsen, Department of Chemistry, Aarhus Universityhemistry, Aarhus University, Aarhus, DENMARK
J.B. Becker, Department of Chemistry, Aarhus University, Aarhus, DENMARK
B.B. Iversen, Department of Chemistry, Aarhus University, Aarhus, DENMARK
M. Glasius, Department of Chemistry, Aarhus University, Aarhus, DENMARK

Session reference: 3AV.3.48
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Effects of Substituents on the Initial Pyrolysis Mechanism of ß-O-4 Type Lignin Dimer Model Compounds

Short introductive summary:
Five ß-O-4 type lignin dimer model compounds are selected to investigate the effect of substituents (OCH3, OH and CH2OH) on the initial pyrolysis mechanism by employing density functional theory methods at M06-2X level with 6-31+G(d,p) basis set. The results indicate that Paths 1-4 are the prevalent pyrolysis pathways for ß-O-4 type lignin dimers, and the reactivity order is as follows: Path 4 Path 3 Path 1 Path2. o-CH3O-PPE or (o-CH3O)2-PPE with one or two methoxyl groups at the ortho-position of the ether bond will decompose through an additional Path 5 which is only second to Path 4. Methoxyl group can decrease the energy barrier of Path 1. a-OH-PPE with a hydroxyl group at Ca position has another two unique pyrolysis pathways, namely Paths 6 and 7 which can hardly occur due to high energy barriers. Hydroxyl group at Ca position has an inhibitory effect on Paths 1, 3 and 4. ß-CH2OH-PPE with a hydroxymethyl group at Cß position will undergo two unique pathways to decompose, namely Paths 8 and 9 which are competitive in the pyrolysis process. Hydroxymethyl group at Cß position can reduce the energy barriers of Paths 3 and 4.

Presenter: **Xiaoyan JIANG, North China Electric Power University, Beijing, P.R. CHINA**

Presenter's biography:
Ms. Xiaoyan Jiang is currently a Ph.D. candidate supervised by Dr. Changqing Dong in North China Electric Power University. Her research focuses on the efficient utilization of biomass by thermochemical conversion techniques.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
X.Y. Jiang, North China Electric Power University, Beijing, P.R. CHINA
Q. Lu, North China Electric Power University, Beijing, P.R. CHINA
B. Hu, North China Electric Power University, Beijing, P.R. CHINA
J. Liu, North China Electric Power University, Beijing, P.R. CHINA
C.Q. Dong, North China Electric Power University, Beijing, P.R. CHINA

Session reference: 3AV.3.50
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Reforming of Raw Pyrolysis Oils with a New Catalyst Derived from Nickel Functionalization of a Mining Residue

Short introductive summary:

Previous publications have shown that a new nickel catalyst (PCT patent pending) prepared from an ilmenite metallurgical residue consisting of an upgraded slag oxide (UGSO) is highly efficient in dry reforming (DR) of methane (CH_4).
In this work the said catalyst was tested for the reforming of liquid products derived from the pyrolysis of various biomass feedstock. These liquids naturally contain sufficient quantities of water which serves as reforming agent.
The reforming reactions were conducted in a fixed bed operated as a differential reactor at 750-850°C and atmospheric pressure using two pyrolysis oils at an average mole O/C ≈ 1.0-2.9 and an average space velocity between 1-5 mL/h.gcat. The catalytic performance was evaluated by means of: (a) liquid carbon conversion; CO and H_2 yields in the produced syngas; CH_4 and other hydrocarbons selectivity and steady state regime stability over time-on-stream. Moreover, the carbon formation tendency was evaluated and found that it is nearly nil.

Presenter: **Nicolas ABATZOGLOU, Université de Sherbrooke, Chemical Engineering and Biotechnological Engineering Dpt., Sherbrooke, CANADA**

Presenter's biography:

Dr. Nicolas Abatzoglou is full professor and has served as Chairman/Head of the Department of Chemical & Biotechnological Engineering of the Université de Sherbrooke (Dec. 2008- Dec. 2012). He is also Adjunct Professor at the University of Saskatchewan, Department of Chemical Engineering. He is a specialist in Process Engineering involving Thermochemical & Catalytic conversion as well as particulate systems in reactive and non-reactive environments. He is the Director of the PIFIR/UdeS Research Centre GREEN-TPV (Groupe de Recherche en Énergie/Environnement-Technologies et Procédés Verts). Since May 2008, he is the holder of the Pfizer Industrial Research Chair in Process Analytical Technologies (PAT) in Pharmaceutical Engineering. He is the Leader of Thermo-Chemical Conversion Theme in Canada's Network of Centers of Excellence BioFuelNet on Biorefining which has started its activities recently with a funding of 25M$ for 5 years. He is also the Leader of the Fuel Preparation Theme in SOFC Canada Network operated with a funding of 5M$ over 5 years (2008-2013). His activities produced the only patent of the Network. He is co-founder of the company Enerkem Inc., a spin-off of the Université de Sherbrooke. Enerkem commercializes technologies in the field of energy from renewable resources (i.e. biomass and waste streams gasification; cellulosic ethanol). He has a career of many years at both the academic and industrial levels. He represented Canada at the International Energy Agency (Gasification Task) from 1997-2001 and was the secretary of the Board of Directors and the Executive Committee of the AQME from 1996-2000. His research activities during the six last years are:

- Particulate systems in non-reactive environments: dry powder processing
- Steam and dry reforming of methane, ethanol, diesel and biofuels.
- New Fischer-Tropsch Synthesis nanocatalytic formulations for the production of Biofuels (Green Diesel and Higher Alcohols) from biosyngas and biogas.
- Process Analytical Technologies (PAT) in Pharmaceutical Engineering
- Carbon sequestration through CO_2 (dry) reforming.
- Biogas purification using granular adsorbents.

His production as researcher includes a hundred of publications in scientific reviews, international conferences, plenary and invited lectures, patents and three book chapters. He currently supervises or co-supervises 10 graduate students and 3 undergraduate students in specialty projects or training sessions. His professional experience as engineer spreads over a dozen of years. He is member of the BioFuelNet and SOFC Canadian Networks. He is official reviewer of research grants/funding programs in Canada, EU and Asia countries. He has received a dozen of distinctions and awards both for his teaching and research achievements. Prof. Abatzoglou is married with Eleni and has two children (daughter and son; both MD surgeons). He is trilingual (Greek-French-English-) and knowledgeable in Spanish. He has also a considerable social contribution in cultural associations and social causes and believes that happiness cannot be reached without equilibrium of all life components.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Abatzoglou, Universitè de Sherbrooke, CANADA
J. Blanchard, Universitè de Sherbrooke, CANADA
A. Bali, Universitè de Sherbrooke, CANADA
M. Chamoumi, Universitè de Sherbrooke, CANADA

Session reference:	3AV.3.52
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

17 Years of Intermediate Pyrolysis: A Major Step Towards CHP Applicable Bio-Oils

Short introductive summary:

The research focuses on the development of a new thermochemical process to convert biogenic carbon based residues into valuable storable products to contribute to current energy, environmental and resource challenges. The Thermo-Catalytic Reforming (TCR®) is an intermediate pyrolysis combined with a unique integrated catalytic reforming step. Various biogenic and industrial residues like digestate, sewage sludge, and municipal solid waste and also blends thereof were tested and characterized in a TCR®-plant. The TCR®-oils can be utilized by proven technologies like small and medium scale CHP engines as well as diesel and gasoline engines in automobile applications. The purpose of this work is to compare different fast pyrolysis concepts with intermediate pyrolysis technologies and highlight the latest achievements of the TCR® technology focusing on medium scale applications. The research at Fraunhofer UMSICHT focuses on the integration of the TCR® technology with these technologies to enable a sustainable transition from the fossil fuel age to meet the political targets for 2020 and beyond.

Presenter: **Johannes NEUMANN, Fraunhofer-Institut UMSICHT, Renewable Energy Dpt., Sulzbach-Rosenberg, GERMANY**

Presenter's biography:

Project Manager at Fraunhofer UMSICHT

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Apfelbacher, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
N. Jäger, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
R. Daschner, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
J. Neumann, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
S. Binder, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
A. Hornung, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY

Session reference:	3AV.3.58
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Fast Pyrolysis of Pine Wood at Pre-Industrial Scale: Yields and Products Chemical-Physical Characterisation

Short introductive summary:

Pyrolysis consists in a thermal decomposition of organic materials into three valuable products: a gaseous mixture, a liquid phase, and a carbon-rich residue. Particular attention is actually posed on the liquid phase, because the European Commission promotes the production of renewable fuels as substitutes for the fossil ones. Moreover, the pyrolysis liquid could be used to produce chemicals, while the solid residue could be employed in soils amelioration and contrast to pollution.
Though the interest in pyrolysis is vivid, the yields and products composition that could be attained are still questionable. Indeed, they depend strongly on the feedstock properties, operating conditions, and reactor design.
Experimental campaigns at pre-industrial scale could contribute to providing more reliable information on the amounts and quality of the fuels obtained. With this aim, a set of pyrolysis tests was carried out using a pilot plant on a pre-industrial scale. In this study, forest biomass was used as feedstock and the process temperature was chosen as a variable. The yields were evaluated, and products quality determined and discussed in the light of their use as fuels.

Presenter: **Carla ASQUER, Sardegna Ricerche, Biomass and Biofuel Laboratory, Uta, ITALY**

Presenter's biography:

I'm a senior environmental engineer at the Biomass and Biofuel Laboratory and PhD student from the University of Cagliari (Italy).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Asquer, Sardegna Ricerche, Cagliari, ITALY
A. Pistis, Sardegna Ricerche, Cagliari, ITALY
C. Tugulu, Sardegna Ricerche, Cagliari, ITALY
F. Floris, University of Cagliari, Cagliari, ITALY
E.A. Scano, Sardegna Ricerche, Cagliari, ITALY

Session reference:	3AV.3.59
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Upgrading of Fast Pyrolysis Bio-Oil in Supercritical Alcohols

Short introductive summary:

In this work, fast pyrolysis bio-oil is produced from empty palm fruit bunch; it has drawbacks such as the higher heating value (HHV) is 16.24 MJ kg-1, total acid number (TAN) is 92.21 mg KOH g-1 and water content is 23.72 wt%. It is upgraded using supercritical methanol without using any external catalysts and hydrogen.

Various reaction parameters including temperatures, concentration, and reaction times are controlled to optimize the properties of upgraded bio-oil. For example, At 400 °C for 30 min, the sugar component in fast pyrolysis bio-oil is decomposed completely, and almost all the carboxylic acid species are converted to their corresponding ester component. As a results, a low TAN of 3.98 mg KOH g-1 and low water content of 4.0 wt% in the upgraded bio-oil are obtained. When the reaction time increased from 10 min to 2 h, the higher heating value (HHV) of upgraded oil increases from 27.9 to 32.9 MJ kg-1. The upgrading in supercritical ethanol is compared with those in supercritical ethanol and supercritical isopropanol.

Presenter: **Heuntae JO, Sungkyunkwan University, Mechanical Engineering Dpt., Suwonsi, REPUBLIC OF KOREA**

Presenter's biography:

Sungkyunkwan University bachelor's degree 2016

Sungkyunkwan University master's course start at 2016

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Jo, SungKyunKwan university, Suwon, REPUBLIC OF KOREA
H. Prajitno, SungKyunKwan university, Jakarta, INDONESIA
J. Kim, SungKyunKwan university, Suwon, REPUBLIC OF KOREA

Session reference: 3AV.3.62

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Energy Production from Chicken Litter by Pyrolysis and Torrefaction

Short introductive summary:

In this paper the method of thermochemical convention of chicken litter into solid fuel or gas fuel are presented. It allow to decrease volume of organic wastes and to obtain energy for own needs of consumer.

Presenter: **Olga LARINA, Joint Institute for High Temperatures of the Russian Academy of Sciences, Moscow, RUSSIAN FEDERATION**

Presenter's biography:

I graduated from Bauman Moscow State Technical University in 2007.In present time I am PhD-student in Joint Institute for High Temperatures of the Russian Academy of Sciences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Larina, Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Moscow, RUSSIAN FEDERATION
V. Zaichenko, Joint Institute for High Temperatures of the Russian Academy of Sciences (JIHT RAS), Moscow, RUSSIAN FEDERATION

Session reference:	3AV.3.63
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Up-scaling a Prototype Top-lit Up-draft Pyrolysis (TLUD-Pyro) Reactor

Short introductive summary:

Pyrolysis is among the most developed and studied conversion technologies. One of the disadvantages of pyrolysis process is that it needs external energy to initiate the process. However, the existing pyrolysis systems can be designed to be self-sustaining. A combined pyrolysis/gasification technology could be an option for self-sustained biomass conversion system, which obtains high-value products from crop residues.

Presenter: **Sajid LATIF, University of Hohenheim, Agricultural Engineering in the Tropics and Subtropics Dpt., Stuttgart, GERMANY**

Presenter's biography:

Sajid Latif did his Ph.D. in 2009 from University of Agriculture, Faisalabad by availing two scholarships from HEC, Pakistan. Right after his Ph.D. he was awarded with Humboldt postdoctoral fellowship at University of Hohenheim, Stuttgart, Germany.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Intani, Universität Hohenheim, Stuttgart, GERMANY
S. Latif, Universität Hohenheim, Stuttgart, GERMANY
C. Fink, Universität Hohenheim, Stuttgart, GERMANY
J. Müller, Universität Hohenheim, Stuttgart, GERMANY

Session reference: 3AV.3.65
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Thermogravimetric Analysis of Biomass Pyrolysis Using a Peak Temperature Method

Short introductive summary:

To predict the pyrolysis behaviour of biomass, numerical simulations rely on the accuary of a kinetic mechanism able to describe pyrolysis for a wide range of biomass and at different operating conditions. The biomass relative composition, in terms of cellulose, hemicellulose and lignin, is needed in order to apply multi-component mechanisms suitable for different types of biomass, as long as its composition is known. This relative composition can be estimated from the biomass thermogravimetric analysis using computational methods instead of traditional wet chemistry analysis. In this work, the relative amounts of the biomass components are estimated, minimizing the difference between the biomass thermogravimetric data and the predicted pyrolysis behaviour of the components, using kinetic data already proposed in the literature.

Presenter: **Teresa MARTÍ-ROSSELLÓ, University of Strathclyde, Chemical and Process Engineering Dpt., Glasgow, UNITED KINGDOM**

Presenter's biography:

I am currently a PhD student in the department of Chemical and Process Engineering of the University of Strathclyde and my research is focused on numerical simulation of biomass pyrolysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Martí-Rosselló, University of Strathclyde, Glasgow, UNITED KINGDOM
J. Li, University of Strathclyde, Glasgow, UNITED KINGDOM
L. Lue, University of Strathclyde, Glasgow, UNITED KINGDOM

Session reference:	3AV.3.66
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Feasibility Study of a Pyrolysis Conversion Plant for Heat and Power Production with Sewage Sludge as Feedstock - Mass and Energy Balance

Short introductive summary:

Nowadays, two of the main discussed environmental questions are the reduction of landfilled waste and the investigation of new energy sources. Thermochemical conversion processes could give a contribution to both abovementioned issues.
Pyrolysis is a thermochemical conversion process that load to a broad spectrum of products (in gas, liquid and solid phase) by means of feedstock thermal degradation. The amount and properties of the pyrolysis products are influenced by process conditions. Pyrolysis can be set to maximize liquid products or gas products playing with process temperature and residence time. Here the goal is to maximize the gas production and quality.
The pyrolysis of organic waste could be a viable path to reduce the waste material and recover energy. In the present work experimental tests with sewage sludge have been run in a commercial pyrolysis plant (at small scale) with different residence time (20-30 minutes). Than the design of a pyrolysis conversion plant for energy generation starting from these waste materials has been studied.

Presenter: **Elisa PIERATTI, smarTeam, Environmental Engineering Dpt., Bolzano, ITALY**

Presenter's biography:

I have a degree in environmental engineering.- I did the PhD on biomass thermochemical conversion process (combustion, gasification and steam gasification). Now I' working for a small start up focused on industrial waste and byproducts valorization by means of thermochemical treatments.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Pieratti, smarTeam, Bolzano, ITALY
V. Cabbai, smarTeam, Bolzano, ITALY
A. Salino, smarTeam, Bolzano, ITALY
W. Capponi, smarTeam, Bolzano, ITALY

Session reference: 3AV.3.67

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

A Solar Driven Thermochemical Process for the Production of Biofuel

Short introductive summary:

The project aims to investigate a novel approach of linking concentrated solar power (CSP) with the thermochemical conversion of biomass.

Presenter: **Toby GREEN, University of Leeds, School of Process and Chemical Engineering, Leeds, UNITED KINGDOM**

Presenter's biography:

I am currently a PhD student at the University of Leeds within the School of Chemical and Process Engineering, taking part in the Bioenergy CDT programme. I am in the first year of the 4 year programme completing. Thesis title: 'Solar Driven Thermochemical Production of Biofuel'.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Green, University of Leeds, UNITED KINGDOM
A. Ross, University of Leeds, UNITED KINGDOM
R Crook, University of Leeds, UNITED KINGDOM

Session reference:	3AV.3.68
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Characterization of Biochar Produced from Various Biomass by Slow Pyrolysis

Short introductive summary:

Application of biochar from biomass pyrolysis to soil is drawing greater attentions for soil quality improvement and carbon sequestration. This study investigates the properties of biochar produced by slow pyrolysis at 500°C from five forestry and agricultural residues: wood (umbrella tree), sugarcane bagasse, cocopeat, paddy straw, and palm kernel shell. The mass yield, elemental composition, microscopic surface area, pH and other key properties are compared for the biochar samples, and the benefits for applications to soil and energy conversion are discussed.

Presenter: **Changkook RYU, Sungkyunkwan University, School of Mechanical Engineering, Suwon, REPUBLIC OF KOREA**

Presenter's biography:

Dr. Changkook Ryu is associate professor in the School of Mechanical Engineering at Sungkyunkwan University, Korea. His research interests are mainly on combustion, gasification and chemical conversion of coal and biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C Ryu, Sungkyunkwan University, Suwon, REPUBLIC OF KOREA
J Park, Sungkyunkwan University, Suwon, REPUBLIC OF KOREA
J Park, Korea Electric Power Coporation, Daejeon, REPUBLIC OF KOREA
Y Lee, Korea Institute of Industrial Technology, Cheonan, REPUBLIC OF KOREA
W Yang, Korea Institute of Industrial Technology, Cheonan, REPUBLIC OF KOREA

Session reference: 3AV.3.69

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Comparative Analysis of Fast Pyrolysis Products of Beech Wood, Flax Shives and Woody Pseudo-Components

Short introductive summary:

Flax shives are a major by-product of the flax industry in Normandy, France, their valorisation is an interesting field to ponder upon. So as to extract the fibres, the harvested flax is retted for several days on the fields in open air. Therefore, the flax shives used as raw materials might be teeming with impurities issued from flax processing. This study aims to analyse the liquid product distribution of fast pyrolysis of flax shives with respect to beech wood, which has already been studied in literature, and the three pure bio-polymers making up biomass.The most notable observation was that flax shives, despite having undergone physical treatments during flax harvest, still exhibited the same behaviour as beech wood with respect to the distribution of chemical groups present in its pyrolytic oils; the same trend of chemical families for both biomasses was noticed for families present in higher percentages. The findings unearthed from this study, apart from helping to understand the pyrolytic behaviour of flax shives, can also help in setting up an appropriate pre-treatment method for the biomass in order to enhance the produced bio-oil properties.

Presenter: **Chetna MOHABEER, INSA Rouen, Rouen, FRANCE**

Presenter's biography:

I am currently a 2nd year PhD student at INSA Rouen, located in Normandy, France. My thesis subject is the production and enhancing of fast pyrolytic bio-oils from agricultural residues. I am originally from Mauritius, and I have a Bachelors degree in chemical engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Mohabeer, INSA, Rouen, FRANCE
L. Abdelouahed, INSA, Rouen, FRANCE
S. Marcotte, INSA, Rouen, FRANCE
B. Taouk, INSA, Rouen, FRANCE

Session reference: 3AV.3.70

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Bio2energy Project: Bioenergy, Biofuels and Bioproducts from Municipal Solid Waste and Sewage Sludge

Short introductive summary:

The EU's effort to the full implementation of Circular Economy principles is an important driving force towards the development of a more effective recovery of resources (materials and energy) from organic fraction of municipal and industrial wastes. Anaerobic digestion (AD) is an efficient waste treatment for biodegradable residues that has gained interest during the last years as it converts organic matter into biogas, a renewable source of energy, and digestate, a valuable fertilizer and soil conditioner (Iacovidau et al., 2012). Nowadays AD is a well-established process but the production of more valuable by-products such as hydrogen and bioplastics continues to be a challenge. The paper presents the first experimental results of Bio2Energy project. Bio2Energy is a technology transfer project that aims to increase the production of renewable energy in Tuscany through the production of biofuel from organic waste. Bio2Energy aims to demonstrate the technical and economical feasibility of biohydrogen generation and renewable fertilizers production from the co-digestion of organic fraction on municipal solid waste.

Presenter: **Francesco BALDI, PIN S.c.r.l., Florence, ITALY**

Presenter's biography:

I studied environmental engineering at the University of Florence. From January 2014 I'm a research fellow at the University of Florence working for the Waste Valorization Group (DIEF - Department of Industrial Engineering). I collaborate with PIN S.c.r.l. in the field of research activities.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Pecorini, University of Florence, Department of Industrial Engineering, ITALY
D. Bacchi, PIN S.c.r.l. - Servizi didattici e scientifici per l'Università di Firenze, ITALY
E. Albini, PIN S.c.r.l. - Servizi didattici e scientifici per l'Università di Firenze, ITALY
F. Baldi, PIN S.c.r.l. - Servizi didattici e scientifici per l'Università di Firenze, ITALY
P. Rossi, DIEF - Department of Industrial Engineering, University of Florence, ITALY
P. Paoli, DIEF - Department of Industrial Engineering, University of Florence, ITALY
L. Ferrari, DESTEC - Department of Energy, Systems, Territory and Construction Engineering, University of Pisa, ITALY
E.A. Carnevale, DIEF - Department of Industrial Engineering, University of Florence, ITALY
M. Peruzzini, Italian National Council for Research, ICCOM, Florence, ITALY
L. Lombardi, University Niccolò Cusano, Rome, ITALY
G. Ferrara, DIEF - Department of Industrial Engineering, University of Florence, ITALY

Session reference: 1BO.1.1
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Bioplastics and Biofuels from Urban Organic Wastes

Short introductive summary:

The paper consider an integrated approach to treat wastewater and other organic waste streams (MSW, agroindustrial residues, food processing residues) in order to recovery energy and high added value secondary products, such as PHA, which can be reinserted in the waste cycle. This approach, considering specific size cluster of 500.00 I.E. basins , can lead to a complete circular economy implementation to waste treatment scenario. Data coming from pilot scale application using real MSW substrates coming form a northern italy city (Treviso, 80000 E.I.) , coming 1 year long experiment period, will be presented.

Presenter: **Paolo PAVAN, University Cà Foscari of Venice, Environmental Sciences Dpt., Mestre, ITALY**

Presenter's biography:

Graduate in Industrial Chemistry in 1989, now full professor at University Ca Foscari of Venice, main research fields focuses on waste and wastewater treatment, circular economy, energy production from biomasses, chemical synthesis using mixed cultures. Author of more than 250 publications

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Majone, University of Rome La Sapienza, ITALY
P. Pavan, University of Venice, ITALY
D. Bolzonella, University of Verona La Sapienza, ITALY
F. Fatone, Polytechnical Univerity of Marche Region, Ancona, ITALY
F. Cecchi, Innoven srl, Verona, ITALY

Session reference: 1BO.1.2
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Enhanced Fatty Acid Generation from Meat Processing Dissolved Air Flotation Sludge Using a Quasi-Homogenous Catalyst

Short introductive summary:

For the first time, in-situ hydrolysis of dissolved air flotation (DAF) sludge catalysed via ion exchange for optimal fatty acid generation was demonstrated. Preliminary experiments were undertaken to facilitate fatty acid profile and lipid content as these inputs were crucial to the determination of the percentage fatty acids generated using standard titrimetric methods. Our initial results demonstrated that increments in the quasi-homogeneous catalyst load favoured the in-situ hydrolysis process while increments in the moisture content of DAF sludge negatively influenced fatty acid generation. The existence of optimal residence time and temperature conditions was established. The experimental showed that the catalysed in-situ hydrolysis reaction was severely hindered when long residence time and high temperatures were imposed. A response model for improved understanding of the reacting system was developed via central composite designs (CCDs) with the optimum conditions of the experimental system statistically determined. Model verification experiments were also undertaken with results obtained supporting the validity of the approach.

Presenter: **Zhifa SUN, Otago University, Physics Dpt., Dunedin, NEW ZEALAND**

Presenter's biography:

Zhifa studied chemical engineering at Northwest University (Xi’an, China), graduating in 1977. Afterwards, he went on to complete his ME at the Beijing University of Chemical Technology in 1982, and his PhD at Tianjin University in 1988. He is currently an A/Professor in Physics Department, Otago.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Okoro, Otago University, Dunedin, NEW ZEALAND
Z. Sun, Otago University, Dunedin, NEW ZEALAND
J. Birch, Otago University, Dunedin, NEW ZEALAND

Session reference: 1BO.1.3
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Evaluation of Industrial Prunus Cerasus Liquor Waste as a Source of Added Value Chemical Products and Energy

Short introductive summary:

There has been increasing research interest in the recovering of chemical products from residual biomass wastes either for energy or for added value products. Prunus cerasus cake from industrial sour cherry liquor manufacture is a waste that is produced in large quantities and normally discarded without any valorization. In the present study this sour cherry residue was analyzed in order to evaluate its potential for energy and added valued products. For this purpose the sour cherry residue was submitted to cascade of processing operations. Firstly the residue was extracted with water, in order to obtain an aqueous extract rich in phenolic compounds. Sequentially, the chemical composition (organic matter, fat, sugar and nitrogen content) of the remaining residue was also analyzed in order evaluate its potential as an energy source.

Presenter: **Ana Luisa FERNANDO, Universidade Nova de Lisboa, Ciências e Tecnologia Biomassa Dpt., Caparica, PORTUGAL**

Presenter's biography:

Ana Luísa Fernando holds a PhD in Environmental Sciences. Assistant Professor at Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.Main scientific areas: energy crops, remediation of contaminated soils, valorization of agro residues.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Mauricio, CBIOS/Universidade Lusofona; Elisa Camara, Lisboa, PORTUGAL
M.P. Duarte, MEtRICs/DCTB/FCT/UNL, Lisboa, PORTUGAL
A.L. Fernando, MEtRICs/DCTB/FCT/UNL, Lisboa, PORTUGAL
C. Rosado, CBIOS/Universidade Lusofona, Lisboa, PORTUGAL
A.M. Diaz-Lanza, Universidad de Alcalà, Madrid, SPAIN

Session reference: 1BO.1.4
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Mapping Organic Waste Potentials from Households

Short introductive summary:

Mapping organic waste potentials from households in the German Federal State Baden-Württemberg, enables and encourages the bioeconomical utilisation of waste streams. Bioeconomy is the future driving force for our economy and society. Avoiding the food-feed-fuel- and fibre-controversy, it is crucial to use organic waste materials as a substrate for biotechnological processes.
The total theoretical and technical potential of organic waste from households is yet unknown, although separate collection systems are well established in Germany. Thus the possible pathways of kitchen and garden waste streams are identified and the potential amount and biogas potential are investigated, e.g. through sorting analyses and laboratory tests. The settlement structure correlates as an indicator and allows spatial assessment. Mapping organic waste potentials from households is done through GIS-modelling. The obtained information serves as a basis for planning and taking action for the organic waste treatment. This offers opportunities to realise a step from the plain disposal sector towards a closed-loop economy.

Presenter: **Lea BOEHME, Institute for Sanitary Engineering, Water Quality and Solid Waste Management, SKA Dpt., Stuttgart, GERMANY**

Presenter's biography:

Scientific Assistant and PhD student at the Institute or Sanitary Engineering, Water Quality and Solid Waste Management Stuttgart, Germany. The research focus lies on the organic waste managemnt and treatment technologies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Boehme, University of Stuttgart, GERMANY
A. Fritzsche, University of Stuttgart, GERMANY
P. Pilsl, University of Stuttgart, GERMANY
D. Clauss, University of Stuttgart, GERMANY
M. Kranert, University of Stuttgart, GERMANY

Session reference:	1BO.1.5
Subtopic:	1.1 Biomass Potentials and Biomass Mobilisation
Topic:	1. BIOMASS RESOURCES

Closing The Loop: Chemical Composition and Economics of Building Blocks/Monomers from Indirect Gasification of Waste

Short introductive summary:

Gasification is a thermochemical process which converts solid fuels into a gas with a useful heating value that can be further processed into a variety of products (heat, power, fuels and chemicals), thus creating smart market opportunities for the valorization of low-value solid feedstock. Some of the outcomes of this work include the MILENA indirect gasification process, the OLGA tar removal. As part of the work for development and commercialization of the MILENA and OLGA technologies at industrial scale, this paper/presentation reports and compiles results of gasification tests performed at pilot scale using waste (industrial waste, plastic-rich waste). The results from the measurement campaign carried out at the pilot MILENA/OLGA show that the producer gas is a high calorific value gas, rich in base chemicals/monomers like ethylene, propylene, styrene and benzene. Furthermore, results show the technical possibility of the MILENA and OLGA for valorizing these feedstocks. The subsequent analysis of the results show that there is a very positive future business case if the valuable gas components are recovered. It also showed that compared to biomass gasification there is

Presenter: **Berend VREUGDENHIL, Energy Research Centre of the Netherlands, Bio Energy & Efficiency Dpt., Petten, THE NETHERLANDS**

Presenter's biography:

Berend Joost (Berend) Vreugdenhil holds an M.Sc. degree in Chemical Engineering from the Technical University Delft. In 2006 he started his career at ECN within the Syngas and SNG group, where research is focussed on developing the technology to produce sustainable natural gas from biomass. The first four years at ECN he was involved in the gasifier research, looking into the effect of bed materials on gas composition, temperature effects and the influence of gasifying medium. Next to this he also looked into the behaviour of tar and more precisely the condensation behaviour of tar in a producer gas.Since beginning of 2011 he is responsible of the tar removal technology developed by ECN, named OLGA, and is coordinating the research program into further optimizing this technology and broadening the range of applications of OLGA. In 2015 he changed in his role to Innovation Manager Gasification, which entails setting out program for gasification within ECN. The area he now is responsible for is gasification, gas cleaning and gas upgrading. Next to the production of substitute natural gas (SNG) from biomass/waste also the production of valuable chemicals (BTX, ethylene) are routes that are being developed

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.J. Grootjes, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
B.J. Vreugdenhil, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
G. Aranda Almansa, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
P. Kroon, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS

Session reference: 2BO.2.1
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Sorption Enhanced Reforming with the Novel Dual Fluidized Bed Test Plant at TU Wien

Short introductive summary:

The advanced 100 kW dual fluidized bed gasifier was presented at EUBCE 2016. First results showed the generation of a nitrogen-free product gas by allothermal steam gasification and olivine sand as bed material for the fluidized bed. This year (2017) experimental test runs with the so called sorption enhanced reforming process with calcite as bed material are shown. In the dual fluidized bed concept, the circulating bed material serves as a heat carrier to promote the endothermic gasification reactions. Additional, the bed material calcite is able to act as a CO_2 carrier. If temperatures in the gasification reactor and the combustion reactor are set adequately, CO_2 is partly removed from the product gas in the gasification reactor. At the same time hydrogen production is enhanced by reactions such as the water-gas-shift equilibrium. Thus, with the sorption enhanced reforming process a product gas with hydrogen contents up to 75 vol.-%db can be produced. By the use of fuels like wood or biogenic residues bio-hydrogen can easily and cost-effective be made available.

Presenter: **Johannes Christian SCHMID, TU Wien, Institute of Chemical Engineering, Vienna, AUSTRIA**

Presenter's biography:

Employment
since 2010 Researcher, TU Wien
2005-09 Own business
2005 Researcher, MCI Innsbruck
2000-04 Engineer, draftsman
Education
2010-16 Ececutive MBA studies, AIM
2008-14 Doctoral studies, TU Wien
2000-04 University of Appl. Sci., MCI Innsbruck
1993-98 Federal Higher Techn. Inst.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.C. Schmid, TU Wien, Vienna, AUSTRIA
J. Fuchs, TU Wien, Vienna, AUSTRIA
F. Benedikt, TU Wien, Vienna, AUSTRIA
S. Mueller, TU Wien, Vienna, AUSTRIA
H. Hofbauer, TU Wien, Vienna, AUSTRIA

Session reference: 2BO.2.2
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Catalytic Gasification of Pighair Biowastes with Hydrogen Generation over NiO/Al2O3 Catalyst for an Integrated Fuel Processor

Short introductive summary:

Hydrogen can be affectively turned out through the gasification of pighair biowastes (PBs). Therefore, the main objective was to investigate the gasification of PBs for H2 generation in a fixed-bed gasifier using 15 wt% NiO/Al2O3 catalysts at 760–900 K. Reduction of Ni(II) catalyst into Ni(0) was confirmed through XANES spectra and consequently EXAFS data shows that central Ni atoms have Ni–O and Ni–Ni bonds with bond distances of 2.04 ± 0.05 and 2.45 ± 0.05 Å, respectively. A simulated pilot-scale PBs catalytic gasification process with 99.9% H2 and 150 kW generation for a PEMFC were also obtained.

Presenter: **Chao-Lung CHIANG, Yuan Ze University, Chemical Engineering and Material Science Dpt., Taoyuan City, TAIWAN**

Presenter's biography:

I am a PhD student from Yuan Ze University in Taiwan. My research topics in MS and PhD programs are the development of porous materials for CO2 separative storage and the catalysis of CO2 for valuable chemicals fabrication. Until Now, I have more than 10 published articles in several journals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.L. Chiang, Yuan Ze University, Taoyuan, TAIWAN
K.S. Lin, Yuan Ze University, Taoyuan, TAIWAN
J.C.S. Wu, National Taiwan University, Taipei, TAIWAN
K.C.W. Wu, National Taiwan University, Taipei, TAIWAN
Y.Z. Huang, Chung Yuan Christian University, Taoyuan, TAIWAN

Session reference: 2BO.2.3
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Gasification Of Grapevines Pruning Residues Into A Fuel Flexible Gasification System: Experimental Investigation

Short introductive summary:

In May 2014 Yanmar co. Ltd installed a demonstration plant in Italy based on biomass gasification technology. The standard feedstock of the plant consists in wood chips from local forest. The reactor has been specifically addressed to Asian applications focused on fuel flexibility and can process also very high ash content biomass (such as rice husk). After the open top fixed bed downdraft reactor the gas reaches cyclone, bag filters, gas coolers, water scrubber and finally two Yanmar cogeneration units generating 20 kWe/35 kWth each. The paper describes the activity of exploiting original design features of the system to focus on low quality high ash content European biomass, such as residues from various fruit tree plantations.
The system preparation activity in order to adjust the gasification process and the test campaign with vine grapes pruning residues as feedstock will be reported. Results describing experimental operation parameters and measure of gas quality will be analysed and test run with different conditions compared.

Presenter: **Roberto MUSSI, Yanmar R&D Europe, Firenze, ITALY**

Presenter's biography:

Roberto Mussi was born in Italy in 1977. He graduated in Mechanical Engineering at Politecnico di Milano and obtained a PhD in Energetics at University of Florence. Roberto is now researcher on biomass gasification at Yanmar R&D Europe.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Mussi, Yanmar R&D Europe, Florence, ITALY
L. Pezzola, Yanmar R&D Europe, Florence, ITALY
A. Bellissima, Yanmar R&D Europe, Florence, ITALY
A.M. Rizzo, University of Florence, Florence, ITALY
H. Wakizaka, Yanmar biomass power generation group, Maibara, JAPAN
D. Chiaramonti, RE-CORD, Florence, ITALY

Session reference: 2BO.2.4
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Conversion of Tars on SOFC Anodes

Short introductive summary:

Tars are inevitable components of producer gas from gasification of biomass. Because of their condensing nature they are often regarded as the Achilles heel of biomass gasification. Tars can be utilized in SOFCs without degradation and hence extensive gas cleaning might be avoided.

Presenter: **Tobias HERRMANN, University of Erlangen-Nuremberg, Chair of Energy Process Engineering, Nürnberg, GERMANY**

Presenter's biography:

Studied Chemical Engineering at the KIT, Karlsruhe and thereupon Energy Science and Engineering at the TU Darmstadt. Since April 2016 he is working as Academic Researcher at the Chair of Energy Process Engineering, Friedrich-Alexander-University Erlangen-Nürnberg (FAU) focusing on the integration of solid oxide fuel cells and biomass gasification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Herrmann, Chair of Energy Process Engineering, Friedrich-Alexander-University of Erlangen-Nuremberg, Nürnberg, GERMANY
M. Dillig, Chair of Energy Process Engineering, Friedrich-Alexander-University of Erlangen-Nuremberg, Nürnberg, GERMANY
J. Karl, Chair of Energy Process Engineering, Friedrich-Alexander-University of Erlangen-Nuremberg, Nürnberg, GERMANY

Session reference: 2BO.2.5
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Mild Organosolv Fractionation of Lignocellulosic Biomass for Feedstock Flexible Biorefineries.

Short introductive summary:

ECN has developed a novel low-temperature organosolv fractionation process based on the use of ketones. The improved fractionation of lignocellulosic biomass combined with reduced biorefinery energy requirements has a large positive effect on the biorefinery economic feasibility.
The presentation will focus on solvent stability and feedstock flexibility for these biorefineries.

Presenter: **Arjan SMIT, Energy Research Center of the Netherlands, Biomass & Energy Efficiency Dpt., Petten, THE NETHERLANDS**

Presenter's biography:

Arjan Smit is a research engineer at ECN and focuses on technology development for cost-effective pretreatment of biomass and upgrading of low cost residual waste streams for commercially viable biorefineries.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.T. Smit, Energy Research Center of the Netherlands, Petten, THE NETHERLANDS

Session reference: 3BO.3.1

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Catalytic Reductive Fractionation: Introducing the Lignin-first Biorefinery

Short introductive summary:

The focal point of this contribution is the catalytic reductive fractionation of lignocellulose, a lignin-first biorefinery approach that recently receives increasing attention (B.F. Sels et al., Energy & Environmental Science, 2015; R. Rinaldi et al., Angewandte Chemie, 2014). Briefly, the process fractionates lignocellulose into a processable carbohydrate pulp, while selectively extracting and transforming the recalcitrant lignin polymer into a liquid product stream containing a select set of high-value phenolic mono- and dimers. This is in contrast to conventional pulping processes like Kraft or Organosolv pulping, yielding a degraded low-value lignin product that is rather unreactive towards depolymerization to chemicals.

Presenter: **Tom RENDERS, KU Leuven, Center for Surface Chemistry and Catalysis, Leuven, BELGIUM**

Presenter's biography:

Studies, KU Leuven
* Bachelor in Bio-Science Engineering, 2009-2012
* Master in Bio-Science Engineering, 2012-2014

PhD programme, KU Leuven, 2014-...
* Supervisor: Prof. Bert Sels
* Center for Surface Chemistry and Catalysis
* Topic: biorefinery, lignin conversion, bio-based chemicals

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Renders, KU Leuven, Leuven, BELGIUM
W. Schutyser, KU Leuven, Leuven, BELGIUM
S. Van den Bosch, KU Leuven, Leuven, BELGIUM
S.-F. Koelewijn, KU Leuven, Leuven, BELGIUM
B. Sels, KU Leuven, Leuven, BELGIUM

Session reference:	3BO.3.2
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Palm Kernel Meal (PKM) and Grass: Valorisation of Non-woody Biomass Streams by Conversion to Bio-energy and Bio-based Products

Short introductive summary:

The scarcity of biomass requires utilisation of a broader spectrum of biomass streams. Besides primary streams like wood, secondary and often contaminated tertiary biomass sources should be considered. This sets the urgency to move towards maximum and sustainable valorisation, achieved through optimal utilisation of the molecular capital in biomass. Biorefinery concepts play a significant role in this step forward. Moreover, many biomass streams are typically prone to issues in logistics and end-use as biofuels because of low energy density, sensitivity to biodegradability and poor grindability.

This project focuses on the development of optimised value chains that combine upstream biomass refining with the co-production of solid bioenergy carriers from economically attractive non-woody biomass streams. A specific case dealt with is the upstream extraction and separate valorisation of proteins out of relatively cheap biomass sources, using the lignin-rich residue fraction for the production of torrefaction pellets for power production. PKM and grass are identified as waste streams with high potential for upstream biorefinery and co-production of solid bio-energy carriers.

Presenter: **Pavlina NANOU, Energy Research Centre of the Netherlands, Biomass and Energy Efficiency Dpt., Petten, THE NETHERLANDS**

Presenter's biography:

Pavlina Nanou has 12 years of research experience on biomass conversion technologies. She has a chemical engineering background and since 2013 she is working as a researcher and project manager on dry and wet torrefaction technologies at ECN.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Nanou, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
E.R.P. Keijsers, FBR, Wageningen, THE NETHERLANDS
J.R. Pels, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
K.P.H. Meesters, FBR, Wageningen, THE NETHERLANDS
B. Beelen, FBR, Wageningen, THE NETHERLANDS
M.C. Carbo, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS

Session reference:	3BO.3.3
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Mechanocatalysis of Lignocellulosic Biomass - An Innovative Bioeconomic Solution for Biofuel, Biochemical and Energy Production

Short introductive summary:

The catalytic conversion of lignocellulosic biomass is attractive due to the feasible generation of valuable products such as reducing sugars which constitute the basic substrates for chemical and transportation fuel production, as well as the production of renewable hydrogen. This study shows the efficient conversion of lignocellulose, especially hemicellulose, into reducing sugars such as xylose and galactose, using sulfuric acid, oxalic acid and potassium pyrosulfate as catalysts in mechanocatalysis. Ball milling was performed, introducing a mechanical force which, combined with chemical pretreatment, leads to reducing sugar yields of 40 to 50%.

Presenter: **Laura SCHNEIDER, Oulu University, Research Unit of Sustainable Chemistry, Turku, FINLAND**

Presenter's biography:

Currently PhD Student of Physical Chemistry at University of Oulu, Finland.
M.Sc. Food Chemistry (Westfälische Wilhelms University Münster, Germany), B.Sc. Chemistry and Biotechnology (Niederrhein University of Applied Sciences, Krefeld, Germany). Profession of Chemical Laboratory Technician.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Schneider, Oulu University, FINLAND
J. Haverinen, CEMIS Oulu, Kajaani, FINLAND
M. Jaakkola, CEMIS Oulu, Kajaani, FINLAND
U. Lassi, Oulu University, FINLAND

Session reference: 3BO.3.4
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Improvement of Bioenergy Yields Obtained from Duckweed by Sequential Ethanol Fermentation and Anaerobic Digestion

Short introductive summary:

Utilization of duckweed, a fast-growing, simple, floating aquatic plant, as a resource for bioethanol production has been proven to be a promising alternative compared to other bioenergy crops. However, management of the waste streams associated with duckweed bioethanol production has not been previously addressed. In this respect, coupling ethanol fermentation and anaerobic digestion processes could potentially increase the overall energetic and environmental performance of the system.
In this study, the potential for improving bioenergy yields obtained from duckweed was evaluated by subjecting duckweed sequentially to ethanol fermentation and then anaerobic digestion, after evaporation of ethanol from the fermentation broth.

Presenter: **Ozgul CALICIOGLU, The Pennsylvania State University, Civil and Environmental Engineering Dpt., State College, USA**

Presenter's biography:

Obtained a B.S. degree in Business Management, B.S. and M.Sc. degrees in Environmental Engineering. Currently, I am a Ph.D. candidate at Penn State University Department of Civil and Environmental Engineering, working on waste-to-energy systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Calicioglu, Penn State University, Department of Civil and Environmental Engineering, University Park, USA
R. Brennan, Penn State University, Department of Civil and Environmental Engineering, University Park, USA

Session reference: 3BO.3.5

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

"Think and Produce" instead of "Produce and Forget" - Integration of RES into an Economic Market System

Short introductive summary:

The European states are increasing the share or RES in all fields, especially in the electricity system. Finally, up to 97% of all electricity should be generated by RES; the highest share by wind and solar. The problem is that fluctuating RES, e.g. wind and solar, could not be integrated in economic market systems. They disturb existing markets and will always be depending on subsidies.

This problem could be solved by organisational measures. These measures are:
- Technical integration of wind, solar, and biogas in a virtual power plant. Biogas is the stabilizing element in the virtual power plant, guaranteing stable power supply.
- Economical integration via generating constant power in the virtual power plant, which could be integrated to the forward market as a base load product.

With this organiasational measure high shares of RES could be integrated in economic energy systems. In a transition phase subsidies could be reduced, in the final phase no subsidies are needed anymore.

Presenter: **Kilian HARTMANN, University of Applied Sciences Aschaffenburg, Faculty of Engineering, Aschaffenburg, GERMANY**

Presenter's biography:

since 2010 Professor for Energy Economics and Policy (Univ. of Appl. Sci. Aschaffenburg)
2008-2010 Teamleader (Fraunofer IWES)
2006-2008 Project manager (DLG, German Agricultural Association)
2002-2006 Research assistent (University of Applied Science and Arts Göttingen)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Hartmann, University of Applied Sciences Aschaffenburg, GERMANY
D. I. Candra, University of Applied Sciences Aschaffenburg, GERMANY

Session reference: 5BO.4.1
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

The Role of Bioeconomy In CO2 Mitigation Through the Energy System - A Scenario Analysis for the Netherlands

Short introductive summary:

In countries that have relatively large industrial sectors such as the Netherlands, bioenergy, biobased chemicals and carbon capture with storage (CCS) are shown to be key in order to embark on cost-efficient trajectories that realise climate targets. This study compares multiple scenario outcomes of the linear optimisation energy system model MARKAL-NL-UU to provide insight in the potential role of renewable energy, bioenergy, CCS and biobased chemicals in CO2 reduction in the Netherlands to 2030 using CO2 tax as the only instrument beyond 2020. The results show that the size of the biobased economy is sensitive to developments of international biomass supply chains, improvements in conversion technologies and the price of fossil fuels. However, a sufficiently high CO2 price, high technology development and the availability of sustainable biomass from intra-EU and extra-EU imports are no-regrets options to achieve deep CO2 emission reduction in the Netherlands. Key technologies are wind, CCS and biomass with CCS whilst renewable jet fuels and biochemicals may contribute up to 7% and 17% to their sectors, respectively by 2030. In countries that have relatively large industrial sectors such as the Netherlands, bioenergy, biobased chemicals and carbon capture with storage (CCS) are shown to be key in order to embark on cost-efficient trajectories that realise climate targets. This study compares multiple scenario outcomes of the linear optimisation energy system model MARKAL-NL-UU to provide insight in the potential role of renewable energy, bioenergy, CCS and biobased chemicals in CO2 reduction in the Netherlands to 2030 using CO2 tax as the only instrument beyond 2020. The results show that the size of the biobased economy is sensitive to developments of international biomass supply chains, improvements in conversion technologies and the price of fossil fuels. However, a sufficiently high CO2 price, high technology development and the availability of sustainable biomass from intra-EU and extra-EU imports are no-regrets options to achieve deep CO2 emission reduction in the Netherlands. Key technologies are wind, CCS and biomass with CCS whilst renewable jet fuels and biochemicals may contribute up to 7% and 17% to their sectors, respectively by 2030.

Presenter: **Ric HOEFNAGELS, Utrecht University, Copernicus Institute, Utrecht, THE NETHERLANDS**

Presenter's biography:

Dr. Ric Hoefnagels is a jr assistant professor at the Copernicus Institute of Susutainable Development - Utrecht University. He is involved in national and international bioenergy projects on biomass supply, demand, trade and emerging markets (biojet fuels,biobased materials).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Tsiropoulos, Utrecht University, THE NETHERLANDS
R. Hoefnagels, Utrecht University, THE NETHERLANDS
M. van den Broek, Utrecht University, THE NETHERLANDS
M.K. Patel, Geneva University, SWITZERLAND
A.P.C. Faaij, Groningen University, THE NETHERLANDS

Session reference: 5BO.4.2
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Flexible Biogas Plants as Servant for Power Provision Systems with High Shares of Renewables: Contributions to the Reduction of the Residual Load in Germany.

Short introductive summary:

In Germany, the share of intermittent renewable energies in the electricity system will continuously increase over the next decades, which brings along the challenge to bring demand and supply in balance. Biogas plants are one available option to reduce and to reduce the surplus generation - excess energy, when renewable electricity generation exceeds the demand - in the electricity system. To assess flexible electricity generation options of biogas plants and their system effects in a future energy system, we defined three different extension forecasts for biogas plants in Germany. For them, we calculated the renewable power generation mix for the time period 2016-2035 and optimized the flexible power generation by using an optimization model, taking flexible biogas production and gas storage capacities into account. Thereby, the optimal flexible power generation from biogas plants to smooth the residual load curve and to reduce surplus generation events can be calculated. As a result, flexible power generation from biogas plants can reduce the quantity and intensity of surplus generation events compared to non-flexible electricity generation at a constant level.

Presenter: **Markus LAUER, DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt., Leipzig, GERMANY**

Presenter's biography:

Environmental Scientist

since 2013 Research Associate,
DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH

since 2016 PhD student,
DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Lauer, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
P. Röppischer, University of Leipzig, Faculty of Mathematics and Computer Science, GERMANY
D. Thrän, UFZ Helmholtz-Zentrum für Umweltforschung, Leipzig, GERMANY

Session reference: 5BO.4.3
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Integrated Utilization Pathways For Biogenic Co2 In Biomass Driven Industry Sectors

Short introductive summary:

The key objective of the paper is to find out most feasible utilization pathways for biobased CO2 as a raw material in Finnish biomass driven industry sectors. Creation of valuable products from bio-CO2 (synthetic fuels, upgraded biogas, chemicals etc.) would perhaps give additional boost for Finnish industry. In this paper technologies for integration of power-to-SNG, -MeOH,
-gasoline and –other chemicals with several biobased industrial processes have been analysed. These include pulp & paper, combined heat & power (CHP), biogas production/utilization and mechanical wood industries.

Presenter: **Janne KÄRKI, VTT Technical Research Centre of Finland, Jyvaskyla, FINLAND**

Presenter's biography:

Mr. Janne Kärki works as a Senior Scientist at VTT's Renewable Energy Processes- team. He holds a M.Sc. (Tech.) from Lappeenranta University of Technology, Department of Energy Technology. Mr. Kärki is specialised in techno-economic assessments of different low-carbon energy concepts.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Kärki, VTT Technical Research Centre of Finland Ltd, Jyväskylä, FINLAND
E. Tsupari, VTT Technical Research Centre of Finland Ltd, Jyväskylä, FINLAND
C. Bajamundi, VTT Technical Research Centre of Finland Ltd, Jyväskylä, FINLAND
S. Kouri, VTT Technical Research Centre of Finland Ltd, Jyväskylä, FINLAND
M. Hurskainen, VTT Technical Research Centre of Finland Ltd, Jyväskylä, FINLAND

Session reference:	5BO.4.4
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Chemical Looping Combustion of Solid Biomass - Performance of Ilmenite and Braunite as Oxygen Carrier Materials

Short introductive summary:

Chemical looping combustion (CLC) is a novel technology, which is able to capture CO2 without an energy-demanding CO2 separation step, enabling lower energy requirements and much lower costs than conventional CO2 capture technologies. Additionally, bio-CLC technology has the potential to use of higher steam parameters in power production and could thus enable higher efficiencies compared to conventional biomass combustion technologies.

For process development purposes, a 10-50 kWth scale dual fluidized bed (DFB) CLC test rig applicable for biomass was constructed during 2015-16, located in VTT's new piloting center Bioruukki in Finland. Tests were carried out using untreated and heat-treated wood pellets, and wood char as fuels, and ilmenite and braunite (both natural ores) as oxygen carriers.

Promising results were achieved and CLC has a clear potential to reduce the risk of high temperature corrosion of super heater tubes enabling the option to use higher steam values in bio-CLC than what is possible in conventional biomass combustion applications, improving the power generation efficiency.

Presenter: **Toni PIKKARAINEN, VTT Technical Research Centre of Finland, Renewable Energy Processes, Espoo, FINLAND**

Presenter's biography:

Toni Pikkarainen, M.Sc., Senior Scientist in VTT since 2005, and before VTT he worked as research engineer in Foster Wheeler's R&D Center (2000-2005). He is experienced in experimental work, process measurements, modelling and development of
combustion processes, especially in fluidized combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Pikkarainen, VTT Technical Research Centre of Finland Ltd, Espoo, FINLAND
S. Teir, VTT Technical Research Centre of Finland Ltd, Espoo, FINLAND
I. Hiltunen, VTT Technical Research Centre of Finland Ltd, Espoo, FINLAND

Session reference: 5BO.4.5
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Influence of the Granulometry and Water Content on the Energy Comsumption of Milling Sorghum and Bamboo

Short introductive summary:

To develop a bio-based economy, there is a need to have a better understanding of the feedstock preparation step. This includes the mechanical size reduction of the feedstock. This process is not yet well understood.
In this study, we determined and compare the grindability by the Von Rittinger equation and the energy consumption of milling sorghum and bamboo.

Presenter: **Bruno GODIN, Walloon Agricultural Research Center, Biomass, Bioproducts and Energy Unit, Gembloux, BELGIUM**

Presenter's biography:

Bruno Godin is a research associate at the Walloon Agricultural Research Center (CRA-W) in Belgium. He has over 8 years of experience in R&D of biomass analysis and utilization for the production of biofuels and chemical precursors.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Godin, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM
A. Arimont, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM
M. Temmerman, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM
J. Delcarte, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM

Session reference: 2BV.1.2
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Influence of the Type of Mill on the Energy Comsumption of Milling Biomass

Short introductive summary:

An important challenge for the further development of biomass based biorefinery and bioenergy plants is the mechanical size reduction of the feedstock. This process is not yet well understood.
In this study, we assessed the grindability by the Von Rittinger equation and the energy consumption of milling biomass (spruce, oak and miscanthus) for two different type of mills (hammer and knife mill).

Presenter: **Bruno GODIN, Walloon Agricultural Research Center, Biomass, Bioproducts and Energy Unit, Gembloux, BELGIUM**

Presenter's biography:

Bruno Godin is a research associate at the Walloon Agricultural Research Center (CRA-W) in Belgium. He has over 8 years of experience in R&D of biomass analysis and utilization for the production of biofuels and chemical precursors.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Godin, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM
O. Prajara, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM
M. Temmerman, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM
J. Delcarte, Walloon Agricultural Research Center - CRA-W, Gembloux, BELGIUM

Session reference: 2BV.1.3
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Influence of Reaction Parameters of Hydrothermal Carbonization on the Alkali and Fouling Index of Hydrothermally Carbonized Biomass

Short introductive summary:

In the course of the exit of our society from nuclear and fossil-fuel based energy generation from biomass is gaining more and more attention. Due to the inherent inhomogeneity and low energy content of biomass thermal use of biomass is however problematic. Hydrothermal carbonization (HTC) is a prominent pretreatment process for biomass enhancement. In HTC, biomass is treated with hot compressed water resulting in a solid product known as HTC biocoal or hydrocoal. In the past years intense research has been made in the field of HTC since any type of biomass can be converted into a solid fuel with properties similar to lignite.
As a solid fuel, one of the key concerns in utilizing biomass feed stocks for energy generation is the occurrence of ash-related problems in boilers. In this context the fate of inorganic elements during HTC is of immense interest. It has been shown that a pre-treatment of biomass via HTC can lower fouling index, alkali index, and chlorine content of the treated biomass in comparison with the raw material.

Presenter: **Lynn HANSEN, TU Munich, Mechanical Engineering Dpt., Garching near Munich, GERMANY**

Presenter's biography:

2010-2014 BSc Studies of Chemical Engineering at ETH Zürich
2013-2015 MSc Studies of Chemical Engineering at ETH Zürich
2015 MSc Thesis at Haldor Topsoe
2015 Work on porous structures from cellulose nano fibers at Swiss National Institute for Material Science
2016 PhD Studies at TU Munich

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L.J. Hansen, TU Munich, Garching, GERMANY
M. Ulbrich, TU Munich, Garching, GERMANY
S. Fendt, TU Munich, Garching, GERMANY
H. Spliethoff, TU Munich, Garching, GERMANY

Session reference: 2BV.1.4
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Briquetting like an Allternative to Benefit the Sugar Cane Harvest Residues (RAC) in the Cogeneration Process on the Colombian Sugar Cane Industry

Short introductive summary:

This paper reports research work in the study of briquetting densification process of sugar cane harvesting residues (RAC) , to understand the influence of parameters like particle size, humidity, pressure and temperature in the mechanical and thermal behavior of the briquette. This project was carried out by the Sugar Cane Research Center of Colombia.

Presenter: **Julian LUCUARA, Cenicana, Cali, COLOMBIA**

Presenter's biography:

Mechanical engineer with four year of expertise in research projects in the sugar industry of Colombia.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.E. Lucuara Medina, Cenicana, Cali, COLOMBIA
A. Gomez Perlaza, Cenicana, Cali, COLOMBIA
N. Gil Zapata, Cenicana, Cali, COLOMBIA
W. Ojeda, Cenicana, Cali, COLOMBIA

Session reference: 2BV.1.5
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Energetic Potential and Thermal Decomposition Kinetics of Briquette Fuel from Sugarcane Industry Wastes

Short introductive summary:

Analysis of the energetic potential, thermal decomposition and degradation kinetics of briquettes from straw and sugarcane bagasse using vinasse as possible binding agent.

Presenter: **Graziella COLATO, Ufabc, BRAZIL**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.M.G. Rios, UFABC, Santo Andrè, BRAZIL
A.R. Santana, UFABC, Santo Andrè, BRAZIL
D.S. Rodrigues, UFABC, Santo Andrè, BRAZIL
C.A. Silva, UFABC, Santo Andrè, BRAZIL
K.B.B Marana, UFABC, Santo Andrè, BRAZIL
G.C. Antonio, UFABC, Santo Andrè, BRAZIL
J.T.C.L Toneli, UFABC, Santo Andrè, BRAZIL

Session reference: 2BV.1.6
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Influence of Road Salting on Chlorine Content of Road Side Woody Biomass

Short introductive summary:

The use of woody roadside vegetation is a possibility to extent the existing feedstock resources for wood chip based heat and power production. However, consumers of such biomass were concerned about possible high chlorine concentration due to the assumption that salt from the road (i.e. from salt spreading in winter time) is washed to the road sides and absorbed from the vegetation. High chlorine would cause corrosion in combustion appliances. In this study woody biomass samples were gained in defined distances to salted and neutral roads. Combustion related fuel parameters were measured including chlorine content. Results show a clear correlation of salt spreading on roads and the chlorine content of roadside woody biomass. One influence factor for this correlation is the geomorphology of the road. In addition results show a significant accumulation of chlorine in the fine parts of trees (i.e. in the brunch wood).

Presenter: **Harald THORWARTH, Rottenburg University of Applied Sciences, Firing Technology Dpt., Rottenburg a.N., GERMANY**

Presenter's biography:

Professorship since 2013

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Woehler, University of Applied Forest Sciences Rottenburg, GERMANY
S. Rieder, University of Applied Forest Sciences Rottenburg, GERMANY
H. Thorwarth, University of Applied Forest Sciences Rottenburg, GERMANY

Session reference:	2BV.1.7
Subtopic:	2.1 Production and Supply of Solid Biofuels
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Influence of Outdoors Storage of Shrub Biomass on Emissions and Slagging During its Combustion

Short introductive summary:

This work has been carried out within the framework of the LIFE+ ENERBIOSCRUB project. The global objective of this project is the mobilization of new biomass resources and the reduction of risk of forest fires by obtaining sustainable solid biofuels from shrub.
Firstly, the economic and technical feasibility of the harvest of biomass from scrub clearings has been studied. Secondly, the pre-treatment of biomass and the quality of the biofuels obtained have been evaluated. And finally, several combustion tests of the shrub biofuels obtained (broom, rockrose and gorse) have been performed in different combustion facilities.
This work includes results of combustion of broom, rockrose and gorse pellets in a kWth moving grate boiler. Two tests will be included for each kind of shrub in order to study the influence of outdoors storage in the combustion behaviour. The first test has been performed with pellets made right after the shrubs collection. The second test has been carried out with pellets produced after one year of shrub biomass storage outside. Results of emissions (O2, CO, TOC, NOx, SO2, HCl and particles) and slagging of both tests with each biofuel will be presented

Presenter: **Elena BORJABAD, CIEMAT, Energy Dpt., Lubia (Soria), SPAIN**

Presenter's biography:

Elena Borjabad (Degree in Chemical Engineering) works in the Renewable Energy Department of CEDER-CIEMAT in Soria (SPAIN) since 2005. Her work is related to combustion of biomass, measurement of gaseous and particle emissions, slagging and fouling in boilers.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Borjabad, CEDER-CIEMAT, Soria, SPAIN
I. Mediavilla, CEDER-CIEMAT, Soria, SPAIN
A. Pascual, CEDER-CIEMAT, Soria, SPAIN
S. García, CEDER-CIEMAT, Soria, SPAIN
M.J. Fernández, CEDER-CIEMAT, Soria, SPAIN
J.E. Carrasco, CEDER-CIEMAT, Soria, SPAIN
L.S. Esteban, CEDER-CIEMAT, Soria, SPAIN
R. Ramos, CEDER-CIEMAT, Soria, SPAIN

Session reference: 2BV.1.10
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Impact of Blending Method and the Ashing Temperature on the Melting Characteristics of Ashes of Biomass Blends

Short introductive summary:

This paper deals with behaviour of ashes of biomass blends. Blending of fuels may cause unexpected results.

Presenter: **Siim LINK, Tallinn University of Technology, Energy Technology Dpt., Tallinn, ESTONIA**

Presenter's biography:

Siim Link has been scientist at Tallinn University of Technology since 2007. He has worked in the field of thermochemical conversion of biomass and ash melting issues, and has participated in many domestic and international projects.

Co-authors:

S. Link, Tallinn University of Technology, ESTONIA
P. Yrjas, Åbo Akademi University, Turku, FINLAND
L. Hupa, Åbo Akademi University, Turku, FINLAND

Session reference:	2BV.1.13
Subtopic:	2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Numerical Simulation of Devolatilization of Wood Logs and Pressure Generation in the Wood Log Center

Short introductive summary:

A numerical model for wood log devolatilization is developed. This model is the basis for future models describing thermal degradation of wood logs in combustion units. Furthermore, the work investigates the pressure generation in the center of the wood log, leading to splitting of the solid fuel. This affects the entire thermal conversion process. An intensive focus on pressure generation in a wood log during thermal conversion has not been done so far.
The wood log is discretized in one direction. The relevant transport equations are implicitly solved. A finite difference method is used and spatial discretization is done with central differencing.
The pressure peak increased from 1.26 (P/P0) to 1.36 (P/P0) when increasing the surrounding gas temperature from 873 K to 973 K. It is concluded that temperature evolution in the wood log has a significant effect on pressure generation. Furthermore, it was shown that a decreasing permeability leads to an increasing pressure peak. Furthermore, the molecular weights of tar and volatiles, chosen to represent the species, have a significant influence on the pressure peak.

Presenter: **Inge HABERLE, Norwegian University of Science and Technology, Energy and Process Engineering Dpt., Trondheim, NORWAY**

Presenter's biography:

2009 - 2013: Bachelor degree in Mineral Resources Engineering at University of Leoben, Austria
2013 - 2014: Master degree in Industrial Energy Technology at University of Leoben, Austria
2015 - now: PhD student at EPT, NTNU, Norway

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Haberle, NTNU, Trondheim, NORWAY
O. Skreiberg, Sintef Energy Research, Trondheim, NORWAY
N. Haugen, NTNU/Sintef Energy Research, Trondheim, NORWAY

Session reference: 2BV.1.15
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Transient CFD Simulations of Wood Log Combustion in a Wood Stove

Short introductive summary:

Low load wood stoves in buildings with new insulation standards demand new technologies and solutions. The WoodCFD project focuses on development of clean and efficient wood stoves through improved batch combustion models and CFD (Computational Fluid Dynamics) modelling approaches. This includes development of a numerical tool that is suitable to study concept improvements for wood stoves and to recommend new improved concepts with respect to high energy efficiency and low emissions based on simulation results.

In the present work, transient CFD simulations have been performed to study the transient behavior of wood log combustion in a wood stove. These simulations require a large amount of CPU power, and significant simplifications compared to steady state simulations are required. Complementary steady state CFD simulations, allowing for a higher level of detail, have been performed for detailed studies of specific phenomena at selected instances in the wood combustion cycle.

Presenter: **Øyvind SKREIBERG, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Dr. Øyvind Skreiberg (49) is Chief Scientist within stationary bioenergy at SINTEF in Trondheim, Norway, having 25 years of broad bioenergy experience, contributed to about 350 scientific publications, presentations and reports andrepresentedNorwaysince 1998 in IEA Task 32 Biomass combustion and cofiring.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Bugge, SINTEF Energy Research, Trondheim, NORWAY
N.E.L. Haugen, SINTEF Energy Research, Trondheim, NORWAY
O. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY

Session reference: 2BV.1.16
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Grateadvance - Advanced Adjustable Grate Solutions for Future Fuel Flexible Biomass Combustion Technologies

Short introductive summary:

The energetic utilisation of alternative fuels (short rotation coppice, Miscanthus), agricultural by-products (straw, corn cops) or biomass residues (nut shells, coffee grounds) becomes of increasing interest. Due to variations in fuel properties – and the ash content in particular – biomass fuels considerably influence the conditions in the combustion zone and especially in the fuel bed. Usually, state-of-the-art combustion appliances are optimized for a particular fuel quality and typically approved only for utilization of standardized wood pellets or wood chips. Research activities within the GrateAdvance project focus on fuel flexible grate technologies being capable of adapting conditions in the combustion zone by a systematic and targeted adjustment of grate parameters in order to minimize emissions and slagging problems, thus setting the basis for a new generation of biomass technologies. Moreover, a novel control concept will ensure optimal combustion conditions for any biomass fuel, and specifically adjust to relevant fuel properties.

Presenter: **Sabine FELDMEIER, Bioenergy 2020+, Graz, AUSTRIA**

Presenter's biography:

2012 - now Researcher (Bioenergy 2020+ GmbH)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Feldmeier, Bioenergy2020+, Wieselburg, AUSTRIA
E. Wopienka, Bioenergy2020+, Wieselburg, AUSTRIA
M. Schwarz, Bioenergy2020+, Wieselburg, AUSTRIA
R. Mehrabian, Bioenergy2020+, Graz, AUSTRIA

Session reference: 2BV.1.18
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biomass Material for Research Work - Representativity, Sampling, and Sample Handling

Short introductive summary:

To ensure consistent empirical conditions and to obtain reliable results for process performance, certain pitfalls regarding biomass feedstock representativity, handling, and sampling should be avoided.
In this study, effects on representativity from various feedstock sampling and handling procedures are scrutinized and the importance of correct handling procedures for reliable research results is illustrated.

Presenter: **Magnus RUDOLFSSON, Swedish University of Agricultural Sciences, Forest Biomaterials and Technology Dpt., Umeå, SWEDEN**

Presenter's biography:

Biomass

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Rudolfsson, Swedish University of Agricultural Sciences, Umea, SWEDEN
G. Kalen, Swedish University of Agricultural Sciences, Umea, SWEDEN
M. Segerström, Swedish University of Agricultural Sciences, Umea, SWEDEN
S.H. Larsson, Swedish University of Agricultural Sciences, Umea, SWEDEN

Session reference: 2BV.1.19
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Methane Emissions from Small Scale Appliances Burning Wood and Pellets

Short introductive summary:

Four manually fed (6-11 kW) firewood burning and two automatic wood pellets (8.8-25 kW) residential heating appliances were tested under real-world operating conditions in order to determine methane emission factors (EFs). The results were examined for the influence of different factors (i.e., type of wood, appliance and combustion cycle). Differently from the standard emission testing methods, user habits were simulated in a schematic way in the laboratory employing different combustion cycles that represent a realistic user behavior. Five types of firewood (beech, false acacia, hornbeam, oak, and spruce) were used for the feeding of manual appliances; these types were selected for their large local market penetration. Two types of pellets (i.e., low-quality higher ash, S-, and Cl-content pellets and high-quality pellets with DIN-PLUS certification) were selected for the experiments in the automatic stove and boiler.

Presenter: **Senem OZGEN, Polytechnic of Milan, Civil and Environmental Engineering Dpt., Milano, ITALY**

Presenter's biography:

Senem Ozgen is a post-doc researcher in the Department of Civil and Environmental Engineering at Politecnico di Milano. Her recent work focuses on emissions of macro pollutants as well as new frontier pollutants such as nanoparticles from residential heating appliances.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Ozgen, Polytechnic of Milan, ITALY
G. Migliavacca, INNOVHUB - Stazione Sperimentale per i Combustibili, Milano, ITALY
C. Morreale, PolitecnicINNOVHUB - Stazione Sperimentale per i Combustibili di Milano, ITALY

Session reference: 2BV.1.20

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Optimization of the Combustion of Vegetable Oils in a Semi Industrial Boiler

Short introductive summary:

The use of vegetable oils as alternative fuels helps not only to reduce greenhouse emissions but also to take advantage of agricultural surpluses. In this work, the combustion of soya and rapeseed vegetable oils in a low-pressure auxiliary air fluid pulverization burner is carried out.The facility used has several parameters that can be adjusted to achieve the maximum combustion efficiency and the lowest gas emissions. These parameters are: the fuel flow supplied to the burner, the secondary air flow, the temperature and pressure of the combustion chamber. The latter two were adjusted by changing the cooling air flow in the combustion chamber and the dumper aperture located in the chimney

Presenter: **Julio SAN JOSÉ, Universidad de Valladolid, Ingeniería Energética y Fluidomecanica Dpt., Valladolid, SPAIN**

Presenter's biography:

PhD in Industrial Engineering from the University of Valladolid, Associate Professor Area Machines and Heat Engines Department of Energy Engineering and Fluid Mechanics of the University of Valladolid. With four-year periods of teaching and three administrations recognized

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. San José, Universidad de Valladolid, SPAIN
M.A. Sanz-Tejedor, Universidad de Valladolid, SPAIN
Y. Arroyo, Universidad de Valladolid, SPAIN

Session reference: 2BV.1.21
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Main Goal of this Research - To Promote a More Efficient Use of Wheat Straw for Cleaner Energy Production by Co-Firing Straw Pellets with Solid And Gaseous Fuels (Wood Pellets, Propane) and Assessing

Short introductive summary:

Main goal of this research – to promote a more efficient use of wheat straw for cleaner energy production by co-firing straw pellets with solid and gaseous fuels (wood pellets, propane) and assessing the impact of the mixture composition on the gasification/combustion characteristics and heat energy production.

Presenter: **Inesa BARMINA, University of Latvia, Institute of Physics, Salaspil, LATVIA**

Presenter's biography:

Dr.sc.ing., a leading researcher of University of Latvia, Institute of Physics since 2004. The main research area: experimental studies of co-firing the renewable with fossil fuel, electric/magnetic field control of combustion process, swirling flame combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Barmina, Institute of Physics, University of Latvia, Salaspils, LATVIA
R. Valdmanis, Institute of Physics, University of Latvia, Salaspils, LATVIA
M. Zake, Institute of Physics, University of Latvia, Salaspils, LATVIA

Session reference: 2BV.1.22
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Role of Aerosols from Biomass Combustion

Short introductive summary:

Particulate Matter smaller than 10 microns (PM10) from biomass combustion are an important drawback and often hinder a further implementation of biomass combustion. The IEA Bioenergy Task 32 on Biomass Combustion and Co-firing therefore supports measures to enable biomass combustion applications with low impact on the air pollution. The paper presents the outcomes of an IEA activity to collect recent scientific findings and to derive recommendations for future actions to reduce PM emissions from biomass.

Presenter: **Thomas NUSSBAUMER, Verenum Research and Lucerne University of Applied Sciences, Zürich, SWITZERLAND**

Presenter's biography:

1984 Diploma as Mechanical and Process Engineer at the Swiss Federal Institute of Technology (ETH) Zurich
1989 PhD on pollutant formation in biomass combustion at ETH
since 89 Associate professor for Energy and Environment at ETH Founder & Head of Verenum Research for R&D in Bioenergy Swiss Delegate in IEA Bioenergy Task 32
since 07 Professor for Renewable Energies at Lucerne University of Applied Sciences

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Nussbaumer, Verenum Research and Lucerne University of Applied Sciences, Zuerich and Horw, SWITZERLAND

Session reference: 2BV.1.23

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Research Facility Assessment for Biomass Combustion in Moving Grate Furnace

Short introductive summary:

The paper deals with the experimental activities on a biomass combustion test-bed. More in detail, experimental campaigns have been devoted to investigate the operation of a biomass moving grate furnace.
A research-oriented facility based on a moving grate furnace (350kW) has been set up in order to perform experimental activities in a wide range of test configurations. The paper reports the description of the complete biomass-plant and the assessment of the system operation. As first step, the chemical and physical properties of the used wooden biomass have been preliminarily investigated. Once the biomass-fuel has been characterized, investigations have been devoted to point out the operation of the furnace. It has been operated at full load, highlighting the influence of biomass on particulate matter emission

Presenter: **Francesco GALLUCCI, CREA-ING, Monterotondo, ITALY**

Presenter's biography:

Francesco Gallucci is a mechanical engineer. In 2002 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). Responsible for advanced research on energy from biomass combustion and emissions of the study in gaseous effluents.
Main activity is is the development systems for energy conversion of biomass, combustion and anaerobic digestion. Authors of more than 40 scientific publications.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Gallucci, CREA, Roma, ITALY
M. Salerno, CREA, Roma, ITALY
E. Guerriero, CNR, Roma, ITALY
M. Amalfi, Uniroma3, Roma, ITALY
F. Palmieri, Uniroma3, Roma, ITALY
G. Chiatti, Uniroma3, Roma, ITALY

Session reference: 2BV.1.27
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Utilization of Naturally Occurring Materials in the Bio-Based Chemical Looping Combustion

Short introductive summary:

This study was performed as part of the Nordic Energy Research project "NegativeCO2", Bio-CLC

Presenter: **Martin F. SUNDING, SINTEF Energy Research, Materials and Chemistry Dpt., Oslo, NORWAY**

Presenter's biography:

Research Scientist at SINTEF Materials & Chemistry, Norway, since 2002.
M.Sc. in Material Sciences, Swiss Federal Institute of Technology EPFL, Lausanne/Switzerland (1995).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Pishahang, SINTEF, Oslo, NORWAY
Y. Larring, SINTEF, Oslo, NORWAY
M. Sunding, SINTEF, Oslo, NORWAY

Session reference:	2BV.1.28
Subtopic:	2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Coupled Ventilation and Flue Gas Heat Exchanger System for Use in Low Energy Dwellings: An Investigation Using Dynamic Energy Simulations.

Short introductive summary:

The main idea in the present study is to integrate a heat exchanger at the exit of a wood stove (logs or pellet) installed in a low-energy dwelling. The exchanger enables to recover part of the heat from the flue gas. The recovered heat is then transferred to the fresh ventilation air, and distributed into the other rooms of the house through the balanced mechanical ventilation system. This technology, aims to both save energy, and to provide a better distribution of the heat between the rooms of the dwelling. The objective of the study was to evaluate the relevance of the system in terms of thermal comfort and energy savings fo the French and Norwegian market depending on different parameters (climate zone, type of construction, type of stove).

Presenter: **Axel CABLE, INSA, Bourges, FRANCE**

Presenter's biography:

Researcher in the field of indoor climate (field and laboratory measurements), ventilation, Dynamic Energy Simulations, Computational Fluid Dynamics, Combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Cablé, INSA Centre Val de Loire, PRISME Laboratory, Bourges, France & SINTEF Building and Infrastructure, O, Bourges, FRANCE
L. Georges, NTNU, Trondheim, NORWAY
P. Peigné, Laboratoire CERIC, Poujoulat Group, Saint-Symphorien, France, St Symphorien, FRANCE
Ø. Skreiberg, SINTEF Energy Research, Trondheim, Norway, Bourges, FRANCE
K. Chetehouna, INSA Centre Val de Loire, PRISME Laboratory, Bourges, France & SINTEF Building and Infrastructure, O, Bourges, FRANCE

Session reference: 2BV.1.29
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Development of an Innovative Low-Cost/low-Emission Pellet-Based Stove Technology

Short introductive summary:

Biomass fired stoves are still popular, which is due to low fuel costs, the aspect that they constitute a renewable and CO2 free energy source and the attraction of the flame which causes a pleasant feeling. Modern stoves are also perfectly applicable as heating source in low energy and passive houses with controlled ventilation systems. However, nowadays stove technologies are in general either rather expensive (high quality pellet stoves) or pollutant emissions are high (wood log and cheap pellet stoves). Therefore, a new certified stove technology is under development, which is characterized by low emissions and a high efficiency at costs, which are 40-50 % lower than current costs of state-of-the-art stoves. These targets are achieved through an innovative and patented fuel feeding system (see explanatory pages), which leads to a very simple setup, and CFD optimization of the technology.

Presenter: **Ali SHIEHNEJAD-HESAR, Bioenergy 2020+, Graz, AUSTRIA**

Presenter's biography:

Dr. Ali Shiehnejadhesar is researcher in the field of turbulent gas phase combustion, NOx formation, algorithm for speed-up of calculation time of reaction kinetics, reduction of detailed reaction mechanism, biomass conversion including (pyrolysis,and combustion) as well as CFD simulations.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Gruber, Bioenergy 2020+, Graz, AUSTRIA
R. Mehrabian, Bioenergy 2020+, Graz, AUSTRIA
T. Bauer, HET Heiz- und Energietechnik Entwicklungs GmbH, Seekirchen am Wallersee, AUSTRIA
A. Anca-Couce, Institute for thermal engineering; TU-Graz, AUSTRIA
R. Scharler, Institute for thermal engineering, Graz University of Technology, AUSTRIA
A. Shiehnejad-Hesar, BIOENERGY 2020+, Graz, AUSTRIA

Session reference: 2BV.1.30
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

CO2 capture from Combustion of Biomass Volatiles with a Chemical-looping Combustion Process

Short introductive summary:

Chemical-looping combustion (CLC) is a low-cost CO2 capture technology that uses oxygen carriers – metal oxides – for oxygen transfer from air to fuel. This enables fuel oxidation without mixing fuel and combustion air. After condensation of steam, a stream of pure CO2 is obtained without the need for an active gas separation. The capture and storage of CO2 from biomass-based fuels sources make it possible to obtain so-called negative emissions – the atmosphere is cleansed from carbon dioxide. This concept of storing biomass-based CO2 could prove to be highly instrumental for a country such as Sweden, which has substantial point emissions of biomass-based CO2.

Presenter: **Carl LINDERHOLM, Chalmers Tekniska Högskola Göteborg, Energy and Environment Dpt., Göteborg, SWEDEN**

Presenter's biography:

Linderholm forskar på kemcyklisk förbränning (CLC), vilket är en teknik för CO2-infångning vid storskalig förbränning för tex kraftproduktion. Infångningen åstadkoms med hjälp av en syrebärare - en partikelformig, sand-liknande, metalloxid, som transporterar syre från förbränningsluft till bränsle.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Moldenhauer, Chalmers University of Technology, Gothenburg, SWEDEN
M. Biermann, Chalmers University of Technology, Gothenburg, SWEDEN
T. Mattisson, Chalmers University of Technology, Gothenburg, SWEDEN
C. Linderholm, Chalmers University of Technology, Gothenburg, SWEDEN

Session reference: 2BV.1.32
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Evaluation of The Bio-Oil Combustion Produced from Coconut Endocarp Via Numerical Studies

Short introductive summary:

The gradual depletion of fossil fuels, the enviromental problems associated with burning them in addition to the increasing demand for energy, has encouraged many researchers to evaluate alternative fuels. Among them bio-oil, seems to be a very promising resource. It is a renewable, biodegrable and non-toxic fuel. Previously, in early work, we have determined the best condition to obtain pyrolysis liquids from coconut endocarp on a reactor scale (Duarte et al., 2016). In this study we have used the chemical composition and physical properties of the bio-oil obtained with its better conditions to focus into the combustion process and to understand the kinetic mechanism of its combustion through a numerical predictive code. The kinetic modelling for bio-oil oxidation was performed using a software package, that takes into account the detailed kinetic and transport phenomena (heat and mass transfer) through a numerical predictive code.

Presenter: **Shirley DUARTE, Universidad Nacional de Asuncion, Industrial Applications, San Lorenzo, PARAGUAY**

Presenter's biography:

Chemical engineering and Master in Computing Science from the National University of Asuncio´ n (UNA), Paraguay. Presently she is pursuing a Ph.D. degree in the field of pyrolysis and gasification of agroindustrial waste biomass in CentraleSupelec (Francia). Assistant Professor of Transport Phenomen

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Duarte, Universidad Nacional de Asuncion, San Lorenzo, PARAGUAY
D. Alviso, Universidad de Buenos Aires, Buenos Aires, ARGENTINA
N. Alvarenga, Universidad Nacional de Asuncion, San Lorenzo, PARAGUAY
J.C. Rolón, Centrale-Supélec, Université Paris Saclay, Paris, FRANCE

Session reference: 2BV.1.34
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effective System Integration of Decentralised Biomass Cogeneration Plants

Short introductive summary:

The work described is dedicated to efficiency improvement of biomass-fired cogeneration plants. The main target of the study was to improve technological, environmental and economic performance of the existing and newly planned cogeneration plants based on Organic Rankine Cycle (ORC) technology. The paper refers to increase sustainability by the efficient use of renewable wood biomass as an energy source in decentralized CHP systems in combination with different heat sinks such as urban quarters and industrial heating demand. The combination of the simulation based optimization of operational management methodology and the installation of new system components as well as the development and analysis of heat sink strategies helped to increase the fuel utilization efficiency of decentralized bioenergy CHP concepts.

Presenter: **Rafal STRZALKA, Stuttgart University of Applied Sciences, Stuttgart, GERMANY**

Presenter's biography:

Research engineer at Stuttgart University of Applied Sciences who carries out research projects on biomass based energy supply systems since 2010. My work scope is simulation-based optimisation of biomass-fired cogeneration systems followed by practical application of research results at existing plants. My current research emphasis is on the development of mathematical models of biomass-fired energy generation plants and controlling systems for the process of biomass conversion appliances.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Strzalka, Stuttgart University of Applied Sciences, GERMANY
A. Strzalka, Stuttgart University of Applied Sciences, GERMANY
J. Kalina, Silesian University of Technology, Gliwice, POLAND
U. Eicker, Stuttgart University of Applied Sciences, GERMANY

Session reference: 2BV.1.36
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Evaluation of Acoustic Intensification in an Hybrid Water/fire Tube Boiler´ s Furnace Burning Eucalyptus Chips

Short introductive summary:

Evaluation of the acoustic intensification of the combustion through the installation of a source of sound waves at the inlet of the primary air duct of a furnace of a hybrid water/fire tubes boiler using eucalyptus chips as fuel. This evaluation was carried out through the comparative analysis of the specific steam generation (kgsteam / kgbiomass), equipment efficiency, burning rate and thermal power of the equipment, calculated from the gas composition data, steam flow, temperature, for the equipment operating with and without acoustic intensification.

Presenter: **Electo Eduardo SILVA LORA, Universidade Federal de Itajubá, Instituto de Engenharia Mecânica, ITAJUBA', BRAZIL**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L.R. de Mello e Pinto, UNIFEI, Itajubá, BRAZIL
P.S. Pedroso Corrêa Jr, UNIFEI, Itajubá, BRAZIL
D.M. Yepes Maya, UNIFEI, Itajubá, BRAZIL
A.M. Martinez Reyes, UNIFEI, Itajubá, BRAZIL
E.E. Silvs Lora, UNIFEI, Itajubá, BRAZIL
O.J. Venturini, UNIFEI, Itajubá, BRAZIL
R. Vieira Andrade, UNIFEI, Itajubá, BRAZIL
A. Ratner, UIOWA, Iowa, USA
L.J. Mendes Neto, UNIFERI, Itajubà, BRAZIL

Session reference: 2BV.1.37
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Bereal-Method for Pellet Stoves: Field Test and Round Robin

Short introductive summary:

The EU project ‘beReal’ developed a testing method for pellet stoves which better reflects the real life operation and supports innovative pellet stoves that perform well under typical operational conditions. In order to finally demonstrate the applicability and practical relevance of the advanced testing method a field test and a round robin test have been conducted. The results from the field test came close to those from beReal measurements performed in the laboratory. This showed that the beReal laboratory test procedure truly reflects normal field conditions. The round robin results proved to be well in line with the overall repeatability as determined for the regarded emission and efficiency parameters. The calculated values for reproducibility show that the beReal method results can mostly be reproduced with the same variability or even better than results from the current type testing method; however, some larger deviation was so far discovered for PM emissions.

Presenter: **Hans BACHMAIER, Technology & Support Centre in the Centre of Excellence for Renewable Resources, Solid Biofuels Dpt., Straubing, GERMANY**

Presenter's biography:

University of Applied Sciences Weihenstephan and University of Natural Resources and Life Sciences Vienna
2003-2011: Bavarian State Research Center for Agriculture in Freising / Germany (energy generation from biogas)
Since 2012: TFZ in Straubing / Germany (solid biofuels)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Bachmaier, Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ),, Straubing, GERMANY
H. Oehler, Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ),, Straubing, GERMANY
H. Hartmann, Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ),, Straubing, GERMANY
M. Rönnbäck, SP Technical Research Institute of Sweden, Boras, SWEDEN
H. Persson, SP Technical Research Institute of Sweden, Boras, SWEDEN
M.G. Jespersen, Danish Technological Institute, Taastrup, DENMARK
J. Hinnerskov Jensen, Danish Technological Institute, Taastrup, DENMARK
Ch. Schmidl, Bioenergy 2020+ GmbH, Wieselburg, AUSTRIA
G. Reichert, Bioenergy 2020+ GmbH, Wieselburg, AUSTRIA
S. Pelz, University of Applied Forest Sciences, Rottenburg, GERMANY
M. Wöhler, University of Applied Forest Sciences, Rottenburg, GERMANY

Session reference: 2BV.1.38
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

beReal: A Practical Test Method for Firewood Roomheaters - Real-Life Relevance and Reproducibility

Short introductive summary:

In the last years standard type test methods for biomass room heating appliances have driven technological development tremendously towards low emissions and high efficiency. However, they are not applicable to reflect real-life operation performance since operating conditions and the user habits are not sufficiently included in the test procedure. Several studies revealed a major contribution of batch fired room heating appliances for harmful gaseous and particulate emissions.
Consequently, there is the need to optimize the combustion performance of these technologies significantly in future, especially in real-life operation. Advanced test procedures implemented in normative standards or labels are effective instruments to assess product quality and to push forward technological development.
Therefore, a new test method for firewood roomheaters was developed focusing on real life operation performance. The test procedure is based on a European survey on user behavior, long term field monitoring as well as comparative combustion tests. This paper presents final results of the beReal project.

Presenter: **Christoph SCHMIDL, Bioenergy 2020+, Biomass Combustion Dpt., Wieselburg-Land, AUSTRIA**

Presenter's biography:

Diplomas in Environmental Engineering and Environmental Management at HBLVA Rosensteingasse(Vienna, Austria) and Chemical Engineering at University of applied sciences Fresenius (Idstein, Germany). PhD in Technical Chemistry at Vienna University of Technology (Vienna, Austria) on Gaseous and Particulate Emissions from Biomass Combustion. Between 2005 and 2009 research assistant at University of Technology in Vienna in the group Environmental Analytical Chemistry active in the field of particulate matter (PM10 and PM2.5) source characterization and source apportionment. Since 2009 Senior Researcher at the Austrian Biomass Competence Centre Bioenergy2020+ in the research group of small-scale combustion systems

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Reichert, Bioenergy2020+, Wieselburg-Land, AUSTRIA
M.G. Jespersen, DTI, Aarhus, DENMARK
H. Hartmann, TFZ, Straubing, GERMANY
R. Mack, TFZ, Straubing, GERMANY
H. Oehler, TFZ, Straubing, GERMANY
S. Pelz, HFR, Rottenburg, GERMANY
H. Persson, SP, Boras, SWEDEN
M. Ronnback, SP, Boras, SWEDEN
C. Schmidl, Bioenergy2020+, Wieselburg-Land, AUSTRIA
H. Stressler, Bioenergy2020+, Wieselburg-Land, AUSTRIA
R. Sturmlechner, Bioenergy2020+, Wieselburg-Land, AUSTRIA
M. Woehle, HFR, Rottenbur, GERMANY

Session reference: 2BV.1.39
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Use of Open Sorption Technology for Heat Recovery in Biomass Combustion Applications

Short introductive summary:

Biomass, especially chipped wood, is commonly used as a fuel for district heating in Austria. Between 2005 and 2013 the energetic end use for district heating from solid biomass increased from 10 PJ to 34 PJ. The water content of the biomass fuel in district heating plants often reaches 50%. Thus, the recovery of condensing heat from water vapour in the flue gases is necessary for reaching high energetic efficiencies. One possible technology is the open sorption process for the heat recovery from the flue gases, which is analysed within this publication.

Presenter: **Ernst HÖFTBERGER, Bioenergy 2020+, Graz, AUSTRIA**

Presenter's biography:

Ernst Höftberger works as a senior scientist and Head of Unit “Technical energy systems“ at BIOENERGY 2020+ GmbH. He is responsible for research in the field of small scale combined heat and power (µ-CHP), process simulation and system integration.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Höftberger, Bioenergy 2020+, Graz, AUSTRIA
R. Riepl, Bioenergy 2020+, Graz, AUSTRIA
B. Hebenstreit, Bioenergy 2020+, Graz, AUSTRIA
L. Golicza, Bioenergy 2020+, Graz, AUSTRIA
A. Weissinger, Bioenergy 2020+, Graz, AUSTRIA
C. Schmidl, Bioenergy 2020+, Graz, AUSTRIA
W. Haslinger, Bioenergy 2020+, Graz, AUSTRIA
K. Paar, Güssing Energy Technologies, Güssing, AUSTRIA
R. Zweiler, Güssing Energy Technoligies, Güssing, AUSTRIA
C. Hochenauer, TU Graz, Graz, AUSTRIA

Session reference: 2BV.1.40
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Slagging Prevention and Plant Optimization by Means of Numerical Simulation

Short introductive summary:

This conference contribution gives a brief overview of a CFD modelling framework for combustion and slagging simulation in grate and fluidised bed biomass boilers in the megawatt range.We discuss possible plant optimisation measures, their feasibility and their influence on the occurrence of depositions. These actions can help to increase the fuel flexibility of existing plants as well as lowering the risk of unscheduled furnace downtimes and maintenance works.

Presenter: **Thomas PLANKENBÜHLER, Friedrich-Alexander-University Erlangen, Chair of Energy Process Engineering, Nuremberg, GERMANY**

Presenter's biography:

Studied Chemical and Biological Process Engineering at the Friedrich-Alexander-University Erlangen-Nürnberg (FAU) from 2007 to 2012 and is working since December 2012 as Academic Researcher at the FAU’s Chair of Energy Process Engineering on the subject of the slagging behavior in biomass powerplants.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Plankenbühler, Friedrich-Alexander-University Erlangen-Nuremberg, Nuremberg, GERMANY
D. Müller, Friedrich-Alexander-University Erlangen-NurembergFriedrich-Alexander-University Erlangen-Nuremberg, Nuremberg, GERMANY
J. Karl, Friedrich-Alexander-University Erlangen-Nuremberg, Nuremberg, GERMANY

Session reference: 2BV.1.41
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Experimental Evaluation of Interactions between K, Ca and P and Mn/Si-based Oxygen Carriers

Short introductive summary:

Oxygen carriers are solid metal oxides particles that are able to provide and absorb oxygen via redox reactions and provide oxygen in solid form. This work experimentally examines the interaction between K, Ca and P with three oxygen carriers with different ratios of manganese and silica. In addition silica sand and pure manganese oxide particles were used as reference. The particles were mechanically mixed with salts from either K, Ca or P and placed in a furnaces at 850°C with either a reducing or oxidizing atmosphere. This will mimic the use of these oxygen carriers as replacement of the bed material in FCB combustion or in the use as oxygen carrier in chemical-looping combustion. After exposure the interaction between particles and ash components where investigated with XRD,SEM and EDS.

The result show that all oxygen carriers have less interaction with the selected ash components than in the equivalent case with silica sand, and out of the oxygen carries the one with a Si/Mn ratio of 25% performed best.

Presenter: **Henrik LEION, Chalmers University, Chemistry and Chemical Engineering, Göteborg, SWEDEN**

Presenter's biography:

Associate professor in combustion Chemistry. Working with combustion, gasification, reforming and CO2-capture. Focus is the use of metal oxides as oxygen carrier.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Leion, Chalmers University of Technology, Göteborg, SWEDEN
D. Zhao, Chalmers University of Technology, Göteborg, SWEDEN
P. Knutsson, Chalmers University of Technology, Göteborg, SWEDEN
B.-M. Steenari, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 2BV.1.43
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Numerical Analysis For The Low-Emission Dual Fuel Combustion In A Boiler Type OP-230

Short introductive summary:

The paper includes results of numerical calculations for co-firing of coal with (i) syngas from bio-fuels gasification; and (ii) natural gas in the furnace chamber of the indicated above wall-fired pulverized coal boiler. On this basis, an attempt to establish the optimum position of the additional nozzles supplying syngas to the combustion chamber has been made. The impact of the co-fuel composition on the reduction of NOx and CO2 emissions was examined, too.

Presenter: **Przemyslaw MOTYL, Kazimierz Pulaski University of Technology and Humanities in Radom, Radom, POLAND**

Presenter's biography:

Przemyslaw Motyl is an Assistant Professor at Kazimierz Pulaski University of Technology and Humanities (UTH), Radom, Poland. His current research interests include power and heat engineering, renewable energy sources, numerical and experimental heat transfer and fluid mechanics.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Motyl, Kazimierz Pulaski University of Technology & Humanities in Radom, Faculty of Mechanical Engineering, Radom, POLAND
J. Lach, Kazimierz Pulaski University of Technology & Humanities in Radom, Faculty of Mechanical Engineering, Radom, POLAND

Session reference: 2BV.1.44
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Performance Evaluation of a Waste to Energy Power Plant: An Exergetic Approach

Short introductive summary:

An efficient waste-to-energy power plant operation requires cost effectiveness and reduction in environmental emissions. Exergy method uses the out of second law of thermodynamics to identify the main point of exergy destruction and shows directions for possible improvements in the plant.

Presenter: **Francis Chinweuba EBOH, University of Borås, Swedish Centre for Resource Recovery, Borås, SWEDEN**

Presenter's biography:

My name is Francis Chinweuba Eboh. I work as a Doctoral Student within the field of combustion and thermal processes in Swedish Centre for Resource Recovery at University of Borås, where I focus on process design, improvement, analysis and optimization of waste-to-energy power plant.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F.C. Eboh, University of Borås, Borås, SWEDEN
P. Ahlström, University of Borås, Borås, SWEDEN
T. Richards, University of Borås, Borås, SWEDEN

Session reference: 2BV.1.45

Subtopic: 2.3 Biomass Combustion in Large Utilities

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Investigation of Conglomerates in the Fuel Bed and Deposits on Heat Ex-Changer Tubes in a Fluidized Bed Pilot Plant

Short introductive summary:

Waste wood and mixtures of waste wood and firewood combustion experiments in a fluidized bed pilot plant were carried out in the framework of a project investigating slagging in the combustion chamber and deposits on surfaces of superheaters and economizers of the boiler system in eight different biomass power plants (BMHP) to find coherence between the biomass input and the resulting slags and deposits. Pilot plant experiments have the advantage to look deeper into the influence of single biofuel mixes and specific technical parameters. The waste wood used as biofuel was also combusted in one of the full scale plants. Therefore, a comparison between slagging samples and deposits in both plants were possible.
Deposits on heat exchanger walls in the fluidized bed pilot plants show the same mineral spectra with higher amounts of silicates due to waste wood combustion and higher amounts of calcite due to firewood combustion. Comparison of deposits after waste wood combustion in the fluidized bed pilot plant and the grate combustion full scale plant also indicate similar mineral spectra.

We would prefer a poster presentation

Presenter: **Britta BERGFELDT, Karlsruhe Institute of Technology, ITC Dpt., Eggenstein Leopoldshafen, GERMANY**

Presenter's biography:

Geoscientist with a PhD in Geochemistry. Group leader for “Inorganic and Ash Analysis” in KIT since 2000. Over 15 years experience in the area of bottom ash characterisation and specialisation on leaching test procedures. Topic of current Projects: investigation of deposits in BMHP and MSWI plants.

Co-authors:

B. Bergfeldt, Karlsruhe Institute of Technology, GERMANY
G. Pfrang-Stotz, Karlsruhe Institute of Technology, GERMANY
J. Reichelt, IBR, Bruchsal, GERMANY
E. Karrer, INTEC, Bruchsal, GERMANY

Session reference: 2BV.1.48
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effects of Fuel Properties on Combustion and Emissions of a Direct Injection Diesel Engine Fueled with N-Butanol-Diesel Blends

Short introductive summary:

Physical and chemical properties, performance and emissions of n-butanol-diesel blends were studied. Numerical models of the fuel blends were established based on CFD. Properties, performance and emissions were analysed by experiment and simulation.

Presenter: **Miao YANG, Henan Academy of Sciences, Henan Key Lab of Biomass Energy, Zhengzhou, P.R. CHINA**

Presenter's biography:

His main interest lies in the thermal power engineering and power machinery, fluid mechanics and Molecular dynamics. He is committed to researching the fuels, combustion and flame and energy conservation and emissions reduction and Computational fluid dynamics.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Yang, Energy Research Institute Co., Ltd, Zhengzhou, P.R. CHINA
Z.W. Wang, Energy Research Institute Co., Ltd, Zhengzhou, P.R. CHINA
S.M. Guo, Energy Research Institute Co., Ltd, Zhengzhou, P.R. CHINA
X.F. Xin, Energy Research Institute Co., Ltd, Zhengzhou, P.R. CHINA
T. Qi, Energy Research Institute Co., Ltd, Zhengzhou, P.R. CHINA
T.Zh. Lei, Energy Research Institute Co., Ltd, Zhengzhou, P.R. CHINA
X.Y. Yan, University of Exeter Penryn Campus, Penryn, UNITED KINGDOM

Session reference: 2BV.1.49

Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Pyrolysis Oil Combustion in a Horizontal Box Furnace with an Externally Mixed Nozzle

Short introductive summary:

Combustion characteristics of neat biomass fast-pyrolysis oil were studied in a horizontal combustion chamber with a rectangular cross-section. An air-assisted externally mixed nozzle known to successfully atomize heavy fuel oils was installed in a modified nominal 100 kW (350,000 BTU/h nominal capacity) burner to explore full utility for pyrolysis oil (bio-oil) combustion in a furnace.

Presenter: **Akwasi A. BOATENG, U.S. Department of Agriculture, Eastern Regional Research Center, Wyndmoor, USA**

Presenter's biography:

Dr. Boateng is currently the Lead Scientist of the thermochemical biomass conversion program at the Agricultural Research Service (ARS), the principal research arm of the United States Department of Agriculture (USDA). He is located at the USDA's lab in Wyndmoor, Pennsylvania.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.A. Boateng, USDA-ARS, Wyndmoor, USA
F.C. Lujaji, Nelson Mandela African Institution of Science and Technology, WyndArusha, TANZANIA
M.A. Schaffer, USDA-ARS, Wyndmoor, USA
C.A. Mullen, USDA-ARS, Wyndmoor, USA

Session reference: 2BV.1.50
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Energetic Potential of Tropical Biomasses

Short introductive summary:

This research seeks to characterize the biomass of acai berry seeds and coconut shell for your energetic use through proximate analysis, thermogravimetric and lower calorific value.

Presenter: **Deyvison SOUZA RODRIGUES, UFABC, Santo Andrè, BRAZIL**

Presenter's biography:

Post graduate student working with energy recovery of waste

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D.R. Rodrigues, UFABC, Santo Andrè, BRAZIL
A.R. Santana, UFABC, Santo Andrè, BRAZIL
J.M.G. Rios, UFABC, Santo Andrè, BRAZIL
K.B.B. Marana, UFABC, Santo Andrè, BRAZIL
C.A. Silva, UFABC, Santo Andrè, BRAZIL
J.T.C.L. Toneli, UFABC, Santo Andrè, BRAZIL
G.C. Antonio, UFABC, Santo Andrè, BRAZIL

Session reference: 2BV.1.51
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Co-combustion of Coal and Biomass: Combustion Characteristics, Fouling and Bed Agglomeration Tendency

Short introductive summary:

This study investigates the co-combustion between sub-bituminous coal (SB) and four types of agricultural biomass in Thailand, namely rice straw (RS), palm empty fruit bunch (EFB), napier grass (NP) and sugarcane top/leaf (CTL) in lab-scale devices for burning characteristics, fouling and bed agglomeration tendency. FactSage simulation was also conducted to understand the mineral transformation during combustion. The results are discussed in the paper.

Presenter: **Suneerat FUKUDA, King Mongkut’s University of Technology, The Joint Graduate School of Energy and Environment, Bangkok, THAILAND**

Presenter's biography:

Suneerat (Pipatmanomai) Fukuda received her PhD in chemical engineering from Imperial College London, UK, in 2002 and is currently an associate professor at KMUTT, Thailand. Her research area is solid fuel thermochemical conversion for energy application.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Fukuda, King Mongkut's University of Technology Thonburi, Bangkok, THAILAND
S. Krerkkaiwan, King Mongkut's University of Technology Thonburi, Bangkok, THAILAND
P. Chaivatamaset, King Mongkut's University of Technology Thonburi, Bangkok, THAILAND

Session reference:	2BV.1.52
Subtopic:	2.3 Biomass Combustion in Large Utilities
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Novel Electrical Charging Condensing Heat Exchanger for Particle Emission Reduction and Efficient Heat Recovery in Small Boilers

Short introductive summary:

In the present work, we introduce and demonstrate a novel concept for reduction of fine particle emissions from small boilers. The method is based on charging of particles upstream of heat exchanger and on a specially designed heat exchanger, which is optimized for high particle deposition. The deposited particles are removed with the flowing condense film, formed at the heat exchanger tube surface. An additional heat exchanger cleaning cycle is also developed based on a spray scrubbing system. The presentation includes measurements and analyses of particulate emissions, gaseous emissions and condensates with versatile analytical methods. The results confirm high reduction efficiency (80%) for fine particle emissions with simultaneous high thermal efficiency in the heat exchanger. The benefit of the system is that it replaces the conventional heat exchanger in boilers, making it a compact and inexpensive solution, when compared to additional flue gas cleaning devices installed after the boiler.

Presenter: **Olli SIPPULA, University of Eastern Finland, Environmental and Biological Sciences Dpt., Kuopio, FINLAND**

Presenter's biography:

Dr. Olli Sippula is a research manager at the University of Eastern Finland. He has studied combustion emissions for more than 14 years. The recent research topics include development of particle emission reduction technologies and physico-chemical characterization of combustion emissions

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Sippula, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
J. Grigonyte, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
H. Suhonen, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
A. Laitinen, University of Eastern Finland, DepartTampment of Environmental and Biological Sciences, Kuopio, FINLAND
M. Kortelainen, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
J. Tissari, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
P. Tiitta, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
A. Lähde, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
J. Keskinen, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND
J. Jokiniemi, University of Eastern Finland, Department of Environmental and Biological Sciences, Kuopio, FINLAND

Session reference: 2BV.1.53
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Combustion Characteristics and Differences in Nitrogen Content of UK Grown Birch and Sitka Spruce

Short introductive summary:

The utilisation of locally sourced woodfuel for energy production is dependent upon the quality of the resource. Considering the UK's existing forest growing stock, this research highlights the variation between two prominent species - birch and Sitka spruce - as well characterising the quality and combustion suitability of differing sections of individual tree specimens.

Presenter: **Douglas PHILLIPS, University of Leeds, School of Chemical and Process Engineering, Leeds, UNITED KINGDOM**

Presenter's biography:

I am a final year PhD student at the University of Leeds, within the Doctoral Training Centre for Low Carbon Technologies. My research looks at the potential of the UKs forest and woodland resource as a bioenergy feedstock, with the aim of influencing the uptake of community scale biomass combustion

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Phillips, University of Leeds, UNITED KINGDOM
G. Allison, Aberystwyth University, UNITED KINGDOM
J.M. Jones, University of Leeds, UNITED KINGDOM

Session reference: 2BV.1.56
Subtopic: 2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

CFD Evaluation of Ash Slagging Tendency Depending on Burner Levels

Short introductive summary:
The slagging in pulverized coal combustion in a commercial boiler is investigated using CFD analysis.

Presenter: **Kieseop KANG, Sungkyunkwan University, SKKU School of Mechanical Engineering, Jangan-Gu, Suwon-Si, Gyeonggi-Do, REPUBLIC OF KOREA**

Presenter's biography:
Doctoral students majoring in solid fuel combustion

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Kieseop, Sungkyunkwan University, Suwon-Si, Gyeonggi-Do, REPUBLIC OF KOREA
P. Jongkeun, Sungkyunkwan University, Suwon-Si, Gyeonggi-Do, REPUBLIC OF KOREA
R. Changkook, Sungkyunkwan University, Suwon-Si, Gyeonggi-Do, REPUBLIC OF KOREA

Session reference: 2BV.1.57
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Possibilities of Producing Energy from Horse Manure by Burning

Short introductive summary:

In the study, a small pellet boiler (Aritern Biomatic +20, 20 kWh) and a local district heat energy production unit's fluidised bed boiler was used to implement mixture burning tests with horse manure in 2016. In the pellet boiler tests, pellets made from two different stable-litter horse manures were burned as a mixture (5–10%) with traditional wood pellets.

Presenter: **Riikka TANSKANEN, South-Eastern Finland University of Applied Sciences, Forest, the Environment and Energy, Mikkeli, FINLAND**

Presenter's biography:

Riikka Tanskanen (M.Sc) is a Project Manager at South-Eastern Finland University of Applied Sciences. The current projects concentrate on renewable energy sources and possibilities, as well as, promoting energy efficiency in South Savo Finland.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Tanskanen, South-Eastern Finland University of Applied Sciences,, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences,, Mikkeli, FINLAND
J.-P. Lemponen, South-Eastern Finland University of Applied Sciences,, Mikkeli, FINLAND

Session reference:	2BV.1.58
Subtopic:	2.2 Biomass and Bioliquids Combustion for Small and Medium Scale Applications
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Modelling of Combustion Chemistry and Gas Phase Alkali Sulphate Formation in Biomass Combustion, Using the Homogeneous Mechanism and Plug Flow Reactor Model Implemented in Cantera.

Short introductive summary:

A model for the chemistry of flue gas inside the boiler has been made and validated using the experimental data from literature. The gas phase alkali sulfate formation is investigated along with some other species of importance.

Presenter: **Hameed ARABZADEH MOQADAM, Lappeenranta University of Technology, Lappeenranta, FINLAND**

Presenter's biography:

I am a master of science student in Lappeenranta University of Technology in Finland. I have done my master thesis at Bioenergy2020+ in Graz, Austria and have also been a research assistant in Energy research Center of the Netherlands (ECN) for half a year.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Arabzadeh Moqadam, Bioenergy2020+, Graz, AUSTRIA
T. Gruber, Bioenergy2020+, Graz, AUSTRIA
R. Soukka, Lappeenranta University of Technology, FINLAND

Session reference: 2BV.1.59
Subtopic: 2.3 Biomass Combustion in Large Utilities
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Negative Carbon Emissions from Perennial Rhizomatous Grasses Used as Biomass Crops

Short introductive summary:

Perennial rhizomatous grasses such as Miscanthus accumulate and sequester carbon in the soil which has benefits for the overall greenhouse gas balance of the system and soil quality. It has been suggested that soil carbon sequestration increases linearly over time and that these biomass crops have a negative carbon budget. Here we review field trials of Miscanthus, established on former grassland and tilled land, that have been harvested annually for up to 20 years and changes in soil organic matter content measured.

Presenter: **Michael JONES, Trinity College Dublin, Botany Dpt., Dublin 2, IRELAND**

Presenter's biography:

Emeritus professor of Botany at Trinity College Dublin. Ecophysiologist. Research interest in energy grasses, particularly Miscanthus. Carbon cycle, carbon sequestration and greenhouse gas emissions.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.B. Jones, Trinity College, Dublin, IRELAND

Session reference: 1BP.1.2

Subtopic: 1.3 Biomass Crops and Energy Grasses

Topic: 1. BIOMASS RESOURCES

Understanding Biomass Ignition in Power Plant Mills

Short introductive summary:

Conversion of pulverized fuel CHP-units from coal to wood pellets is a readily implemented strategy to increase the share of energy from biomass. However, there is an increased risk of mill fires if the air temperature at the mill inlet is not lowered. Data available from self-ignition tests does not predict this behavior when switching from coal to wood.
Self-ignition temperature (SIT) is commonly defined as the external temperature that allows transition from smoldering to flaming combustion. On the other hand, field experience suggests that mill fires are caused already by nests of smoldering particles.
Experiments simulating mill conditions show oxidation reactions beginning at 100…150 K below SIT. By comparing the ratio of CO to CO2 in the off-gases of pulverized pine samples heated at 1 K/min, several distinct phases can be distinguished with increasing temperature. Exothermic reactions appear during smoldering, which can possibly provide heat to switch to a more rapid combustion regime, given sufficient time.
The implication of these findings is that SIT is not a sufficient measure to characterize ignition in mills, and that other ignition criteria should be defined.

Presenter: **Lars SCHWARZER, Technical University of Denmark, Chemical and Biochemical Engineering Dpt., Kgs Lyngby, DENMARK**

Presenter's biography:

Lars Schwarzer is a PhD Student at Danmarks Tekniske Universitet since 12/2015, working on Biomass Particle Ignition in Power Plant Mills. He graduated from Karlsruhe Institute of Technology in 2012. Interests include combustion and other thermal/chemical conversion processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Schwarzer, DTU Chemical Engineering, Kgs Lyngby, DENMARK
P. A. Jensen, DTU Chemical Engineering, Kgs Lyngby, DENMARK
P. Glarborg, DTU Chemical Engineering, Kgs Lyngby, DENMARK
J. K. Holm, DONG Energy, Fredericia, DENMARK
K. Dam-Johansen, DTU Chemical Engineering, Kgs Lyngby, DENMARK

Session reference: 2BP.2.1
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Separation of Salts During the Gasification of Spent Grain in Supercritical Water

Short introductive summary:

Previous experiments without salt separation showed high gasification rates at a reaction temperature of more than 600 °C and 280 bar pressure. However, long time operation frequently led to plugging of the reaction system. For the new experiments with spent grain a process layout with salt separation after the preheater section was applied. This process unit was first tested with sewage sludge and good results were obtained. During the preheating-step, the solubility of inorganic salts decreases due to the low dielectric constant and density of water in its supercritical state (T374 °C, p22,1 MPa). The aim is to remove the salts before they form deposits which will plug the plant. Primary separation is done by gravimetric forces. Salts are transferred into a section with subcritical temperature where they dissolve again –at least partly. Then the salts are removed from the high pressure system. This is possible by a system operating under semi-continuous flow-conditions developed at KIT. A side effect of this procedure is the loss of some organic material which is separated along with the salt brine. This leads to slightly lower process efficiency. On the other hand, co

Presenter: **Nikolaos BOUKIS, Karlsruhe Institute of Technology, Institute of Catalysis Research and Technology, Karlsruhe, GERMANY**

Presenter's biography:

1976 -1981 Study of Chemistry, University of Athens
1981 Diploma in Chemistry
1981-1985 Ph.D.study, Research Center Karlsruhe
1985 Doctorate (Dr. rer. nat.), University of Heidelberg
1987-1992 Academic employee ITC-CPV (IHCH), Forschungszentrum Karlsruhe
1992-1999 Group leader, "Corrosion research and Surface Analysis”
Since 1999 Group leader, “Hydrothermal Gasification - VERENA”

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Boukis, Karlsruhe Institute of Technology, GERMANY
I.K. Stoll, Karlsruhe Institute of Technology, GERMANY
J. Sauer, Karlsruhe Institute of Technology, GERMANY
J. Fischer, Paulaner, Munich, GERMANY
R. Kansy, Paulaner, Munich, GERMANY

Session reference: 2BP.2.2
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Resource Efficiency of Bioenergy from Municipal Waste - A Case Study from Municipality of Stuttgart in Southern Germany

Short introductive summary:

The presentation shows results of a study, investigating resource efficiency of separate collected biowaste in Municipality of Stuttgart in Southern Germany.
The study compares scenarios for alternative usage of biowaste by comparing resource efficiency of jointly collected organic municipal waste within a waste to energy scenario (waste incineration) and the production of biogas from separate collectd organic material within a fermentation plant, including valorization of residuals in agriculture.

Presenter: **Gerold HAFNER, University of Stuttgart, ISWA - Institute for Sanitary Engineering, Water Quality and Solid Waste Management Dpt., Stuttgart, GERMANY**

Presenter's biography:

Civil and Environmental Engineer, graduated 1992; since 2003 University of Stuttgart; since 2009 Head of Department: "Resources Management and Industrial Wastes" at University of Stuttgart

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Hafner, University of Stuttgart, GERMANY
C. Maurer, University of Stuttgart, GERMANY

Session reference: 1BO.5.1
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Power Generation Based on Agricultural Residues Gasification: The Potential of Corn Cobs

Short introductive summary:

This paper is about biomass gasification. There is an identified need for diversifying biomass sources that guarantee economic profit and environmental benefits. Currently there is no practical experience of this technology that is reported in Colombia and the use of corn cobs for power generation is an innovative approach to utilize the biomass potential in this context.

Presenter: **Maria GÓMEZ, Universidad de La Sabana, Chemical Engineering Dpt., Bogotá, COLOMBIA**

Presenter's biography:

Chemical Engineer,MSc in Sustainable Energy Engineering, PhD in Energy Technology. Research in energy access for remote areas and renewable energy. Over fourteen years of professional experience in environmental and energy systems performance. Fields of interest:Energy access,Energy and environment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Gomez, Universidad de La Sabana, Bogotà, COLOMBIA
L. Martinez, Universidad de La Sabana, Bogotá, COLOMBIA
A. Sanches-Pereira, Universidade de Sao Paulo, Sao Paulo, BRAZIL
A. Manrique, KTH Royal Institute of Technology, Stockholm, SWEDEN

Session reference: 1BO.5.2
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Techno-Economic Optimisation of Combined Anaerobic Digestion and Gasification of Food Waste as Integrated Waste Management and Energy System

Short introductive summary:

This work explores the use of a food waste treatment network in Ireland in which AD and gasification are integrated with cogeneration of heat and electricity in a waste-to-energy national scheme. This work includes a parametric optimisation of AD and gasification of food waste based on experimental data and process modelling. A Geographic Information System algorithm locates and designs facilities for waste treatment, distribution and conversion to energy. This work presents the benefits of this waste-to-energy network and provides a sustainable alternative to current waste management practices in Ireland and other regions where landfilling and other methods are environmentally harmful.

Presenter: **Rory MONAGHAN, National University of Ireland Galway, Mechanical Engineering Dpt., Galway, IRELAND**

Presenter's biography:

Lecturer of Energy Systems Engineering in Mechanical Engineering at the National University of Ireland Galway. Research interests include advanced simulation of thermal-fluid systems, including combustion, gasification and thermal performance of buildings.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Singlitico, National University of Ireland, Galway, IRELAND
K. Dussan, National University of Ireland, Galway, IRELAND
R. O'Shea, University College Cork, IRELAND
D. Wall, University College Cork, IRELAND
J. Goggins, National University of Ireland, Galway, IRELAND
J. Murphy, University College Cork, IRELAND
R.F.D. Monaghan, National University of Ireland, Galway, IRELAND
R Monaghan, National University of Ireland, Galway, IRELAND

Session reference: 1BO.5.3
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Assessment of Citrus Wastes Gasification Through a Fluidized Bed Reactor: Experimental Analysis for Integration in an Existing Citrus Juice Industry

Short introductive summary:

For citrus juice companies, citrus wastes management is a challenging issue to deal with. The aim of this work is to assess the integration of citrus residues gasification in a Sicilian medium size enterprise, which processes about 85,000 t/year of fresh fruit. Experimental activities has been carried out through a bench-scale fluidized bed gasification reactor in order to determine the syngas composition at different reaction conditions. Based on the experimental results and the energy inputs of the company, the impact of the proposed technology application has been evaluated in terms of combined heat and power production by an internal combustion engine, non-renewable primary energy and CO2 savings. Results demonstrate the advantages for the company of such technology for solving waste management issues.

Presenter: **Mauro PRESTIPINO, University of Messina, Engineering Dpt., Messina, ITALY**

Presenter's biography:

Researcher in the field of residual biomass gasification. Part of the research activity is focused on the kinetic study of biomass decomposition in H2O atmosphere. M.Sc in Materials Engineering, University of Messina; PhD Student at University of Messina, Department of Engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Prestipino, University of Messina, ITALY
V. Chiodo, CNR-ITAE, Messina, ITALY
G. Zafarana, CNR-ITAE, Messina, ITALY
A. Galvagno, University of Messina, ITALY

Session reference: 1BO.5.4
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Increased Biogas Production from Sewage Sludge and Manure, with Highly Efficient Dewatering and Phosphate Recovery

Short introductive summary:

One of the focus points of wastewater treatment facilities and farmers is the reduction of energy use, investments in energy-efficient solutions, reduction of waste streams combined with nutrient recovery. The integration of TORWASH and IC(X) technology allows for complete processing of both sewage sludge and manure by mild hydrothermal treatment, resulting in highly efficient dewatering, biogas production and nutrient recovery. This innovative combination is more efficient compared to current techniques for sewage sludge and manure treatment. In this work, the IC(X) technology is used to experimentally determine the conditions for optimal digestion of TORWASH effluents, after mechanical dewatering of the feedstock. Comparing to state-of-the-art technologies, the TORWASH & IC(X) combination produces 10 - 30% more methane and the sludge/manure can be dewatered to a level of 60% dry matter. Following the laboratory tests, projects for pilot plants are planned for 2017. When this facility demonstrates to be successful, TORWASH/IC(X) for-sewage-sludge and manure can be implemented, starting in the Netherlands, the UK and Germany. The TORWASH technology, combined with digestio

Presenter: **Jaap KIEL, Energy Research Centre of the Netherlands, Biomass & Energy Efficiency Dpt., PETTEN, THE NETHERLANDS**

Presenter's biography:

Jaap Kiel is the development manager of the Biomass Programme at ECN and a part-time professor in Thermochemical Conversion of Biomass at Delft University of Technology. He also is the coordinator of Thermochemical Processing within EERA Bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.J. Grootjes, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
J.R. Pels, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
M.C. Carbo, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
H. Kuipers, Waterschap Zuiderzeeland, Lelystad, THE NETHERLANDS
J. Vogelaar, Paques B.V., Balk, THE NETHERLANDS

Session reference: 1BO.5.5
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Ash and Bed Material Research in Dual Fluidized Bed Gasification of Biomass in Lab- and Industrial-Scale

Short introductive summary:

This contribution will give a comprehensive overview of ash and bed material research conducted in both lab scale experiments at Bioenergy2020+ and TU Wien as well as in industrial scale investigations at the DFB gasification plants in Senden, near Ulm, Germany, and Oberwart, Austria.

Presenter: **Matthias KUBA, Bioenergy 2020+, Graz, AUSTRIA**

Presenter's biography:

Matthias KUBA has studied chemical engineering at TU Wien, Austria. He is currently working as unit head and senior researcher at Bioenergy2020+ GmbH in the field of fluidized bed gasification. In addition, he closely collaborates as post-doctoral research fellow with Umea University and Lulea University of Technology, Sweden.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Kuba, Bioenergy2020+, Güssing, AUSTRIA
H. Hofbauer, TU Wien, Vienna, AUSTRIA

Session reference: 2BO.6.1
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Gasification of Anaerobic Digestate from Mix of Biomass Residues, Manures and MSW to Combined Heat and Power Production

Short introductive summary:

This paper concerns a study aimed at the energy valorization via gasification of the solid residue (digestate) recovered in a process of anaerobic digestion (AD). In this latter, the AD reactor is fed with fermentable feedstocks obtained by mixing biomass residues, manures and the organic fraction of MSW, while the produced biogas is upgraded to biomethane. According to the stated aim, a rotary kiln reactor was adopted to study the process when using CO_2, steam and mixes of them as gasification agent. Experimental tests were carried out at 800°C, 40-45 min residence time, 0.7 kg/h solid feeding rate. Regarding CO_2 and steam, in a first campaign CO_2/digestate and steam/digestate were assumed at 0.3 and 0.55 respectively, while in a second one only steam was used. Under these conditions, a produced gas with a dry composition of 33 %v H_2, 19 %v CO, 7,5 %v CH_4, 33 %v CO_2 was observed in the first campaign; for tar load and carbon conversion values around 10 g/Nm3dry and 90 %wt were respectively evaluated. In the second campaign the gas composition was 40 %v H_2, 23 %v CO, 13 %v CH_4, 19 %v CO_2. By using the software ChemCAD, the data were finally used to model the gasification process.

Presenter: **Donatella BARISANO, ENEA Research Centre, Energy Technologies Dpt., Rotondella, ITALY**

Presenter's biography:

Donatella Barisano is senior researcher at Enea Trisaia Research Center. She works in the field of biomass valorization for bioenergy and biofuels production. Her present activity is focused on biomass gasification and use of catalysts and sorbents for gas upgrading and conversion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Nanna, ENEA Research Centre, Rotondella, ITALY
A. Villone, ENEA Research Centre, Rotondella, ITALY
R. Agostini, ENEA Research Centre, Rotondella, ITALY
C. Freda, ENEA Research Centre, Rotondella, ITALY
D. Barisano, ENEA Research Centre, Rotondella, ITALY
G. Cornacchia, ENEA Research Centre, Rotondella, ITALY
S. Brandani, Ladurner Srl, Bolzano, ITALY

Session reference: 2BO.6.2
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Sewage Sludge Pyrolysis in an Indirectly Heated Rotary Kiln: Primary Measures for Tar Reduction.

Short introductive summary:

In this work, an experimental study to evaluate the influence of the process conditions on the reduction of tar generated during sewage sludge pyrolysis in a rotary kiln is presented. An indirectly heated rotary kiln at a laboratory scale was used (until 4 kg/h). The effects of final temperature and residence time of the volatile phase in the rotary kiln were investigated. Product and energy distribution, as well as the composition of the generated tars were determined. Efficiencies in tar reduction in the gas phase between 17 and 71 % (in mass fractions) were achieved.

Presenter: **Sonia L. RINCON PRAT, National University of Colombia, Mechanical and Mechatronics Engineering Dpt., Bogotá, COLOMBIA**

Presenter's biography:

Mechanical Engineer of the National University of Colombia (Unal) with a doctorate from the University of Kassel.She works as Professor in the Mechanical Engineering Department of the Unal and is the head of the Research Group on Biomass and Optimization of Thermal Processesof this University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Mendoza Geney, Universidad Nacional de Colombia, Bogotá, COLOMBIA
A. Gomez, Universidad Nacional de Colombia, Bogotá, COLOMBIA
S. Rincon, Universidad Nacional de Colombia, Bogotá, COLOMBIA

Session reference: 2BO.6.3
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Role of Inorganics in Modelling of Biomass Gasification

Short introductive summary:

In this work, a summary of the research carried out about the role of inorganic elements in biomass gasification is presented. The research work has focused on the catalytic effects of alkali and alkaline earth metals in char gasification. The work has included gasification experiments using thermogravimetric analysis and fluidized beds as well as modeling techniques.

Presenter: **Jukka KONTTINEN, Tampere University of Technology, Chemistry and Bioengineering Dpt., Tampere, FINLAND**

Presenter's biography:

Since August 2014: Professor of Chemistry of biorefining. Tampere University of Technology, Department of Chemistry and Bioengineering. Supervisor of 6 PhD students, teacher in Master's level courses of 14 ECTS. During the last 5 years externally financed research projects of 1,5 million euros.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Kramb, Tampere University of Technology, Tampere, FINLAND
J. Konttinen, Tampere University of Technology, Tampere, FINLAND
N. DeMartini, Ãbo Akademi Process Chemistry Centre, Turku, FINLAND
A. Gomez-Barea, University of Seville, SPAIN

Session reference: 2BO.6.4

Subtopic: 2.4 Gasification for power, CHP and polygeneration

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Kinetic Study of Supercritical Water Gasification in the Mixture of Glucose, Xylose, and Guaiacol

Short introductive summary:

To elucidate the interaction of glucose, xylose and guaiacol under hydrothermal conditions and to determine the kinetics of the reaction involved, mixture of these compounds were gasified under hydrothermal condition. Interaction of these intermediates has an effect on kinetics of reactions and distribution of the final products. The reaction pathway of three model compounds is developed and proposed in this study.

Presenter: **Nattacha PAKSUNG, Hiroshima University, Mechanical Sciences and Engineering Dpt., Hiroshima, JAPAN**

Presenter's biography:

Doctoral course student of Graduate School of Engineering, Hiroshima University
Department of Mechanical Science and Engineering
Thermal Engineering Laboratory

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Paksung, Hiroshima University, Higashi-Hiroshima, JAPAN
Y. Matsumura, Hiroshima University, Higashi-Hiroshima, JAPAN

Session reference: 2BO.6.5
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Technological Advances and Opportunities for the Development of Sustainable Biorefineries

Short introductive summary:

Moving to a more sustainable economy, where renewable biomass is used to produce fuels, chemicals, energy and materials, is one of the main challenges faced by the society nowadays in order to ensure a sustainable low-carbon economy for the future. In addition, a bio-based economy has the potential to generate new jobs and new opportunities for entrepreneurship, with further benefits to the global economy and the society. Biomass can be used to replace fossil feedstocks for the production of different products, among of which, chemicals are particularly very attractive due to their high market value. This creates abundant growth opportunities for the chemical industries. In this sense, the development of biorefineries to produce chemicals and energy from biomass is a strategy that has been strongly considered in order to have a significant impact in the final commodity prices. Although substantial steps have been taken in recent years into the transition towards a bio-based economy, there are still significant technological challenges to overcome in order to develop more efficient, advanced and sustainable bio-based processes, able to compete with the optimized petrochemical production chains currently available. Moreover, not only technological development, but also process integration and environmental impact analyses must be considered in the design and implementation of future sustainable biorefineries. The most recent technological advances and opportunities for the development of sustainable biorefineries will be presented and discussed in this presentation.

Presenter: **Solange MUSSATTO, Technical University of Denmark, Novo Nordisk Foundation Center for Biosustainability, Kongens Lyngby, DENMARK**

Presenter's biography:

Solange Mussatto is Head of a Research Group at the Technical University of Denmark. She has over 18 years of expertise in the areas of Biomass Pretreatment and Fermentation Technology with focus on the development of processes for a sustainable conversion of biomass into bio-based products.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Session reference: 3BO.7.1

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Techno-Economic Evaluation of a Small Scale Integrated Biorefinery Based on Olive Tree Pruning Biomass

Short introductive summary:

In this work, a small scale integrated biorefinery system based on Olive Tree Pruning is proposed and evaluated from a techno-economic standpoint. In the processing plant, after milling, OTP undergoes water extraction step, where part of extractives (mainly made of non-structural sugars and mannitol) is recovered. After extraction, a pre-treatment step of OTP is performed in a steam explosion unit, in which a water insoluble solid (WIS), containing mainly glucose and lignin, and a liquid fraction, consist mainly of xylose, are obtained. Then the WIS fraction undergoes saccharification and fermentation process (SSF), producing bioethanol and lignin. The liquid fraction, after a detoxification step is used for xylitol production. Finally, lignin fraction is combusted in order to satisfy the thermal energy demand of the plant.
Since a commercial small scale integrated biorefinery system does not exist yet, the processing plant is simulated in Aspen Plus, using pilot-scale experimental results. Based on simulation results, the energy efficiency and the economic feasibility of the biorefinery system are evaluated.

Presenter: **Ana Isabel SUSMOZAS, CIEMAT, Energy Dpt., Madrid, SPAIN**

Presenter's biography:

Ana Susmozas is a postdoctoral researcher in the Biofuels Unit of CIEMAT. Her work focusses on the simulation and techno-economic analysis of bioenergy systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Susmozas, CIEMAT, Madrid, SPAIN
I. Ballesteros, CIEMAT, Madrid, SPAIN
M.J. Negro, CIEMAT, Madrid, SPAIN
J.M. Oliva, CIEMAT, Madrid, SPAIN
M. Ballesteros, CIEMAT, Madrid, SPAIN

Session reference: 3BO.7.2
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

SMIBIO: A German Business Case Study

Short introductive summary:

Within the SMIBIO project the technical-economic and environmental viability of small-scale integrated biorefinery units is studied. These units are capable of processing different kinds of biomass produced in short radius catchments in rural and small urban areas, both in Europe and in CELAC (Community of Latin American and Caribbean States). The focus of the presentation will be on the results of a German business case which will show the possibilities of a small-scale integrated biorefinery in the real bio economy in Bavaria. This includes sustainable feedstock availability (otherwise wasted grass is used as feedstock), suited conversion technology, legal context of such a plant and integration potential into the existing agro-industrial and agro-food processing value chains.

Presenter: **Ingo BALL, WIP, Project Dpt., Munich, GERMANY**

Presenter's biography:

Ingo Ball works as Project Manager at WIP Renewable Energies in the Biomass Department. He holds two degrees: Dipl. Sports Economist and B.Sc. Management of Renewable Energies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Ball, WIP, Munich, GERMANY
R. Janssen, WIP, Munich, GERMANY
D. Rutz, WIP, Munich, GERMANY

Session reference: 3BO.7.3

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Black Rice Straw as a Feedstock for the Extraction of Anthocyanin and Sugars in a Combined Biorefinery

Short introductive summary:

Lignocellulosic biofuels production with the present technology is not an economical process. A way forward for 21st century biorefinery could be by combining high value products with biofuel production. A potential example might be the extraction of anthocyanin from the straw of black rice Chakhao poireiton and use of the residue for biofuel production. Anthocyanin content of the straw was ~63mg/100g with major contribution from the straw stem. The optimised microwave aqueous treatment was able to extract ~90% of the anthocyanin and more importantly displayed higher antioxidant capacity than methanol extracts suggesting their potential use as bioactive agents. The anthocyanin extraction had negligible impact on the sugar composition of the residue. The recovered straw after pretreatment showed a glucose digestibility of ~50%. The extracts are currently being analyzed on mammalian cell lines for their bioactivity and potential pharmaceutical applications – Cytotoxity, apoptosis and anti-proliferation assays. Preliminary studies showed that the extracts have a protective effect on the cells with the water extracts having higher protective effect compared to the methanol extracts.

Presenter: **Kamaljit MOIRANGTHEM, University of Nottingham, Biosciences Dpt., Loughborough, UNITED KINGDOM**

Presenter's biography:

Kamaljit is a Bioenergy PhD Researcher at University of Nottingham,UK. Holding an BEng in Biotechnology and a MSc. in Crop Biotechnology & Entrepreneurship, his interests are in lignocellulosic biorefinery research (fuel, high value compounds etc) and its commercialisation.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Moirangthem, University of Nottingham, Loughborough, UNITED KINGDOM
P. Ramakrishna, University of Nottingham, Loughborough, UNITED KINGDOM
A. Ghumra, University of Nottingham, Loughborough, UNITED KINGDOM
R. Rajkumari, D.M. College of Science, Imphal, INDIA
G. Tucker, University of Nottingham, Loughborough, UNITED KINGDOM

Session reference:	3BO.7.4
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Macroalgae Biorefinery in a Nordic Perspective

Short introductive summary:

Macroalgae (seaweed) represent a huge unexploited marine bioresource. There are approx. thousand species in the North Sea, of which brown macroalgae are of biorefinery interest from Nordic perspective. Brown macroalgae are built up of a variety of polymers being composed of C5 and C6 sugars such as glucose, xylose, galactose, and mannose, as well as other value added components such as proteins, polyphenols, minerals, etc. These components from seaweed biomass can be converted into various marketable products and energy, so to maximize the biomass values and minimize the waste. For example, sugar compounds can be fermented to products such as liquid biofuels. Other value added components can be extracted and/or converted to products with potentially high values in different market sectors such as cosmetics, pharmaceutics, food/feed ingredients, biofertilizers etc.

Results from several ongoing seaweed projects coordinated by DTI will be presented, including the innovative integrated biorefinery process, economic and environmental impacts from the whole value chain of Macroalgae Biorefinery.

Presenter: **Dimitar Borisov KARAKASHEV, Danish Technological Istitute, Taastrup, DENMARK**

Presenter's biography:

Senior Project Manager at Danish Technological Institute in area of seaweed biorfeinery

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.B. Bjerre, Danish Technological Institute, Taastrup, DENMARK
X. Hou, Danish Technological Institute, Taastrup, DENMARK
R. Neerup, Danish Technological Institute, Taastrup, DENMARK
D.B. Karakashev, Danish Technological Institute, Taastrup, DENMARK

Session reference: 3BO.7.5

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Promoting a New European Strategy for Organic Waste Valorisation into High Value Bio-SynGas as a New Direction Towards the European Biofuels Sector Development

Short introductive summary:

The study aims to demonstrate that the target expected for 2020 could be exceeded if the European Commission will start fostering the production of advanced gaseous biofuels instead of liquid ones, opening the transportation fuels sector to low quality substrates like food waste and high value organic fraction of municipal solid waste.

Presenter: **Giuliano GRASSI, Secretary General, European Biomass Industry Association, Brussels, BELGIUM**

Presenter's biography:

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Salimbeni, European Biomass Industry Association, Brussels, BELGIUM
L. Tita, European Biomass Industry Association, Brussels, BELGIUM
G. Grassi, EUBIA, Bruxelles, BELGIUM

Session reference:	IBO.8.1
Subtopic:	6.5 Policy
Topic:	6. INDUSTRY SESSIONS

From Green Forest to Green Commodity Chemicals

Short introductive summary:

A cross-sectoral cooperation initiated in 2012, through the project "Forest Chemistry", brought together a forest industry cluster, a petrochemical industry cluster and research organizations. The aim was to lay the foundation for a sustainable and competitive production of forest-based commodity chemicals in Sweden. Detailed technical studies of value chains, from forest to butanol, methanol and olefins, with potential to be scaled up, were performed within the project and business models were suggested.
The production of biochemicals as drop-in substitutes in the petro-chemical industry is challenging under the present policy environment. However, the project and the cross-sectoral collaboration arena it created gave rise to spin-offs. For example, a pilot plant for methanol production installed in a pulp mill and efforts to realize forest based bio-polyethylene and lignin-based fuels. The personal trust developed favored the establishment of the Swedish innovation program BioInnovation.
In the present paper, we elaborate on the experience gained through the cross-sectoral collaboration, from the industry perspective and supported by a framework for innovation systems analysis

Presenter: **Jonas JOELSSON, SP Processum, Örnsköldsvik, SWEDEN**

Presenter's biography:

MSc Engineering Physics, PhD Ecotechnology and Environemntal Science. Field of expertice is energy and environmental systems analysis of biomass based systems, especially industrial production systems. Currently R&D manager at SP Processum AB, part of the Technical Research Institute of Sweden.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.M. Joelsson, SP Processum, Örnsköldsvik, SWEDEN
M. Warneryd, SP Technical Research Institute of Sweden, Gothenburg, SWEDEN
Y. Alwarsdotter, SEKAB, Örnsköldsvik, SWEDEN
J. Brücher, Holmen, Örnsköldsvik, SWEDEN
L. Heuts, West Sweden Chemicals and Materials Cluster, Gothenburg, SWEDEN

Session reference: IBO.8.2
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

Sustainable Regional Supply Chains for Woody Bioenergy in Eastern Europe

Short introductive summary:

BioRES, the topic of the paper, is a EU-Horizion2020 funded project that will end on 30 June 2017. The EUBCE would be the first occasion after the BioRES final conference where the findings of the project and the current thinking around the RES directive could be presented.

Presenter: **Frank MISCHLER, GIZ- German Development Cooperation, Munich, GERMANY**

Presenter's biography:

Frank Mischler coordinates a EU/Horizon2020 Project BioRES that supports Biomass Logistics and Trade Centers in Southeast Europe. He holds a Master sin Environmental Management (SOAS). Before joining GIZ, Frank was with the UN´ s Food and Agriculture Organization.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Mischler, GIZ, Munich, GERMANY

Session reference: IBO.8.3

Subtopic: 6.5 Policy

Topic: 6. INDUSTRY SESSIONS

Ash Removal from Ash-Rich Biomass and Sludge: The Biar Process

Short introductive summary:

This contribution to the conference focuses on a new approach to recover low value ash rich biomass and make it suitable for any energy application: the BiAR process. Trials on bark, digestate and sludge show that almost complete ash removal from the feedstock is achieved. Thanks to this new process, ash free biomass can be obtained from a wide range of feedstocks so far impossible to be used as fuel.
Process is PCT patent pending.

Presenter: **Gian Claudio FAUSSONE, Inser Energia, Torino, ITALY**

Presenter's biography:

Graduated in industrial engineering he hasbeeninvolved in R&Dprojects for more than 10 years in Europe, California, Congo and Thailand on gasification, fuelsynthesis, and waste-to-energyapplications with leadinginstitutions and companies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Faussone, Inser Energia, Turin, ITALY
M. Grilc, National Institute of Chemistry, Ljubljana, SLOVENIA REPUBLIC
B. Likozar, National Institute of Chemistry, Ljubljana, SLOVENIA REPUBLIC

Session reference: IBO.8.4
Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic: 6. INDUSTRY SESSIONS

Bioenergy in Balancing Grids and Providing Storage Options - Results of IEA Bioenergy Agreement Special Project

Short introductive summary:

The significant advances of wind and solar energy in the EU electricity market has created concerns on the management of the grid bound to increase in the future with further expansion of intermittent energy sources. Efforts are been carried out by the European utilities, research organisations and other stakeholders to understand the problem, solutions and strategies how to balance the grid.
Bioenergy, in its various forms, can eventually contribute to balancing the grid; however, so far little attention has been paid to the possible role of bioenergy as an effective, low carbon and low cost grid management and energy storage option.

Presenter: **Antti ARASTO, VTT Technical Research Centre of Finland, Espoo, FINLAND**

Presenter's biography:

Research Manager of Sustainable energy and chemical technologies area. Antti is expert in techno-economic assessment especially related to bioenergy, biofuels use and conversion, biorefinery and carbon capture and storage technologies in addition to energy strategy assessments and roadmaps.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Arasto, VTT Technical Research Centre of Finland, Espoo, FINLAND
D. Chiaramonti, University of Florence, ITALY
J. Kiviluoma, VTT Technical Research Centre of Finland, Espoo, FINLAND
E. van den Heuvel, studio Gear Up, Amsterdam, THE NETHERLANDS
L. Waldheim, Waldheim Consulting, Stockholm, SWEDEN
K. Maniatis, European Commission DG ENER, Brussels, BELGIUM
K. Sipila, VTT Technical Research Centre of Finland, Espoo, FINLAND

Session reference:	IBO.8.5
Subtopic:	6.5 Policy
Topic:	6. INDUSTRY SESSIONS

Biobattery: Integration of Thermo-Catalytic Reforming, Pressure Swing Adsorption And Hydrotreatment for the Production of 100% Green Fuels, Biochar, Heat and Power

Short introductive summary:

The concept of the Biobattery is to process biomass residues along with renewable power to store the chemical energy and to provide when needed, where needed in the desired way – as power, as heat or as fuel. A key component of the biobattery is the thermo-catalytic reforming (TCR) unit, which produces bio-oil, syngas and biochar.
An integrated approach will demonstrate and validate the technical and economic viability of the com-bination of thermo-catalytic reforming, pressure swing adsorption and hydrotreatment, together with their environmental and social sustainability, as well as the cost-competitiveness, at near commercial scale.
The integrated concept will be described and results of the production of TCR-bio-oil from sewage sludge as well as hydrotreated oil will be presented. The results are discussed and an outlook for the upscale to industrial size will be given.

Presenter: **Miloud OUADI, Fraunhofer-Institut UMSICHT, Sulzbach-Rosenberg, GERMANY**

Presenter's biography:

Researcher Scientist

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Binder, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY
M. Ouadi, University of Birmingham, UNITED KINGDOM
A. Hornung, Fraunhofer UMSICHT, Sulzbach-Rosenberg, GERMANY

Session reference: 5BV.2.1
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Energetic Analysis of Innovative Hybrid Biomass/solar Organic Rankine Cycles (ORCs) for Micro-scale CHP Applications

Short introductive summary:

The work aims at investigating the performances of an innovative hybrid biomass/solar energy production system for domestic micro-scale combined heat and power (CHP) generation.
The system is based on Organic Rankine Cycle (ORC) technology that represents an attractive option for sustainable and reliable energy supply in small-scale applications, where traditional plants are technologically and economically unfeasible.
The proposed ORC can be fuelled separately by a biomass burner or a concentrated solar power (CSP) system, or by the combination of the two sources.
A parametric analysis has been carried out to define the proper ORC configurations and the suitable operating conditions. The performances of the innovative system have been compared with the traditional ORCs driven by single renewable sources.
The investigation demonstrates that hybrid biomass/solar ORC system is an effective solution for micro-scale CHP generation. The possible application to the Italian and Spanish residential sector has been analysed. Results illustrate that hybridisation permits to overcome the intermittency of the solar source, reduce the biomass consumption, and improve the global efficiency.

Presenter: **Angelo ALGIERI, University of Calabria, Mechanical, Energy and Management Engineering Dpt., Arcavacata di Rende, ITALY**

Presenter's biography:

Angelo Algieri is Assistant Professor of Energy Systems at the Department of Mechanical, Energy and Management Engineering of the University of Calabria (Italy).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Algieri, University of Calabria, Arcavacata di Rende, ITALY
P. Morrone, University of Calabria, Arcavacata di Rende, ITALY
F. Rovense, University of Calabria, Arcavacata di Rende, ITALY

Session reference: 5BV.2.2
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Bioenergy Integration in Ethanol Plants: An Alternative End Use For Biogas to Enable 2g Ethanol Production

Short introductive summary:

This paper’s objective is to assess how much sugarcane bagasse can be spared from burning in ethanol plants CHP systems to produce lignocellulosic ethanol (2G ethanol) using biogas generated from vinasse biodigestion. This is necessary because sugarcane bagasse is the main fuel for power generation in ethanol plants generating energy surplus, which creates revenues for the plant, thus not being simple to use bagasse for 2G ethanol production in an ethanol plant. Calculations were performed to assess how much bagasse was possible to displace using gas-fired power generation technology (Rankine cycle, Brayton Cycle and combined cycle) for burning biogas. Results indicates that up to 57% of the bagasse can be displaced for 2G ethanol production and that the use of another renewable fuel (possibly bagasse straw) would be necessary to displace all the available bagasse.

Presenter: **Alessandro SANCHES-PEREIRA, University of Sao Paulo, Institute of Energy and Environment, São Paulo, BRAZIL**

Presenter's biography:

Research Fellow at Research Group on Bioenergy, Institute of Energy and Environment, USP University of São Paulo. ORCID: orcid.org/0000-0001-9905-8824

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. L. Joppert, Institute of Energy and Environment of the University of São Paulo, São Paulo, BRAZIL
M.M. Santos, Institute of Energy and Environment of the University of São Paulo, São Paulo, BRAZIL
H.K.M. Costa, Institute of Energy and Environment of the University of São Paulo, São Paulo, BRAZIL
A.S. Pereira, Institute of Energy and Environment of the University of São Paulo, São Paulo, BRAZIL
S.T. Coelho, Institute of Energy and Environment of the University of São Paulo, São Paulo, BRAZIL

Session reference: 5BV.2.3
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Reliable Bio-based Refinery Intermediates - BioMates

Short introductive summary:

The purpose of the BioMates H2020-project is to develop a route from 2G-biomass (straw, miscanthus) to bio-based intermediates with reliable properties, ready to be fed into conventional fossil-based refineries.
The approach comprises of ablative fast pyrolysis followed by mild hydrotreatment integrating solar-generated renewable make-up hydrogen and electrochemical compression of recycled gas. Various feedback-loops from sustainability, economics and end-use potential will improve the applicability of the results to be generated.
The main scientific innovation lies in providing 2G-biomass-based intermediates of reliable properties and thus in closing the gap between agriculture (sustainable products with typically varying properties) and fuels refining (lack of sustainable feedstock, but demanding close compliance with properties). It will include validating the technology in a Technology Readiness Level 4-5.
Preliminary results will be given in the presentation at the conference, as the project just started.

Due to the early stage of the project, we propose a visual rather than an oral presentation for this year’s conference.

Presenter: **Tim SCHULZKE, Fraunhofer-Institut UMSICHT, Biorefinery and Biofuels Dpt., Oberhausen, GERMANY**

Presenter's biography:

I studied chemical engineering at University of Dortmund, where I received my diploma in 1992. From then on I work at Fraunhofer UMSICHT, since January 1st, 2013 as group manager Thermochemical Process and Hydrocarbons in department Biorefinery & Biofuels.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Heil, Fraunhofer UMSICHT, Oberhausen, GERMANY
T. Schulzke, Fraunhofer UMSICHT, Oberhausen, GERMANY
S. Bezergianni, CERTH/CPERI, Thessaloniki, GREECE
N. Rettenmaier, ifeu - Institut für Energie- und Umweltforschung Heidelberg GmbH, Heidelberg, GERMANY
U. Pfisterer, BP Europa SE, Hamburg, GERMANY
M. Martin, Ranido sro, Prague, CZECH REPUBLIC
M. Mulder, Hydrogen Efficiency Technologies (HyET) BV, Arnhem, THE NETHERLANDS
R. Diaz-Chavez, Imperial College of Science, Technology and Medicine, London, UNITED KINGDOM
D. Kubicka, University of Chemistry and Technology Prague, Prague, CZECH REPUBLIC

Session reference: 5BV.2.5
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

The Combination of Biomass with Solar Thermal Energy and other Renewables for Small Heating Grids

Short introductive summary:

The heating and cooling demand in Europe accounts for around half of the EU's final energy consumption. Renewable energy policies often mainly focus on the electricity market, whereas policies for renewable heating and cooling are usually much weaker. Therefore, it is important to support and promote renewable heating and cooling concepts. A presentation at the 25th EUBCE, will present concepts on the combination of biomass with different other renewable energies, such as solar thermal and power-to-heat, for the supply of heating grids. Past and ongoing activities of the CoolHeating project will be presented.

Presenter: **Dominik RUTZ, WIP, Biomass Unit, München, GERMANY**

Presenter's biography:

Dominik Rutz is a Senior Project Manager at WIP Renewable Energies (www.wip-munich.de) since 2005. He graduated in Environmental Science (Dipl.-Ing.) and Consumer Science (M.Sc.). His main field of experience includes the technical and non-technical analysis of bioenergy and its supporting policies in developing countries and emerging economies worldwide. He is coordinator of several EU funded projects.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Rutz, WIP, Munich, GERMANY
R. Mergner, WIP, Munich, GERMANY
R. Janssen, WIP, Munich, GERMANY
M. Hofmeister, PlanEnergi, Århus, DENMARK
L. Laurberg Jensen, PlanEnergi, Århus, DENMARK
C. Doczekal, Güssing Energy Technologies GmbH, Güssing, AUSTRIA
R. Zweiler, Güssing Energy Technologies GmbH, Güssing, AUSTRIA
T. Puksec, University of Zagreb (UNIZAG FSB), Zagreb, CROATIA
N. Duic, University of Zagreb (UNIZAG FSB), Zagreb, CROATIA
R. Sunko, Skupina fabrika d.o.o., Ljutomer, SLOVENIA REPUBLIC
B. Sunko, Skupina fabrika d.o.o., Ljutomer, SLOVENIA REPUBLIC
N. Markovska, International Centre for Sustainable Development of Energy, Water and Environment Systems - Affiliat, Skopje, REPUBLIC OF MACEDONIA
M. Karanfilovska, International Centre for Sustainable Development of Energy, Water and Environment Systems - Affilia, Skopje, REPUBLIC OF MACEDONIA
N. Rajkovic, School of Electrical Engineering and Computer Science, Belgrade, REPUBLIC OF SERBIA
I. Batas Bjelic, School of Electrical Engineering and Computer Science, Belgrade, REPUBLIC OF SERBIA
A. Kazagic, Elektroprivreda, Sarajevo, BOSNIA AND HERZEGOVINA
A. Ademovic-Tahirovic, Elektroprivreda, Sarajevo, BOSNIA AND HERZEGOVINA
S. Jerotic, Municipality of of Sabac, Sabac, REPUBLIC OF SERBIA
E. Fejzovic, Municipality of Visoko, Visoko, BOSNIA AND HERZEGOVINA
T. Zrinski, Municipality of Ljutomer, Ljutomer, SLOVENIA REPUBLIC

Session reference: 5BV.2.6
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Electricity Production via Biogas Plants in Electricity Grids with a High Share of Installed Volatile Power Producers

Short introductive summary:

With the expansion of variable renewable energies (VRE) from wind and solar energy, the demand for future energy system management in Germany is increasing. Especially the security and reliability of electricity supply has to be evaluated with new aspects. The electrical energy supply has to be ensured by expanding the electricity grid, building energy storages and, additionally, by controllable renewable energy producers. Apart from solid biomass, biogas is the only energy source that can be stored among the renewable energies. The expansion of technical and economic potential of controllable power production via biogas plants can ensure grid stability in the future.
In this context, the Institute of new Energy Systems at Technische Hochschule Ingolstadt is working on the research project “FlexFuture – Integration of biogas plants in electricity grids with a high share of variable power producers. (Project-Number: FZJ-563-2516-068), funded by the German Federal Ministry for Economic Affairs and Energy. The aim is to develop control strategies for biogas plants for a grid stabilizing and cost effective electricity production in German electricity distribution grids. Simulations are carried out and modifications for a controllable electricity production via biogas plants are implemented onto an existing biogas plant. The overall efficiency of biogas plants is optimized and a monitoring system and a proactive control unit is implemented in a flexible biogas plant.

Presenter: **Katharina BÄR, Technische Hochschule Ingolstadt, Institute of New Energy Systems, Ingolstadt, GERMANY**

Presenter's biography:

Employed at:
Institute of New Energy Systems
Technische Hochschule Ingolstadt (THI)
October 2015 – now
Research Engineer
(Focus on Optimising the Flexible Electricity
Generation by Biogas Plants)
Education :
THI, Industrial Engineering (B.Eng.)
THI, Electrical Engineering (M.Sc.)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Bär, Technische Hochschule Ingolstadt, ., GERMANY
M. Sonnleitner, Technische Hochschule Ingolstadt, GERMANY
W. Zörner, Technische Hochschule Ingolstadt, GERMANY

Session reference: 5BV.2.9
Subtopic: 5.2 Bioenergy and grid balancing
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Uncertainty in Climate Benefits of Bioenergy with Carbon Capture and Storage

Short introductive summary:

Bioenergy is expected to play an important global role in supplying energy, replacing fossil fuels and mitigating climate change in the 21st century. Carbon dioxide released during biomass combustion is taken from the atmosphere during biomass regrowth, explaining the climate change mitigation potential of bioenergy. Still larger mitigation and even negative greenhouse gas (GHG) emissions are possible when carbon emissions from bioenergy are captured and stored. This BioEnergy with Carbon Capture and Storage (BECCS) mechanism is expected to be indispensable in meeting 2 or 1.5 ?C climate change mitigation targets, according to most climate change mitigation scenarios. Our objective is to estimate typical values and uncertainty of 1) how long it takes until BECCS leads to climate benefits, and 2) the size of these climate benefits, on a per hectare and per MJ fuel basis over a fixed time period. Both BECCS electricity and transport fuels are studied. Climate benefits are determined in terms of reduced cumulative radiative forcing and BECCS is considered at a global level, including different biomes, previous land-uses, bioenergy feedstocks, and final energy carriers.

Presenter: **Steef HANSSEN, Radboud University, Environmental Science Dpt., Nijmegen, THE NETHERLANDS**

Presenter's biography:

I am a PhD student at Radboud University (The Netherlands). My research concerns the climate change impact of bioenergy, with a focus on electricity and transport fuels from second-generation bioenergy feedstocks. I graduated in Energy Science from Utrecht University in 2015 (MSc, cum laude).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.V. Hanssen, Radboud University, Nijmegen, THE NETHERLANDS
Z.J.N. Steinmann, Radboud University, Nijmegen, THE NETHERLANDS
M.A.J. Huijbregts, Radboud University, Nijmegen, THE NETHERLANDS

Session reference: 5BV.2.12
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Bioenergy Sustaining the Future and ERA-NET Bioenergy Results

Short introductive summary:

Bioenergy Sustaining the Future (BESTF3) is a European initiative aiming to encourage the commercialisation of bioenergy projects and increase renewable energy production across the EU. By incorporating the cooperation with ERA-Net Bioenergy as an additional activity within the project, demonstration and research are brought together and collaborative projects are thus encouraged across the entire TRL spectrum.

Presenter: **Kees KWANT, Netherlands Enterprise Agency, Ministry of Economic Affairs, RVO, Utrecht, THE NETHERLANDS**

Presenter's biography:

Kees W. Kwant has a background in Fluid Dynamics and Technology Development from the Technical University Twente.
He worked at industry DSM to develop fermentation processes and was programme manager of the national solar energy programme of the Netherlands.
He has extensive experience in developing and implementation of bioenergy in the Netherlands and abroad, develop sustainability and chaired the working group on the GHG calculation methodology. At present he is Liaison Biobased Economy and the linking pin between research and implementation in the framework of the Biobased and Renewable Energy Programs of RVO in the Netherlands. He participates in the EU programs: www.biomasspolicies.eu and Bioenergy for Business. He holds the Chair of the IEA Bioenergy Implementing Agreeement and is Executive member and for the Netherlands www.ieabioenergy.com Winner of the Dutch Bioenergy price 2009 of the Platform Bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Kwant, RVO.nl, Utrecht, THE NETHERLANDS
R. van Leeuwen - Jones, RVO.nl, Roermond, THE NETHERLANDS
B. de Leeuw, BEIS, London, UNITED KINGDOM

Session reference: 4BO.9.1
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Resource Efficient Market Stimulation Policies for Indigenous Biomass Value Chains at EU Member States

Short introductive summary:

To date, biomass mobilisation has been quite slow and fragmented among sectors and countries with forest biomass being a front runner in specific applications (mostly in the pulp and paper sector). To stimulate future markets and steer development across new innovative and highly efficient technologies it is essential for national policy makers to:

• understand their country’s indigenous biomass capacities and prioritise value chains;
• design and implement balanced and integrated policies, aiming for sustainable, resource efficient mobilization while keeping a level-playing field with all non- food bio-based markets.

This paper capitalises on the findings of Biomass Policies and S2Biom projects and provides ‘value chain’ specific policy recommendations for EU Member States by analysing:

• indigenous biomass value chains with high potential for 2020 and 2030;
• policy mechanisms with good potential to stimulate markets at various stages of development and to facilitate deployment of indigenous biomass value chains with high decarbonisation potential;
• rationale and expected added value from their implementation.

Presenter: **Calliope PANOUTSOU, Imperial College, Centre for Energy Policy and Technology, London, UNITED KINGDOM**

Presenter's biography:

Dr Calliope Panoutsou is a Senior Research Fellow at Imperial College London and the Vice Chair of the Scientific Board, for BBI. Recent work IS related to integrated policy for biomass value chains.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Panoutsou, Imperial College, London, UNITED KINGDOM
A. Singh, Imperial College, London, UNITED KINGDOM
A. Uslu, ECN, Amsterdam, THE NETHERLANDS
J. van Stralen, ECN, Amsterdam, THE NETHERLANDS
L. Pelkmans, VITO, Mol, BELGIUM
B. Elbersen, DLO, Amsterdam, THE NETHERLANDS

Session reference: 4BO.9.2
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Future Market Share Estimation of Renewable Gas in Germany Using a System Dynamics Modelling Approach

Short introductive summary:

We have developed a market simulation model for renewable gas in Germany using a quantitative bottom-up modeling approach. Whereas the focus of the past decade was on modeling the transition of the power sector our modeling approach deals with renewable gas in the power, heat and fuel market. Renewable gas will play a major role for the upcoming flexibility demand in the power sector due to the increased installation of volatile renewables like wind and solar power in the progress of the energy transition. Our approach is highly innovative by having a dynamic modeling methodology that is able to reflect the actual dynamics in the real market encompassing the power, heat and fuel market. It is highly relevant because renewable gas with its applications in the power, heat and fuel markets will play a major role by meeting greenhouse gas reduction targets, its storability will help to balance fluctuating power from wind and solar, the production fosters rural development and being a domestic energy source it reduces import dependencies. The model simulates the German biomethane market till 2030. First results show, that the successful introduction of bio-SNG till 2022 can alr

Presenter: **Thomas HORSCHIG, DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt., Leipzig, GERMANY**

Presenter's biography:

Thomas Horschig. Work experience :01/2014 till present DBFZ Deutsches Biomasseforschungszentrum gGmbH, Leipzig. PhD Student Education 2011 - 2013 University Halle-Wittenberg. M. Sc. Management of Natural Resources.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Horschig, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
D Thrän, DBFZ-German Biomass Research Centre, Leipzig, GERMANY

Session reference: 4BO.9.3
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

International Trade of Energy Biomass - An Overview of the Global Status

Short introductive summary:

The work is commsiioned by IEA Bioenergy Task 40, whose members will also review and add information to the study. I can present an oral presentation.

Presenter: **Svetlana PROSKURINA, Lappeenranta University of Technology, Laboratory of Sustainable Energy Systems, Lappeenranta, FINLAND**

Presenter's biography:

Svetlana Proskurinais a PhD student of Laboratory of Sustainable Energy Systems, Lappeenranta University of Technology, Finland. Research focuses the international trade of biomass and bioenergy products, which will continue to have a significant impact on the bioenergy development in the world. Wood pellets and other biofuels, which are made through gasification, torrefaction and pyrolysisand its markets and applications.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Proskurina, Lappeenranta University of Technology, FINLAND
M. Junginger, Copernicus Institute, Utrecht University, Utrecht, THE NETHERLANDS
J. Heinimo, Mikkeli Development Miksei Ltd, Mikkeli, FINLAND
E. Vakkilainen, Lappeenranta University of Technology, FINLAND

Session reference: 4BO.9.4
Subtopic: 4.1 Market implementation, investments & financing
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Supply-Side Perspectives on the Euro-American Pellet Trade

Short introductive summary:

The Southern United States is the source of over 5.5 million metric tons/year of wood pellets, which feed into European and other international energy markets. This area of the world is home to a unique forestry community, which has diverse ownership and management goals. To fully understand the supply-side of this market it is necessary to examine this forestry system and the motivation of the landowners in this region. This paper will provide a discussion of the social, economic and environmental pressures facing pellet manufacturers and feedstock providers in the Southern United States and will provide a context for the uncertainty in this emerging industry.

Presenter: **William HUBBARD, Southern Regional Extension Forestry, Athens, USA**

Presenter's biography:

William Hubbard is the Southern Regional Extension Forester based at the University of Georgia in Athens, Georgia, USA. He facilitates regional Extension and university outreach for the 13 southern land-grant universities and the USDA Forest Service. He serves state forestry agencies and others within the southern forestry community in a variety of capacities. In the past, Dr. Hubbard was a state Extension Forester and Forest Management Instructor at the University of Florida from 1987-1993. He has been in his current position for 22 years. He received a B.S. in Forest Management from the University of Florida in 1985, an M.S. in Forest Economics from the University of Florida in 1987 and is currently pursuing a PhD in Adult Education at the University of Georgia in 2010. Dr. Hubbard has been a Principal Investigator on over $5 million in federal grants and contracts related to bioenergy, climate change, forest restoration, new technologies and Extension and outreach programs. He has published on several of these topics including authoring a book chapter on Wood Bioenergy for "Bioenergy: Biomass to Biofuels" (2015) textbook.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

W. Hubbard, Southern Regional Extension Forestry, USA
D.P. Geller, University of Georgia, Athens, GA, USA

Session reference: 4BO.9.5

Subtopic: 4.1 Market implementation, investments & financing

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Experimental Investigation on Steam-Oxygen Fluidized Bed Gasification of Biogenic Residues

Short introductive summary:

Steam-oxygen gasification is the autothermal conversion of a solid fuel to a nitrogen free syngas that can be used for fuel (e.g. SNG, DME, kerosene) and chemical (basic chemicals, plastic monomers) synthesis. To make the process economic and sustainable, this work proposes the use of biogenic residues as low-cost regenerative fuels. In this work experimental investigations on the steam-oxygen gasification of the low cost biogenic fuels and dried sewage sludge and wheat straw are conducted in a technically relevant 20 kW fluidized bed facility. The composition and quality of the produced syngas is investigated extensively: (i) the main components H2, CO, CO2 CH4, CxHy with online measuring devices (ii) the impurities H2S, NH3, and HCl with wet chemical methods and first trials of online measurement (iii) wet chemical sampling of tars with assesment of the amount and elemental composition of gravimetric tars as well as analysis of GCMS tars. The gathered data is used to conduct a mass balance of the gasification process. An effective way to model the process in Aspen Plus® using the experimental data has been found. With that further mass and energy balances can be evaluated.

Presenter: **Max SCHMID, University of Stuttgart, Institute of Combustion and Power Plant Technology, Stuttgart, GERMANY**

Presenter's biography:

Max Schmid holds a master’s degree in process engineering and is a Ph.D. student at the Institute of Combustion and Power Plant Technology (IFK) at the University of Stuttgart. He is working on gasification of biomass and hot gas cleaning.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Schmid, IFK University of Stuttgart, Stuttgart, GERMANY
M. Beirow, IFK University of Stuttgart, Stuttgart, GERMANY
D. Schweitzer, IFK University of Stuttgart, Stuttgart, GERMANY
R. Spörl, IFK University of Stuttgart, Stuttgart, GERMANY
G. Scheffknecht, IFK University of Stuttgart, Stuttgart, GERMANY

Session reference:	2BO.10.1
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Gasification of Pine Forest Residues as First Stage for the Production of Jet Fuel Via Fischer-Tropsch

Short introductive summary:

Future demand of Jet Fuels will require of sustainable alternative sources; among them, biomass gasification to syngas followed by Fischer-Tropsch is one of the most promising and the one chosen by the North Atlantic Council to replace part of the kerosene used in its planes. Syngas from gasification must fulfil some requirements: tar1 mg·m-3(STP), sulphur compounds 1 ppm, nitrogen compounds 20 ppb, alkalines 10 ppb or halides 10 ppb and H2/CO molar ratio = 1,7–2,15). In order to adjust this molar ratio, a water gas-shift reaction stage is sometimes required. In this scenario, it is essential to have a deep knowledge of the influence of the main operational conditions: equivalent ratio, temperature, steam to carbon ratio and use of catalysts. The gasification process is usually carried out autothermically at the desired gasification temperature by means of the adjustment of the equivalent ratio. The effect of these operational conditions on the H2/CO ratio can be studied by a non-stoichiometric thermodynamic equilibrium model if the energy balance is included in it. However, and regarding the production of contaminants, it is necessary to perform an experimental study.

Presenter: **Isabel FONTS, Centro Universitario de la Defensa, Chemical and Environmental Engineering Dpt., Zaragoza, SPAIN**

Presenter's biography:

In 2010 I finished my PhD about sewage sludge valorization by means of pyrolysis. My main research lines are the valorization of bio-wastes (sewage sludge, manure, meat and bone meal, black liquors) by pyrolysis and gasification.I am author of 18 papers and around fourty conference proceedings.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Abrego, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
I. Fonts, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
N. Gil-Lalaguna, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
M. Atienza-Martinez, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
Z. Afailal, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN
J.A Mateo-Román, Aragon Institute for Engineering Research (I3A), Universidad de Zaragoza, Zaragoza, SPAIN

Session reference:	2BO.10.2
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Recirculation Of Reactive Fines An Optimization Strategy For Existing Dual Fluidized Bed Gasification Systems

Short introductive summary:

Collection and combustion of the product gas ashes of industrial gasifiers is a common mean to enhance the carbon conversion. In a dual fluidized bed gasifier, the combustion chamber of the system serves that purpose. Similarly, limitation of the loss of bed material is generally achieved by recirculation of the coarse fraction of fly ashes from the combustor into the system. In this work, the effect on the product gas quality of the recirculation of fly ashes was investigated. 600 kg of olivine in a suitable particle size distribution was introduced through the recirculation loop. The fine fraction entrained by the gases out of the system was collected and recirculated back to the gasifier in two occasions. Samples of the fine fraction were collected before and after recirculation for material characterization.

Presenter: **Sébastien PISSOT, Chalmers University of Technology, Energy Technology Division, Göteborg, SWEDEN**

Presenter's biography:

Sébastien Pissot is a PhD student in the Energy Technology division at Chalmers University. He works with gasification and aims to gain understanding on the ash chemistry and flows in a dual fluidized bed gasifier system.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Pissot, Chalmers University of Technology, Göteborg, SWEDEN
T. Berdugo, Chalmers University of Technology, Göteborg, SWEDEN
M. Seemann, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 2BO.10.3
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Methanation-Enhanced Gasification - Design of a High Pressure Gasification Reactor to Investigate and Boost the Biomass to SNG Conversion Efficiency

Short introductive summary:

Thermo-chemical conversion of lignin-rich biomass to SNG (Synthetic Natural Gas) is commonly done by allothermal steam gasification and subsequent methanation. Whereas the gasification is endothermic, the strongly exothermic methanation reaction requires heat dissipation. Further, biomass gasification requires high temperatures, usually above 700 °C, while formation of methane is favored at lower temperatures, usually down to 300 °C. The heat of methanation can hence not readily be used for the endothermic gasification, but is usually only available as low-grade heat (e.g. for drying). However, the heat released during methanation accounts for up to 20 % of the biomass' initial energy content (HHV) – a considerable reduction of the conversion efficiency. Innovative process concepts have been developed to overcome this issue by integrating the methanation directly into the gasification process. A continuously operated high pressure gasification reactor is to be built to investigate experimentally three different measures which enhance the conversion of biomass into methane despite high temperatures.

Presenter: **Gebhard WAIZMANN, University of Stuttgart IFK, Institute of Combustion and Power Plant Technology, Stuttgart, GERMANY**

Presenter's biography:

Gebhard Waizmann is working as PhD student at the IFK (University of Stuttgart, Germany) since 2014. His research is about the development and analysis of thermally integrated and optimised thermochemical conversion of biomass to SNG (Substitute Natural Gas).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Waizmann, IFK - University of Stuttgart, GERMANY
R. Spörl, IFK - University of Stuttgart, GERMANY
G. Scheffknecht, IFK - University of Stuttgart, GERMANY

Session reference: 2BO.10.4
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Alkali Compounds as Tar and Soot Suppressors in Entrained Flow Gasification.

Short introductive summary:

This work investigates at laboratory scale the activity of alkali compounds in reducing tar and soot formation. Pine wood was impregnated with different amounts of potassium to determine the saturation threshold of alkali activity with regards to tar and soot. Additionally, blends of black liquor (alkali rich) and pyrolysis oil (alkali poor) were studied to evaluate the feasibility of decreasing the content of alkali in the well-established black liquor gasification process

Presenter: **Albert BACH-OLLER, Luleå University of Technology, Division of Energy Science, Luleå, SWEDEN**

Presenter's biography:

PhD student in University of Technology of Luleå (Sweden) working on alkali-catalysed biomass gasification at a laboratory scale

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Bach-Oller, Division of Energy Science, Lulea University of Technology, Lulea, SWEDEN
G. Haggstrom, Division of Energy Science, Lulea University of Technology, Lulea, SWEDEN
K. Kirtania, Division of Energy Science, Lulea University of Technology, Lulea, SWEDEN
E. Furusjo, Division of Energy Science, Lulea University of Technology, Lulea, SWEDEN
K. Umeki, Division of Energy Science, Lulea University of Technology, Lulea, SWEDEN

Session reference: 2BO.10.5
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Microwave Pyrolysis of Biomass: Turning the Fundamentals Into Commercial Plants

Short introductive summary:

Microwave pyrolysis of biomass has long been recognised to provide potential opportunities for producing a range of bio-based products. Unlike conventional heating, microwave heating occurs through the interaction of biomass with electromagnetic energy, with the biomass heated volumetrically by energy conversion instead of conventional heat transfer mechanisms. With microwave heating pyrolysis can be achieved within a cold surrounding environment, a feat that is not possible with conventional heating processes. This unique phenomenon presents a number of opportunities for processing of biomass feedstocks, which include enhanced bio-oil quality and a significantly simplified process flowsheet, both of which improve the economic viability of industrial biomass processing. Herein, the basis of an approach which have already proven to successfully operate at scale, within several industrial environments, has been followed to describe the scaling-up of microwave pyrolysis. Only a fundamental understanding (interactions between the electric field component of the microwave and biomass) and the resulting relationship between product yield and quality with microwave heating variables, will allow to exploit the potential benefits of microwave heating. As a result, five different processing concepts have been identified to move this technology upwards in scale.

Presenter: **Daniel BENEROSO VALLEJO, University of Nottingham, Chemical and Environmental Engineering Dpt., Nottingham, UNITED KINGDOM**

Presenter's biography:

MEng in Chemical Engineering (2010)
MSc in Energy Engineering (2012)
PhD in Energy Engineering (2016)
Research Fellow at Un of Nottingham (Current position)

Thermochemical conversion of conventional and renewable carbon-based fuels: pyrolysis and gasification; microwave processing.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Beneroso, The University of Nottingham, Nottingham, UNITED KINGDOM
J. Robinson, The University of Nottingham, Nottingham, UNITED KINGDOM

Session reference: 3BO.11.1
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrothermal Processing of Wastewater Willow with Integrated Nutrients Recovery

Short introductive summary:

Hydrothermal liquefaction of biomass is a highly promising thermochemical process for sustainable drop-in biofuel and added-value chemicals production. When biomass is hydrothermal processed, water is used as the reaction medium, and this allows using a wide range of wet biomasses. Many different lignocellulosic feedstocks have been successfully investigated under hydrothermal reaction conditions; in a cost-efficient prospect the use of residual waste fractions is preferable. Lignocellulosic willow biomass is efficiently used to uptake nutrients and heavy metals from waste water streams. The present work is aimed to investigate hydrothermal processing of willow harvested after usage in waste water plant. The reactions involved in the conversion will be studied together with quantitative and qualitative analysis of the products; special emphasis will be also addressed to trace in which phase both nutrients and metals go after the reaction, and to define the optimal technique to separate and extract them.

Presenter: **Federica CONTI, Aalborg University, Energy Technology Dpt., Aalborg, DENMARK**

Presenter's biography:

With a university background in Process and Chemical Engineering (both Bachelor and Master degree), I am currently working at Aalborg University on hydrothermal processing of various biomass feedstocks and residual organic fractions for biofuels and chemicals production.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Conti, Aalborg University, Aalborg, DENMARK
T.H. Pedersen, Aalborg University, Aalborg, DENMARK
H.L. Bach, Ny Vraa Bioenergy, Tylstrup, DENMARK
L. Rosendahl, Aalborg University, Aalborg, DENMARK

Session reference: 3BO.11.2
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

New Pseudo-components of Hemicellulose and Lignin

Short introductive summary:

Hemicellulose and lignin have significant chemical variations within plant species and after biomass treatment, which are outside of the capability of most pyrolysis kinetic models. This study creates a chemical/physical kinetic model that can (i) be readily adapted to numerous types of lignocellulosic biomass, and (ii) offer detailed information of product distribution and composition within a satisfactory level of accuracy, via the introduction of new model pseudo-components for hemicellulose and lignin.

Presenter: **Karla DUSSAN, National University of Ireland, Mechanical Engineering Dpt., Galway, IRELAND**

Presenter's biography:

Karla Dussan is currently a postdoctoral researcher at the National University of Ireland-Galway investigating the technical feasibility and detailed kinetics of thermal conversion routes for biomass and waste conversion to energy and chemicals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Dussan, National University of Ireland Galway, Galway, IRELAND
S Dooley, Trinity College Dublin, Dublin, IRELAND
R. Monaghan, National University of Ireland Galway, Galway, IRELAND

Session reference: 3BO.11.3

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Effect of Biomass Particle Size on the Fast Pyrolysis Characteristics of Palm Kernel Shell to Produce the Biocrude-Oil

Short introductive summary:

A tilted-slide reactor for fast pyrolysis of biomass was designed with biomass capacity of 20 kg/h, in which no fluidizing gas and no electric power are necessary for conveying hot sand. Because the heat transfer from the hot sand to the biomass particle is important, the particle size is one of the key factors to control the fast pyrolysis process. In this study, PKS (Palm Kernel Shell) was used for fast pyrolysis to study the effect of biomass particle size on the fast pyrolysis characteristics. The raw biomass was crushed and grinded first, and three ranges of particle sizes were sieved using meshes to be 1~2mm, 0.425~1mm, and 0.106~0.425mm. As a preliminary test, fast pyrolysis was performed in a lab-scale bubbling-fluidized-bed reactor at various reaction temperatures from 465˚ C to 560˚ C. In the case of 1~2mm size, the biocrude-oil yield was 44.41wt% at 465˚ C and 46.01wt% at 560˚ C which was almost similar with temperature variation. When the particle size was 0.106~0.425mm, the biocrude-oil yield was 39.12wt% at 465˚ C and 47.31wt% at 560˚ C, which was smaller than the case of 1~2mm at low temperature, but becomes larger at high temperature.

Presenter: **Sang-Kyu CHOI, Korea Institute of Machinery & Materials, Eco-Machinery System Dpt., Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

Dec. 2012 - Present
Senior Researcher, Korea Institute of Machinery & Materials (KIMM)
Feb. 2010 - Nov. 2012
Post-Doctoral Fellow, King Abdullah University of Science and Technology

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.K. Choi, Korea Institute of Machinery and Materials, Daejeon, REPUBLIC OF KOREA
Y.S. Choi, Korea Institute of Machinery and Materials, Daejeon, REPUBLIC OF KOREA
S.J. Kim, Korea Institute of Machinery and Materials, Daejeon, REPUBLIC OF KOREA
S.Y. Han, Korea Institute of Machinery and Materials, Daejeon, REPUBLIC OF KOREA
Y.W. Jeong, Korea Institute of Machinery and Materials, Daejeon, REPUBLIC OF KOREA
T. Rahman, Korea University of Science and Technology, Daejeon, REPUBLIC OF KOREA

Session reference: 3BO.11.4
Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Bio-Oil Production from Palm-Oil Industry Residues Employing Conventional and Catalytic Hydrothermal Liquefaction

Short introductive summary:

I am a lecturer/researcher in the department of mechanical engineering, Kasetsart University, Thailand. Currently, my scope of research is waste and biomass conversion technology focusing on hydrothermal treatment/carbonization/liquefaction technology, pyrolysis of e-waste, gasification at medium/small/micro scale and other physical conversion of biomass.

Presenter: **Jeerattikul KAHARN, Kasetsart University, Mechanical Engineering Dpt., Bangkok, THAILAND**

Presenter's biography:

I am a student

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Kaharn, Kasetsart University, Bangkok, THAILAND
A. Suemanotham, Thailand Institute of Scientific and Technological Research, Pathum Thani, THAILAND
K. Somkeattikul, Kasetsart University, Bangkok, THAILAND
T. Thuechart, Kasetsart University, Bangkok, THAILAND
M. Haruthaithanasan, Kasetsart University, Bangkok, THAILAND
C. Areeprasert, Kasetsart University, Bangkok, THAILAND

Session reference:	3BO.11.5
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Power2gas Plant Operation Schemes - First Results from GP Joule's Power Gap Filler

Short introductive summary:

GP JOULE is one of the earliest power to gas concepts developing companies to integrate renweable energy prodution from wind, biomass and solar using existing infrastructure. We are operating a first plant as a cobination of biogas plants and electrolyzer to store hydrogen onsite or to utilize it as an alternative fuel.

Our power gap filler can be seen as a add-on to existing biogas plant, e.g. 8000 all over Germany.

Presenter: **Lars JÜRGENSEN, Aalborg University Esbjerg, Energy Technology Dpt., Esbjerg, DENMARK**

Presenter's biography:

Lars Jürgensen did his PhD at Aalborg University Esbjerg focusing on the catalytic methanation of biogas for the utilization of surplus electricity from wind and solar power. Now he is part time postdoctoral researcher at Aalborg University and part time project manager at GP JOULE, a company developing storage schemes for renewable energy in Northern Germany.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Jürgensen, GP JOULE, Bredsted, GERMANY

Session reference: IBO.12.1

Subtopic: 6.4 Biochemical Conversion

Topic: 6. INDUSTRY SESSIONS

Optimised Low-CapEx Concept for the Production of Drop-in Biofuels via Gasification

Short introductive summary:

Transport sector represents almost a quarter of Europe’s greenhouse gas emissions and has not experienced the same gradual decline in emissions as other sectors. The ECâ€™s new (July 2016) strategy for low-emission mobility reiterates the need for drastic reductions in transportation emission by the mid-century. Numerous studies have identified a clear need for advanced drop-in biofuel technologies to meet such ambitious goals. However, based on the experiences of the NER300 programme, significant reductions in capital intensity of the proposed projects needs to be achieved to initiate deployment. In this work we propose a new and improved gasification-based concept that has potential to achieve such reductions and to reach satisfactory economics at a scale previously thought unfeasible. In our analysis we also explore synergies between biomass and other renewable energy sources and carry out prospective techno-economic and GHG analysis for a first-of-a-kind plant that incorporates latest advances in the area of thermochemical biomass conversion.

Presenter: **Ilkka HANNULA, VTT Technical Research Centre of Finland, Espoo, FINLAND**

Presenter's biography:

Dr Hannula is a Senior Scientist and Principal Investigator at VTT. His work involves engineering and economic modelling of advanced energy conversion systems. His specific technology interests include advanced biofuels, and the role of bioenergy in a flexible low-emission energy system.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Hannula, VTT Technical Research Centre of Finland, Espoo, FINLAND
E. Kurkela, VTT Technical Research Centre of Finland, Espoo, FINLAND

Session reference: IBO.12.2
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

CelluAPP - Technology Enabling Wood Based Value Chains

Short introductive summary:

The challenge to convert wood to biofuels and biochemical has today moved, from a technical issue to a challenge to create a robust business based value chain. The value chain includes both main and by products which can have totally different end markets.

The cellulose to sugars and chemicals development has been ongoing for the last decades. The technology starts to be commercial viable, but new cross businesses area agreements has to be developed. It has to reach from the forest owner/supplier, the technology developers and to the final consumer product supplier.

Presenter: **Thore LINDGREN, SEKAB E-Technology, Örnsköldsvik, SWEDEN**

Presenter's biography:

xx

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Lindgren, SEKAB E-Technology, Örnsköldsvik, SWEDEN
J. Lindstedt, SEKAB E-Technology, Örnsköldsvik, SWEDEN

Session reference: IBO.12.3
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Can Biomass Play a Role in Reducing Greenhouse Gas Emissions from Canada's Oil Sands?

Short introductive summary:

Canada's oil sands are projected to hold 11-13% of global oil reserves, but have become a focal point for protest due to the greenhouse gas emissions produced during bitumen recovery, extraction, upgrading, and transportation. This presentation will provide a summary of an in-depth investigation of opportunities to reduce oil sands greenhouse gas emissions by substituting renewable biomass for fossil fuels. Examples include biomass combined heat and power, renewable natural gas (biomethane), biocrude co-processing, bio-based diluent, and biohydrogen. It was determined that the use of biomass in oil sands production could reduce the well-to-refinery GHG intensity of bitumen blends or synthetic crude oil to levels competitive with the low GHG intensity conventional crudes. It is estimated that biomass from Alberta has the potential to reduce industry-wide oil sands GHG emissions by 15% or more, although the financial and logistical feasibility of commercial deployment of bio-based products and bioenergy in the oil sands requires further investigation and analysis.

Presenter: **Jamie STEPHEN, TorchLight Bioresources, Ottawa, CANADA**

Presenter's biography:

Dr. Jamie Stephen is the Managing Director of TorchLight Bioresources, a bio-strategy consulting and project management firm based in Ottawa, Canada. He has managed bioenergy and cleantech projects for a broad variety of clients including national and provincial governments, utilities, airlines, vehicle manufacturers, oil producers, investment funds, aboriginal groups, and technology developers. Projects have focused on industrial growth strategies, facility feasibility, technology deployment hurdles, and policy design. He has provided investment advisory and due diligence services to both public and private sector cleantech funds. Jamie holds a Ph.D. in biofuel/bioenergy techno-economics and a Master's in Chemical Engineering from the University of British Columbia.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.D. Stephen, TorchLight Bioresources, Ottawa, CANADA
W.E. Mabee, Queen's University, Kingston, CANADA
J. Bergerson, University of Calgary, CANADA
H.L. MacLean, University of Toronto, CANADA

Session reference: IBO.12.4
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

A Novel Robust and Selective Solvent for Biomass Fractionation

Short introductive summary:

We have developed an economic, robust and environmentally friendly process for biomass fractionation. The core of the process is biomass dissolution in aqueous ZnCl2- based solvent. The technology is feasible as the first step for a variety of biomass feedstocks in a large range of biomass based plants. Depending on the conditions (ZnCl2 concentration; solvent acidity; temperature and time) biomass main components – hemicellulose, cellulose, lignin - can be selectively separated. Due to mild process conditions (T90 oC) biomass sugar, glucose and xylose, are produced with very little degradation. Further, they are isolated from the solvent as rather concentrated aqueous solution, up to 25 wt.% sugars. The sugar stream is a nice starting material for almost endless options for further conversion: fermentation to bioethanol; hydrogenation/dehydration to monomers, etc. If desired, polymeric cellulose of nanoscale range can be produced in a simple process, by precipitation using an antisolvent. Most of lignin is not dissolved and is recovered by filtration. The process makes possible further selective conversion/utilization of all lignocellulosic biomass components.

Presenter: **Igor BABICH, BIOeCON, Hoevelaken, THE NETHERLANDS**

Presenter's biography:

Research activities are devoted to biomass conversion to fuel and chemical. Currently we are developing a process for biomass and biomass originated feedstocks fractionation and conversion into advanced products and specialty chemicals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Babich, BIOeCON, Hoevelaken, THE NETHERLANDS
J. Moulijn, BIOeCON, Hoevelaken, THE NETHERLANDS
P. O'Connor, BIOeCON, Hoevelaken, THE NETHERLANDS

Session reference: IBO.12.5
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Techno-economic Analysis of a HTL-based Algae Biorefinery

Short introductive summary:

Microalgae have the potential of contributing to the substitution of fossil fuels without affecting the food production and while being respectful to the environment. Hydrothermal liquefaction (HTL) appears to be an effective conversion technique to produce an energy dense liquid biofuel. HTL avoids the energy penalty of drying the microalgae feedstock by processing the whole wet microalgae feedstock in hot compressed water. This work presents a techno-economic assessment of a microalgae-biorefinery with an output of 0.5, 5 and 10 MW in the form of biocrude oil produced via HTL. The whole value chain (cradle-to-gate) is assessed in this study, from the cultivation of algae to the hydrothermal conversion to biocrude. The marine species Nannochloropsis gaditana is considered for this study. The results indicate that the production of biocrude oil from microalgae follow economies-of-scale and become more economic with larger-sized plant concepts. Within a sensitivity analysis the major cost blocks and drivers are identified. Cultivating and harvesting the microalgae have particularly high costs within the value chain, whereas HTL itself is a minor contributor to the main proc

Presenter: **Kay SUWELACK, Fraunhofer INT, Euskirchen, GERMANY**

Presenter's biography:

Kay Suwelack is a scientist and deputy head of business unit at the Fraunhofer INT. His research comprises renewable energies, production of platform chemicals from lignocellulose, and life-cycle assessment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Suwelack, Fraunhofer Institute for Technological Trend Analysis INT, Euskirchen, GERMANY
D. López Barreiro, Department of Biosystems Engineering, Ghent University, Ghent, BELGIUM
F. Ronsse, Department of Biosystems Engineering, Ghent University, Ghent, BELGIUM
W. Prins, Department of Biosystems Engineering, Ghent University, Ghent, BELGIUM
U. Hornung, Institute for Catalysis Research and Technology, Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen, GERMANY
A. Kruse, Life Cycle Assessment of Renewable Resources (440f), Institute of Agricultural Engineering, Universi, Stuttgart, GERMANY

Session reference: 3BV.3.1

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Bioethanol And Xylooligosaccharides Production From Agricultural Residue

Short introductive summary:

The aim of this work is, on the one hand to enhance enzymatic hydrolysis of cellulose contained in water insoluble solid (WIS) from steam exploded barley straw in order to be fermented to ethanol and, on the other hand, to study the oligosaccharides released during the pretreatment in the liquid fraction in order to obtain compound of high value-added (prebiotic).

Presenter: **Paloma MANZANARES, CIEMAT, Biofuels Unit, Renewable Energy Division, Madrid, SPAIN**

Presenter's biography:

Paloma Manzanares is PhD in Biology and Senior Scientist at Biofuels Unit of CIEMAT, Spain. She has large expertise in biomass production and utilization and in the last years has specialized in advanced technologies for 2nd generation bioethanol.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Álvarez, CIEMAT, Madrid, SPAIN
A. González, CIEMAT, Madrid, SPAIN
M. Ballesteros, CIEMAT, Madrid, SPAIN
M.J, Negro, CIEMAT, Madrid, SPAIN
P. Manzanares, CIEMAT, Madrid, SPAIN
I. Ballesteros, CIEMAT, Madrid, SPAIN
J.M. Oliva, CIEMAT, Madrid, SPAIN
F. Saéz, CIEMAT, Madrid, SPAIN

Session reference: 3BV.3.5

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biogas Biorefinery: Techno-Economic Analysis of Several Paths

Short introductive summary:

Andrey is a PhD student in Czech Technical University in Prague. He is interested in processing of biomass since master degree. So, now he wants to present one of his last works.

Presenter: **Andrey KUTSAY, Czech Technical University in Prague, Process Engineering Dpt., Prague, CZECH REPUBLIC**

Presenter's biography:

Andrey Kutsay is studying on the second year of PhD program in Czech Technical University in Prague. His department (Process Engineering) is quite diverse in designing technologies. One of them is Biorefinery concepts. So, the aim for Andrey on EUBCE 2017 would be to introduce his recent studies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Andrey Kutsay, Czech Technical University in Prague, Prague, CZECH REPUBLIC
Lukas Kratky, Czech Czech Technical University in PragueTechnical University in Prague, Prague, CZECH REPUBLIC
Tomas Jirout, Czech Technical University in Prague, Prague, CZECH REPUBLIC

Session reference:	3BV.3.6
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sustainability Analysis of Co-Producing High Value-Added Bioproducts and Biofuels in Integrated Biorefineries using Lignocellulosic Residues. The Case of Olive Tree Pruning

Short introductive summary:

This paper shows the results of the sustainability analysis of an integrated biorefinery using olive tree pruning as feedstock for producing high value-added products in small amounts and large amounts of low-profit biofuels. The economic dilemma of producing high value-added antioxidants in small amounts versus large amounts of low-profit biofuels using this lignocellulosic residue was previously studied and production conditions for its economic feasibility at medium scale were established. Producing antioxidants with the extractives (20% in mass of the total pruning) is profitable, thus the rest of the pruning residue rich in polysaccharides (around 50% in mass) could be discarded. Nevertheless, the economic feasibility of bioethanol production from this polysaccharides-rich residue could be improved if other factors, besides the oil price, are considered.
The paper employs a sustainability analysis method to conclude that the integrated design is more sustainable than producing either only extractives or only bioethanol and provides an explanation based on the quantitative values for each indicator as well as for the global sustainability indicator.

Presenter: **Arturo SANCHEZ, Centro de Investigacion y de Estudios Avanzados del IPN, Bioenergy Futures Laboratory, Zapopan, MEXICO**

Presenter's biography:

(B.Sc. Chem. Eng., 1985; M. Chem. Eng., 1989; Ph.D., 1994). He is currently a Senior Scientist at Cinvestav-Gdl, Mexico. His research interests include advanced biofuels process engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Sanchez, Laboratorio de Futuros en Bioenergía, Centro de Investigación y de Estudios Avanzados (CINVESTAV), Zapopan, MEXICO
G. Rendon-Acosta, Laboratorio de Futuros en Bioenergía, Centro de Investigación y de Estudios Avanzados (CINVESTAV), Zapopan, MEXICO

Session reference: 3BV.3.7
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Well-To-Tank Data for Advanced Tailor-Made Biofuel Alternatives

Short introductive summary:

The present work is part of a cross-disciplinary national Swedish research project on advanced tailor-made biofuels that aims at identifying drop-in biofuel options for the transport sector that combine excellent combustion properties with sustainable production pathways. The present paper addresses the methodology and primary results of the biofuel production pathway assessment. The general approach within the overall research project is described as well as the methodology applied in the work packages analyzing the sustainability of the biofuel production from different perspectives. A production pathway analysis for eight fuels chosen for compression-ignition (CI) (Diesel) engine operation is presented (se figure) and preliminary results for the well-to-tank (WTT) energy performance for one of the chosen biofuels (2-ethylhexanol) is presented. Three different production routes for 2-ethylhexanol are evaluated: butanol-based, ethanol-based and gasification-based.

Presenter: **Stefan HEYNE, CIT Industriell Energi, Goteborg, SWEDEN**

Presenter's biography:

Interested in biorefinery concepts modelling and evaluation; integration of biorefineries to the existing energy infrastrucutre; techno-economic and environmental evaluation of biorefinery concepts;
PhD in Industrial Energy Systems; PhD project on Biomass Gasification for SNG production (GoBiGas)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Heyne, CIT Industriell Energi AB, Göteborg, SWEDEN
R. Hackl, IVL Swedish Environmental Research Institute, Stockholm, SWEDEN
K. Pettersson, SP Technical Research Institute of Sweden, Göteborg, SWEDEN
S. Harvey, Chalmers University of Technology, Göteborg, SWEDEN
M. Grahn, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 3BV.3.8
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Simulation Tool for a Quick Evaluation of Molecules as Gasoline Alternatives - A Case Study with Bio-Oil Derived Compounds in Biorefineries

Short introductive summary:

On the example of lignin valorization a model to quickly assess the suitability of a compound as a fuel is presented. This allows to
compare the performance of any given liquid compound to gasoline. Helping to use the different compound occuring in biorefineries to their full potential and thereby helping to increase the economics of biorefineries.
We would like to emphasize that our internal combustion engine model and the presented approach are not only relevant for bio-oil-derived compounds. They can be applied to judge the suitability of any organic (waste) stream present in biorefineries, opening new ways of designing biorefineries. To ease the use of the model and to promote its applicability, the SI ICE model will be made accessible from our homepage soon.

Presenter: **Dominic GSCHWEND, Paul Scherrer Institute, ENE Dpt., Villigen PSI, SWITZERLAND**

Presenter's biography:

2014 - current phd thesis at Paul Scherrer Institute on biofuels
2007 - 2013 bsc & msc at ETH Zurich in mechanical engineering
Jul 2012 - Dec 2012 exchange semester at NTNU Trondheim (Norway)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Gschwend, PSI, Villigen, SWITZERLAND
P. Soltic, EMPA, Dübendorf, SWITZERLAND
S. Müller, PSI, Villigen, SWITZERLAND
F. Vogel, PSI, Villigen, SWITZERLAND

Session reference: 3BV.3.9
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Thermal conversion of lignin-rich residues from lignocellulose biorefining: from thermogravimetry to updraft gasification

Short introductive summary:

The residues from enzymatic hydrolysis od cane reed and wheat straw were gasified with mix air/O2/ steam in updraft mode at pilot scale (20/kg/h) corresponding to several equivalence ratios (combustion and water oxydation). The yield of incodensable gases (H2, CO, CO2, CnHm) and tars were discussed as funtion of the ERs with the aid of responce surface analysis and the corresponding 2D plots, in particular the molar ratio H2/CO was investigated for thye potential use of the syngas in FT process.

Presenter: **Francesco ZIMBARDI, ENEA Research Centre, Energy Technologies Dpt., Rotondella, ITALY**

Presenter's biography:

Graduated in industrial chemistry, fellow at the combustion institute of Naples 4y before joining ENEA a public body depending from the ministry of economy. His current interests are biomass pretreatment for sugar/biofulel production and thermal conversion of biomass by gasification and pyrolysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Cerone, ENEA, Rotondella, ITALY
F. Zimbardi, ENEA, Rotondella, ITALY
M. Prestipino, ENEA, Rotondella, ITALY
M. Carnevale, ENEA, Rotondella, ITALY
A. Villone, ENEA, Rotondella, ITALY

Session reference: 3BV.3.10

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Lignocellulose-based integrated biorefinery technology in Taiwan toward bio-economic development

Short introductive summary:

The Institute of Nuclear Energy Research (INER) of Taiwan has long been working to develop biorefinery technology for utilizing local abundant lignocellulosic biomass to produce biofuels and biobased chemicals under the support of national policy. Especially, a daily processing capacity of one ton biomass biochemical pilot plant has been established. Several years of substantial efforts in INER have resulted in significant cellulosic ethanol technology achievement. To make the biofuel economic viable, INER has further expanded the application of core technologies derived from cellulosic ethanol to biobased chemicals production such as lactic acid,xylitol and 2,3-butanediol. Currently, one ton of dry biomass can produce at least 500 kg of renewable sugars; and it can be biochemically converted to 200 to 250 L of ethanol, or approximately 200~230 kg of lactic acid. The results have shown that INER's biorefinery technology has reached the level of commercial application. It is perspective that INER will provide assistance for establishing domestic biorefinery industry and toward bioeconomic development in Taiwan.

Presenter: **Chiung-Fang HUANG, Institute of Nuclear Energy Research, Division of Chemistry, Taoyuan City, TAIWAN**

Presenter's biography:

Chiung-Fang Huang, Assistant researcher, Green Chemistry Group of Division of Chemistry, Institute of Nuclear Energy Research (INER), Taiwan.
Research involved in microbial cell factory optimization and fermentation studies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. F. Huang, Institute of Nuclear Energy Research, Taoyuan, TAIWAN
T. Y. Ma, Institute of Nuclear Energy Research, Taoyuan, TAIWAN
W. H. Chen, Institute of Nuclear Energy Research, Taoyuan, TAIWAN
G. L. Guo, Institute of Nuclear Energy Research, Taoyuan, TAIWAN
W. S. Huang, Institute of Nuclear Energy Research, Taoyuan, TAIWAN

Session reference: 3BV.3.11
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Innovative Char-Based Catalysts for the Conversion of Biomass-Derived Syngas to Liquid Hydrocarbons

Short introductive summary:

Biomass gasification can be considered as the core of a biorefinery where conventional desirable products (i.e. syngas) and undesirable by-products (i.e. char and tar) cooperate to valorize the overall process. The present work focuses on the use of char obtained from commercial biomass gasifiers as catalyst support for the Fischer-Tropsch (FT) reaction, aiming at the conversion of biomass-derived syngas to liquid fuels. Chars were used as support for cobalt catalysts synthetized by the solution combustion method. Preliminary characterization results showed a reduced metal-support interaction and higher metal dispersion, indicating the possibility to enhance FT reaction rates and increase C5+ selectivity.

Presenter: **Vittoria BENEDETTI, Free University of Bolzano, Faculty of Science and Technology, Bolzano-Bozen, ITALY**

Presenter's biography:

Vittoria Benedetti holds an MSc in Energy Engineering and currently is a PhD student in Sustainable Energy and Technologies at the Faculty of Science and Technology of the Free University of Bozen-Bolzano, Italy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Benedetti, Free University of Bolzano, ITALY
S. Ail, Free University of Bolzano, ITALY
F. Patuzzi, Free University of Bolzano, ITALY
M. Baratieri, Free University of Bolzano, ITALY

Session reference: 3BV.3.12

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Use Of Experimental Catalysts for Production of Bio-Methane from Biomass: Tests Of Methanation with Real Syngas and Performance Evaluations

Short introductive summary:

The present work concerns the results achieved in the conversion of a product gas obtained from a process of steam/oxygen biomass gasification, carried out at a 1 MWth pilot plant with in-vessel gas filtration, in BioSNG. To promote the relevant reactions of methanation, the experimental catalyst Ni23.7Mg56.3Al20 was adopted. Such catalyst was selected based on results gained in previous works aimed at developing catalysts with improved resistance to carbon deposition. For comparison, in the experimental tests a commercial catalyst was also included. Based on the assessments of the produced flow rates and gas compositions, the collected results indicated that, at operating conditions of 400°C and 25 bar, Ni23.7Mg56.3Al20 showed better performances in terms of both gas conversion and catalytic stability. The better performances of this latter were also confirmed by morphological and chemical analyses via XRD and SEM-EDAX techniques carried out on end-of-tests samples, and by the Raman spectroscopy coupled with optical microscopy. From the Raman spectra no signal from carbon species were observed on the Ni23.7Mg56.3Al2, carbon formation was instead visible on the commercial one.

Presenter: **Donatella BARISANO, ENEA Research Centre, Energy Technologies Dpt., Rotondella, ITALY**

Presenter's biography:

Donatella Barisano is senior researcher at Enea Trisaia Research Center. She works in the field of biomass valorization for bioenergy and biofuels production. Her present activity is focused on biomass gasification and use of catalysts and sorbents for gas upgrading and conversion.

Co-authors:

D. Barisano, ENEA, Rotondella, ITALY
A. Lotierzo, ENEA, Rotondella, ITALY
A. Villone, ENEA, Rotondella, ITALY
R. Agostini, ENEA, Rotondella, ITALY
F. Nanna, ENEA, Rotondella, ITALY
F. Basile, University of Bologna, ITALY
E. Lombardi, University of Bologna, ITALY

Session reference: 3BV.3.13
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Influence of Sulfur Components on the Catalytic Mixed Alcohol Synthesis Based on Wood Gas Derived from Biomass Steam Gasification

Short introductive summary:
• the purpose of the work and approach
In this work, the influence of sulfur components on the MAS performance, operated with wood gas derived DFB biomass steam gasification is studied.
• the scientific innovation and relevance
The synthesis of mixed alcohols using wood gas is a promising option in the field of biomass to liquids for the transportation sector and the chemical industry.
• the (preliminary) results and conclusions
A CO conversion rate of up to 15 % and a total productivity of liquids of 30 g per liter of catalyst and per cubic meter of wood gas (at standard conditions) could be achieved. The liquid MAS product showed a mass fraction of propanol of up to 50 %. Sulfur components, mainly H2S, were transformed into mercaptans and also found in the liquid product.

Presenter: **Matthias BINDER, Bioenergy 2020+, Guessing, AUSTRIA**

Presenter's biography:
Matthias Binder graduated in chemical process engineering at TU Wien. After graduation, he started working for BIOENERGY 2020+ GmbH in the area of biomass gasification systems. In 2015 he started his PhD in the field of biomass to liquids, based on biomass steam gasification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
M Binder, Bioenergy 2020+, Güssing, AUSTRIA
R Rauch, Bioenergy 2020+, Güssing, AUSTRIA
H Hofbauer, TU Wien, Vienna, AUSTRIA

Session reference: 3BV.3.14
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Preparation Method Comparison of Nickel Based Carbon Fibers-Alumina Composite Support for the Catalytic Reforming of Biogas

Short introductive summary:

The group is major in the conversion of biomass for many years. This work introduce the preparation of catalyst for the catalytic reforming of the biogas. The different preparation methods exhibit the different catalytic activity and lifetime.

Presenter: **Min SONG, Southeast University, School of Energy and Environment, Nanjing, P.R. CHINA**

Presenter's biography:

Dr. Min Song is an associate professor in the school of Energy and Environment at Southeast University. Her main areas of expertise involve: treatment and disposal solid waste; analysis, control and monitoring of gaseous pollutants; preparation and application of environmental functional materials.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Yu, Southeast University, Nanjing, P.R. CHINA
C. Wu, Southeast University, Nanjing, P.R. CHINA
Y. Wei, Southeast University, Nanjing, P.R. CHINA
M. Song, Southeast University, Nanjing, P.R. CHINA
B. Jin, Southeast University, Nanjing, P.R. CHINA

Session reference:	3BV.3.15
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Organosolv Treated Barley Straw For Industrial Liquid Waste Cleaning

Short introductive summary:

In this study, the utilization of lignocellulosic wastes, specifically barley straw as low-cost value absorbent material, which has been pretreated with organosolv, from biomass, consists of a scientific breakthrough. Modified barley straw can be obtained in combination with fermentable to ethanol sugars co-production in the frame of the biorefinery concept. Additionally, farmers and biomass processing industries can work together in rural areas in the frame of Industrial Ecology.

Presenter: **Dimitrios SIDIRAS, University of Piraeus, Industrial Management and Technology Dpt., Piraeus, GREECE**

Presenter's biography:

Assoc. Prof. D. Sidiras, Dep. Industrial Management & Technology, Univ. Piraeus; 5-year diploma and PhD in chemical engineering, NTUA; Scopus: 43 publications, 590 citations, h-index=12; Google Scholar 93 publications, 1048 citations, h-index=13.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Sidiras, University of Piraeus, GREECE
I. Salapa, University of Piraeus, GREECE
D. Politi, University of Piraeus, GREECE
G. Giakoumakis, University of Piraeus, GREECE

Session reference: 3BV.3.16

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Efficient fractionation of corn stover by organosolv pretreatment and enzymatic hydrolysis of the obtaine cellulosic residue

Short introductive summary:

pretreatment of lignocellulosics by organic solvent to efficiently fractionate it into emicellulose, lignin, cellulose. The following hydrolysis of the carbohydrates can be carried out with high efficinecy to produce free sugars, while the obtained lignin can be separated with an high degree of purity.

Presenter: **Francesco ZIMBARDI, ENEA Research Centre, Energy Technologies Dpt., Rotondella, ITALY**

Presenter's biography:

Graduated in industrial chemistry, fellow at the combustion institute of Naples 4y before joining ENEA a public body depending from the ministry of economy. His current interests are biomass pretreatment for sugar/biofulel production and thermal conversion of biomass by gasification and pyrolysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Zimbardi, ENEA, Rotondella, ITALY
E. Viola, ENEA, Rotondella, ITALY
V. Gallo, ENEA, Rotondella, ITALY
V. Valeri, ENEA, Rotondella, ITALY

Session reference: 3BV.3.18

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrogen Free Catalytic Conversion of Lignin Coupled with Biomass Fractionation

Short introductive summary:

Current processes for the fractionation of lignocellulosic biomass focus on the carbohydrate part, more precisely, cellulosic fibers. The other fractions (hemicellulose and lignin) that constitute approximately half of lignocellulose are treated as waste or used for energy production. The transformation of lignocellulose beyond paper pulp to fine chemicals, polymer precursors, and fuels, etc. is a feasible alternative to refining of fossil fuels. One of the difficulties in rational lignin utilization is that lignin depolymerization reactions often occur in parallel with irreversible condensation reactions of the formed fragments. Here we describe a strategy where lignin valorization is performed in concert with the pulping process. Lignin oligomers and fragments formed during organosolv pulping are stabilized by means of transition metal catalysis. That allowed markedly suppresses the undesired condensation pathways. Selective transformation of lignin into a few aromatic compounds and simultaneous fractionating of biomass at organosolv pulping conditions are demonstrated.

Presenter: **Maxim GALKIN, Stockholms Universitet, Organic Chemistry Dpt., Stockholm, SWEDEN**

Presenter's biography:

Postdoctoral fellow at Stockholm University (Organic Chemistry). Ph.D. in Organic Chemistry from Uppsala University (2015) Specialist degree in Chemistry (2004-2009) from Lomonosov Moscow State University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. V. Galkin, Stockholm University, Stockholm, SWEDEN
A. T. Smit, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
E. Subbotina, Stockholm University, Stockholm, SWEDEN
K. A. Artemenko, Uppsala University, Uppsala, SWEDEN
J. Bergquist, Uppsala University, Uppsala, SWEDEN
W. J. J. Huijgen, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
J. S. M. Samec, Stockholm University, Stockholm, SWEDEN

Session reference: 3BV.3.19
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Lignocellulosic Biorefineries based on Mixed Cultures

Short introductive summary:

A conceptual design for lignocellulosic biorefineries based on mixed-culture bioprocesses is introduced. This approach mimics natural processes that sequentially disintegrate lignocellulosic biomasses into different target biofuels ending up in fuel biobutanol. These mixed-culture biorefineries improve the cost structure since reduce the proportion of the operation costs. Also, these biorefineries produce more energy than they consume having lower energy consumption and environmental impacts than conventional 2G lignocellulosic biofuels biorefineries. This new concept for biorefineries opens new possibilities to carry out the production of lignocellulosic biofuels in simpler and cheaper facilities taking advantage of the natural interactions of mixed cultures.

Presenter: **Idania VALDEZ-VAZQUEZ, Universidad Nacional Autónoma de México, Instituto de Ingeniería, Querétaro, MEXICO**

Presenter's biography:

I V-V has a PhD in Environmental Biotechnology. She has worked for more than 10 years in production of gaseous and liquid biofuels from cellulosic biomasses, municipal organic wastes and wastewater utilizing microbial consortia (natural and engineered).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Valdez-Vazquez, UNAM, Querétaro, MEXICO
A. Sanchez, CINVESTAV, Guadalajara, MEXICO

Session reference: 3BV.3.20

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Valorization of Extracted Olive Oil Pomace Residue Through Conversion into Bioethanol and Bioproducts

Short introductive summary:

In this work, a residue from olive oil industry, i.e., extracted dry olive pomace (EOP) originated after removing residual oil from dry pomace, is studied as feedstock for bioethanol and bioproducts generation. EOP process conversion includes a first step of aqueous extraction at 115ºC for 30 minutes, followed by Liquid Hot Water (LHW) pretreatment [170-190ºC temperature with the addition or not of sulphuric acid at 1% (w/v)] and a LSSF (liquefaction plus simultaneous saccharification and fermentation) process for ethanol production using a commercial cellulase cocktail and Saccharomyces cerevisiae as fermenting yeast. Results show the water-extraction step allows concentrating main components for the subsequent step of LHW, while significant amounts of valuable compounds such as mannitol and phenolic compounds can be recovered. LHW was found to be an effective method to facilitate sugar release by enzymatic hydrolysis, although it is necessary to elevate the temperature over 170ºC. LSSF of EOP pretreated at 210ºC without acid and high solid loading of 30% w/w, resulted in ethanol concentrations close to 40 g/l and process yields of 70% of the maximum theoretical.

Presenter: **Paloma MANZANARES, CIEMAT, Biofuels Unit, Renewable Energy Division, Madrid, SPAIN**

Presenter's biography:

Paloma Manzanares is PhD in Biology and Senior Scientist at Biofuels Unit of CIEMAT, Spain. She has large expertise in biomass production and utilization and in the last years has specialized in advanced technologies for 2nd generation bioethanol.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Ballesteros, CIEMAT, Madrid, SPAIN
JM Oliva, CIEMAT, Madrid, SPAIN
A. Gonzalez, CIEMAT, Madrid, SPAIN
M.J. Negro, CIEMAT, Madrid, SPAIN
M. Ballesteros, CIEMAT, Madrid, SPAIN
P. Manzanares, CIEMAT, Madrid, SPAIN

Session reference: 3BV.3.22

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Properties and Possible Applications for Lignin Streams Obtained from Rice Straw Processing

Short introductive summary:

This study aimed to evaluate the chemical and physical properties of lignin streams recovered from rice straw processing and to study the extraction of antioxidant phenolic compounds from these materials. The evaluated samples included two different cellulignin fermentation residues (FR's) and an acid-precipitated lignin from alkaline-deacetylated black liquor (DBLL). For comparison, a standard lignin sample (Kraft lignin, from Sigma-Aldrich) was also assayed. Besides providing a better understanding about such materials, the obtained results made also possible to propose some potential applications for such lignin samples.

Presenter: **Solange MUSSATTO, Technical University of Denmark, Novo Nordisk Foundation Center for Biosustainability, Kongens Lyngby, DENMARK**

Presenter's biography:

Solange Mussatto is Head of a Research Group at the Technical University of Denmark. She has over 18 years of expertise in the areas of Biomass Pretreatment and Fermentation Technology with focus on the development of processes for a sustainable conversion of biomass into bio-based products.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.C.A. Castro, Department of Biotechnology, Engineering College of Lorena, University of São Paulo, Lorena / SP, BRAZIL

I.S. Ferreira, Department of Biotechnology, Engineering College of Lorena, University of São Paulo, Lorena / SP, BRAZIL

I.C. Roberto, Department of Biotechnology, Engineering College of Lorena, University of São Paulo, Lorena / SP, BRAZIL

S.I. Mussatto, Novo Nordisk Foundation Center for Biosustainability, Technical University of Denmark, Kongens Lyngby, DENMARK

Session reference: 3BV.3.23

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Antioxidants from Brown Seaweed

Short introductive summary:
Brown seaweed contains a portfolio of bioactive substances such as polysaccharides, proteins, polyphenols with antioxidant, antibacterial, anticoagulant etc. properties, which highlighted the potentially high values for the market sectors such as cosmetics, pharmaceutics, and food/feed ingredients. The extraction and quantification of the bioactive compounds are influenced by extraction solvents, algae species, harvest season, harvest location and the maturity of the sample. This study focus primarily on extracting antioxidants from the Faroe Islands cultivated brown seaweed Saccharina latissima. The efficiencies of extraction by different green solvents i.e. ethanol, water/glycerol, and oil were compared. Total phenol content, laminarin content and recovery efficiency, as well as antioxidant capacity were investigated, aiming for further process improvement.

Presenter: **Randi NEERUP, Danish Technological Institute, Biomass and biorefinery, Taastrup, DENMARK**

Presenter's biography:
Education:
2014-2016 MSc. in Chemical and Biochemical Engineering, Technical University of Denmark
2010-2014 BEng. in Chemical and Biochemical Engineering, Technical University of Denmark

Work Experience:
June 2016 - current Cunsultant, Danish Technological Institute

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
X. Hou, Danish Technological Institute, Taastrup, DENMARK
R. Neerup, Danish Technological Institute, Taastrup, DENMARK
A.B. Bjerre, Danish Technological Institute, Taastrup, CZECH REPUBLIC

Session reference: 3BV.3.25
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Valorisation of Black Liquor Carbohydrates by Means of Haloalkaline Microorganisms

Short introductive summary:

We are investigating the production of volatile fatty acids by means of haloalkaline microorganisms. The aim is the valorisation of carbohydrates present in black liquor (polysaccharides and aliphatic carboxylic acids) without expensive preconditioning of the liquor neutralisation, separation etc.)

Presenter: **Viktoria LEITNER, Kompetenzzentrum Holz, WCB Dpt., Linz, AUSTRIA**

Presenter's biography:

Teamleader, Team Biotechnological Processes

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Leitner, Kompetenzzentrum Holz GmbH, Linz, AUSTRIA
S. Lehner, Kompetenzzentrum Holz GmbH, Linz, AUSTRIA
F. Gattermayr, Kompetenzzentrum Holz GmbH, Linz, AUSTRIA

Session reference: 3BV.3.26
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biofuel Precursors from Beer Bagasse Under Microwave Radiation.

Short introductive summary:

Fossil fuels reserves are decreasing and its uses causes high CO2 emissions. Biomass has been recognized as the most promising renewable resource for the production of high value bio-chemicals, between them 5-hydroxy methylfurfural (HMF) and levulinic acid (LA) which are biofuel precursors. Our research group works on agro food and lignocellulosic residues focusing on their carbohydrate contents. Six-carbon carbohydrates are dehydrated in acidic medium at high temperature to obtain HMF and LA, which are interesting compounds as they involve the obtaining renewable precursors for the production of plastics and biofuels.

The aim of this work involves the carbohydrate dehydration from the beer bagasse that is produced in beer industries (about 25000 tons/year). Thereby environmentally friendly techniques, such as microwave radiation as energy source will be used meeting some of the Green Chemistry Principles.

We have been able to obtain biofuel precursors from waste using a green and environmentally friendly energy such us microwave radiation, also we have developed different methods to obtain one precursor or another changing experimental conditions.

Presenter: **Andrés MORENO, University of Castilla-La Mancha, Organic Chemistry Dpt., Ciudad Real, SPAIN**

Presenter's biography:

Profesor of Organic Chemistry in the Faculty of Science and Technology Chemistry. Actual work:
- Chemistry of food. Structural Identification of its components by NMR.
- Synthesis and Characterization of biofuel precursors from agricultural wastes.

Background in Catalysis, NMR, Microwaves

Co-authors:

A. Moreno, UCLM, Ciudad Real, SPAIN
A. Lorente, UCLM, Ciudad Real, SPAIN
C. Lucas-Torres, UCLM, Ciudad Real, SPAIN
M.P. Sanchez-Verdu, UCLM, Ciudad Real, SPAIN
B. Cabañas, UCLM, Ciudad Real, SPAIN

Session reference: 3BV.3.27
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biocompatibility Profiling for Corncob Beneficiation to Biocommodities in Molten Zinc Chloride Salt Pre-treatment Medium

Short introductive summary:

The production of biobased commodities and energy from waste agro-industrial materials such as corn cob holds a lot of promises although their beneficiation is yet still currently challenging as issues with the general cost of processing makes final products uncompetitive. Lignocellulosic biomass processing involves two major steps; pre-treatment and catalytic conversion (Fermentation) both of which accounts for over 70% of process costs hence, the possibilities of cost-cuts by means of integrating both processes. The advent of non-derivatising biomass solvating mediums such as ionic and molten hydrate salts systems which can also act as a medium for biocatalytic activites have continued to reinforce a re-thinking of the ideal bioreactor. For the first time, this study investigates the potentials of zinc chloride medium as a biocompatible platform capable of solvating biomass. The resulting profile will contribute to the scope of biomass processing and will be a step further in achieving a better competitive and sustainable biorefinery platform.

Presenter: **Michael DARAMOLA, University of the Witwatersrand, School of Chemical and Metallurgical Engineering, Johannesburg, SOUTH AFRICA**

Presenter's biography:

I am an Associate Professor of Chemical Engineering in the School of Chemical & Metallurgical Engineering at the University of the Witwatersrand, Johannesburg, South Africa. I am a Chartered Chemical Engineer (C. Eng.)and a member of the Institution of Chemical Engineers (IChemE) UK.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. A. Awosusi, University of the Witwatersrand, Johannesburg, SOUTH AFRICA
M. O. Daramola, University of the Witwatersrand, Johannesburg, SOUTH AFRICA
A. O. Ayeni, University of the Witwatersrand, Johannesburg, SOUTH AFRICA
R. Adeleke, Agricultural Research Council – Institute for Soil, Climate, Pretoria, SOUTH AFRICA

Session reference:	3BV.3.28
Subtopic:	3.6 Biorefineries
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Microwave Catalytic Conversion of Cellulose into Biofuel Precursors and its Application to Lignocellulosic Wastes.

Short introductive summary:

Biomass waste is becoming increasingly recognised as a good feedstock and carbon source with different components & applications. Cellulose is the main component in lignocellulose waste, for this reason, the aim of this work is to study the catalytic conversion of cellulose into biofuels precursors such as 5-hidroxymethyl furfural & levulinic acid. One example of this type of feedstock is the agro-food wastes as sugarcane bagasse, & the external part of melon rind, which are considered in this work as potential bio-resources with several applications. Indeed, these materials are fairly rich in carbohydrates, phenolic compounds & fatty acids. Sugarcane bagasse is mainly composed by cellulose (50%), hemicellulose (25%) and lignin (25%). The main sugars present in bagasse are glucose, xylose & arabinose. The carbohydrate fraction of melon rind is mainly composed of cellulose, hemicelluloses and pectin, with glucose, xylose & galactose being the major monosaccharides present. This approach highlights the opportunities of cellulose & lignocellulosic wastes to be transformed in a source of biofuel precursors, in a clean & efficient manner, using environmental-friendly techniques.

Presenter: **Andrés MORENO, University of Castilla-La Mancha, Organic Chemistry Dpt., Ciudad Real, SPAIN**

Presenter's biography:

Profesor of Organic Chemistry in the Faculty of Science and Technology Chemistry. Actual work:
- Chemistry of food. Structural Identification of its components by NMR.
- Synthesis and Characterization of biofuel precursors from agricultural wastes.

Background in Catalysis, NMR, Microwaves

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Moreno, UCLM, Ciudad Real, SPAIN
C. Lucas-Torres, UCLM, Ciudad Real, SPAIN
A. Lorente, UCLM, Ciudad Real, SPAIN
M.P. Sánchez-Verdú, UCLM, Ciudad Real, SPAIN
B. Cabañas, UCLM, Ciudad Real, SPAIN

Session reference: 3BV.3.29
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Olive Mill Leaves as a Raw Material in a Biorefinery Approach. Comparison of Sugar Recoveries after Delignification by Alkaline-Peroxide and Organosolv Pretreatments

Short introductive summary:

Olive mill leaves (OML) refers to the olive leaves and thin branches that are generated during olive harvesting and that have to be separated from olives before the olive oil extraction process in olive mill industry. In this work, this residue has been considered as feedstock in a biorefinery approach to obtain bioethanol from structural sugars and other added value chemicals as antioxidants compounds. Different delignification pretreatments have been investigated to increase the enzymatic digestibility of OML cellulose: organosolv pretreatment with 50% (v/v) of ethanol using 1% w/v sulphuric acid as catalysis at 150 and 190 ºC, and alkaline-peroxide treatment at 80ºC during 60 minutes with different solid loadings (5 and 10%). Both kinds of pretreatments were also applied after an aqueous extraction step of the raw material at 130ºC during 60 minutes. Better results were obtained with organosolv pretreatment, with sacharification yields between 80 and 95% in the range assayed with limited delignification yields ranging between 42 and 59%. This could be attributable to the higher hemicellulose solubilization produced by the acid catalyst used in the organosolv pretreatment.

Presenter: **Encarnacion RUIZ RAMOS, Universidad de Jaen, Chemical, Environmental and Materials Engineering Dpt., Jaen, SPAIN**

Presenter's biography:

I am an Associate Professor at the Department of Chemical, Environmental and Materials Engineering of the University of Jaen (Spain). My scientific activity has been mainly developed in the valorization of residual biomass for the production of bioethanol and other byproducts of interest.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Ruiz Ramos, Universidad de Jaén, SPAIN
I. Romero, Universidad de Jaén, SPAIN
J.C. López-Linares, Universidad de Jaén, SPAIN
J. Mondaray, Universidad de Jaén, SPAIN
M.J. Díaz-Villanueva, Universidad de Jaén, SPAIN
C. Cara, Universidad de Jaén, SPAIN
M. Moya, Universidad de Jaén, SPAIN
E. Castro, Universidad de Jaén, SPAIN

Session reference: 3BV.3.30

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Contributing to a Jatropha-based Biorefinery: Seed Cake Valorisation for bioH2

Short introductive summary:

The purpose of this work was to contribute to a Jatropha-based biorefinery, evaluating the best operational design to bioH2 production by a strain of the bacteria E. aerogenes in batch dark fermentation using JSC as feedstock. The effects of thermal pretreatment length (15 and 30 min), solid powder presence and its separation method were studied. For the best operational conditions the effect of JSC concentration was assessed.

Presenter: **Rita FRAGOSO, Instituto Superior de Agronomia , Universidade de Lisboa, DCEB Dpt., Lisboa, PORTUGAL**

Presenter's biography:

Assistant Professor at ISA-UL, has a pH’D on Agro-Industrial Engineering and a degree in chemistry. My research interests are related with water use efficiency, wastewater treatment technologies and waste valorisation. Have been doing research on Waste conversion to energy, biogas and biohydrogen.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Fragoso, ISA-UL, Lisboa, PORTUGAL
S. Lopes, ISA-UL, Lisboa, POLAND
E. Duarte, ISA-UL, Lisboa, PORTUGAL
P. A.S.S. Marques, Lneg, Lisboa, PORTUGAL

Session reference: 3BV.3.32

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrotreating of bio-oil from Thermo-Catalytic Reforming - A Novel Biorefining Route to Renewable Chemicals and Fuel

Short introductive summary:

According to the Paris climate change agreement new pathways are needed to substitute fossil fuels and to minimize CO2 emissions. The Thermo-Catalytic Reforming process (TCR) produces an organic liquid from biological wastes. After hydrotreating of the bio-oil high renewable high quality carbohydrates are gained that are basements for feuel and chemical production. The biorefinery concept includes the TCR process and the hydrotreating as main technologies.

Presenter: **Andreas HORNUNG, Aston University, Birmingham, UNITED KINGDOM**

Presenter's biography:

Professor Andreas Hornung studied chemical technology in Darmstadt and received his doctorate at the University of Kaiserslautern. Subsequent to studies tours in Karlsruhe, Austria and Italy, he switched to Aston University in Birmingham, UK. There, he founded the European Bioenergy Research Institute (EBRI), which he continues to lead as Director. Effective January 1, 2013, Professor Dr. Andreas Hornung took over the management of the Institute Branch Sulzbach-Rosenberg of Fraunhofer UMSICHT as a new director. Professor Hornung is a Fellow of the Royal Society of Chemistry as well as a Fellow of the Institution of Chemical Engineers. In 2012, he received the Green Leader Award of the West Midlands. He holds 18 patents and has published more than 150 scientific publications to date."

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Schmitt, Fraunhofer Institute for Envoronmental, Safety, and Energy Technology, Sulzbach-Rosenberg, GERMANY
A. Hornung, University of Birmingham, School of Chemical Engineering; Fraunhofer Institute for Envoronmental, Sa, Sulzbach-Rosenberg, GERMANY

Session reference: 3BV.3.33
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sapropel and Lime as a Binder for Development of Composite Materials

Short introductive summary:

The aim of this paper is to study possibilities to obtain composite materials using organic rich lake sediments (further – sapropel) and lime as a binder and hemp shives, wood fibre, and wood sanding dust as filler. The mechanical and thermal properties of obtained composite materials are investigated and compared to similar composites, such as lime-hemp concrete (LHC) and magnesium oxychloride hemp composite (MHC). Because of the high amount of organic content these materials are prone to biodegradation, therefore the materials were coated with ALINA organoclay additive that helps to extend product life-time, reducing rate of biodegradation. The effect of the coating on the resistance against fungi Alternaria alternata and Cladosporium herbarum was investigated in two conditions: before and after experimental accelerated ageing of materials in climate camera. Results indicated that the composites made of sapropel and lime has similar mechanical properties as LHC and MHC: compressive strength of 0.77 MPa for sapropel-lime binder compared to 0.61 MPa for LHC and 1.8 MPa for MHC.

Presenter: **Vaira OBUKA, University of Latvia, Environmental Science Dpt., Riga, LATVIA**

Presenter's biography:

I am currently a PhD student at the Department of Environmental Science, in the University of Latvia. My research involves investigation of new uses of various materials with the main goal to look for possibilities of wider use of natural materials, industrial by-products, local resources.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Obuka, University of Latvia, Riga, LATVIA
M. Sinka, Riga Technical University, LATVIA
V. Nikolajeva, University of Latvia, Riga, LATVIA
S. Kostjukova, LLC Baltic Clay Minerals, Riga, LATVIA
L. Lazdina, University of Latvia, Riga, LATVIA
M. Klavins, University of Latvia, Riga, LATVIA

Session reference: 3BV.3.35

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of 1,3-prodpanediol from Glycerol using a Novel Isolate Lactobacillus Reuteri CH53

Short introductive summary:

Abstract
1,3-propanediol(1,3-PDO) has numerous applications for the production of polymers, cosmetics, foods and medicines. Lactobacillus sp. is a potential strain for the production of 1,3-PDO and lactate due to its good safety. Lactobacillus sp. do not grow in medium with glycerol as sole carbon source. Cofermentation of glycerol-glucose by Lactobacillus sp. is an effective way for the production of 1,3-PDO and lactate during fermentation, in high conversion of glycerol to 1,3-PDO could be expected. A novel Lactobacillus reuteri CH53 that can utilize glycerol and produce 1,3PDO with a yield of 0.81g1,3-PDO/gGlycerol and productivity of 0.68g/Lh. Batch fermentation with glucose-glycerol c-fermentation was carried out to evaluate the production of 1,3-PDO and other byproducts. At the optimized condition, 57.5g/L 1,3-PDO was obtained under fed-batch fermentation.
Acknowledgement
This subject was supported by Korea Ministry of Environment as ‘‘Commercialization Project for Promising Technologies’’.

Presenter: **Baekrock OH, Korea Research Institute of Bioscience and Biotechnology, Jeongup, REPUBLIC OF KOREA**

Presenter's biography:

I'm working in Korea Research Institute of Bioscience and Biotechnology (KRIBB).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.-Y. Heo, Korea Research Institute of Bioscience and Biotechnology, Jeongup, REPUBLIC OF KOREA
J.-H. Ju, Korea Research Institute of Bioscience and Biotechnolog, Jeongup, REPUBLIC OF KOREA
J.-W. Seo, Korea Research Institute of Bioscience and Biotechnolog, Jeongup, REPUBLIC OF KOREA
C.H. Kim, Korea Research Institute of Bioscience and Biotechnolog, Jeongup, REPUBLIC OF KOREA

Session reference: 3BV.3.36
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

A New Value Chain for Rubber and Inulin Production in the European BioEconomy

Short introductive summary:

Natural rubber is a sustainable material that is used for more than 40,000 products, among others natural rubber is applied in construction (sealants), medicine (gloves) and transportation (matting, tyres) industries. At the moment natural rubber is exclusively harvested from the rubber tree of which about 90% is grown in South East Asia. Because of the specific quality aspects of natural rubber in many products it cannot be replaced by synthetic rubber. DRIVE4EU - ‘Dandelion Rubber and Inulin Valorization and Exploitation for Europe’ aims at the development of the production chain of natural rubber and inulin from Rubber dandelions (Taraxacum koksaghyz, TKS). The main activities are plant genotypes with high root biomass, high rubber and inulin yield, seed batches for agronomic tests and large scale demo field trials, optimized cultivation and harvest methods for TKS, ecological analysis of the gene flow, scaled-up and optimized extraction and refinery protocol for TKS natural rubber and inulin, testing and application of TKS natural rubber and inulin in end product uses, demonstration of the economic viability of the TKS production chain for natural rubber and inulin.

Presenter: **Maria HINGSAMER, Joanneum Research Forschungsgesellschaft, Graz, AUSTRIA**

Presenter's biography:

Maria Hingsamer holds a diploma in Environmental System Sciences and is a scientist at JOANNEUM RESEARCH. She is working in the field of Life Cycle Sustainability Assessment (technological, economic and environmental) with a focus on biofuels, biorefineries and energy from microalgae.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Hingsamer, JOANNEUM RESEARCH Forschungsgesellschaft mbH, Graz, AUSTRIA
M. Beermann, JOANNEUM RESEARCH Forschungsgesellschaft mbH, Graz, AUSTRIA
G. Jungmeier, JOANNEUM RESEARCH Forschungsgesellschaft mbH, Graz, AUSTRIA
I. van der Meer, Wageningen UR – Food & Biobased Research, Wageningen, THE NETHERLANDS
P. van Dijk, Keygene NV, wageningen, THE NETHERLANDS
H. Muylle, VLAAMS GEWEST, Melle, BELGIUM
J. Kirschner, BOTANICKY USTAV AV CR, V.V.I., Pruhonice, CZECH REPUBLIC
F. Kappens, Wageningen UR – Food & Biobased Research, Wageningen, THE NETHERLANDS
N. Gevers, APOLLO TYRES GLOBAL R&D BV, Enschede, THE NETHERLANDS

Session reference: 3BV.3.38
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sequential Utilization of Sugars in Microalgal Hydrolysate for Ethanol and DagA Production

Short introductive summary:

Microalgal hydrolysate, an alternative carbon source, could be used as a feedstock for the production of valuable bioproducts such as biofuel and biochemicals. At first, DagA, a ß-agarase was produced by cultivating a recombinant Streptomyces lividans. When a mixed-sugar medium was used, a low DagA activity was obtained with very low substrate utilization efficiency due to the catabolic repression of glucose. A novel two-step fermentation process based on sequential utilization of sugars in the mixed-sugar medium has been proposed. By adopting this two-step process, the overall substrate utilization efficiency was increased approximately 3-fold with a nearly 2-fold improvement of DagA production, let alone the additional benefit of ethanol production.

Presenter: **Juyi PARK, Korea Advanced Institute of Science and Technology, Advanced Biomass R&D Center, Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

2005. 3 ~ 2010. 2 Department of Chemical Engineering, Hongik University, Korea (B.S.)
2011. 2 ~ 2016. 2 Department of Chemical and Biomolecular Engineering, KAIST, Korea (Integrated M.S. & Ph.D.)
2016. 3 ~ present Advanced Biomass R&D Center, Senior Researcher

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Park, Advanced Biomass R&D Center, Daejeon, REPUBLIC OF KOREA
Y.K. Chang, Advanced Biomass R&D Center, Daejeon, REPUBLIC OF KOREA

Session reference: 3BV.3.40

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Utilization of Lipid-extracted Chlorella Vulgaris Hydrolysate by Using Solid and Liquid Acids

Short introductive summary:

A lipid-extracted Chlorella vulgaris biomass with 12.2 % of total carbohydrate was hydrolyzed by simultaneous use of solid and liquid acids. Nitric acid at as low as 0.0075N as liquid acid catalyst and 7.6 g/L of Amberlyst36 was used as the solid acid catalyst to treat 10 g/L of biomass to produce monosugars at 150 ?. Six different monosugars of glucose, galactose, xylose, rhamnose, arabinose and fucose were liberated with a total sugar yield of 88.5%. This result shows 95 % increased hydrolysis efficiency of Amberlyst36 that compare with the yield by Amberlyst36 only used. The use of such low amount of liquid acid was to minimize or eliminate the necessity of post-treatment steps of neutralization and desalting. The suitability of the resulting hydrolysate as fermentation medium is to be investigated for several microbial strains with different salt tolerance.

Presenter: **Gyeongho SEON, Korea Advanced Institute of Science and Technology, Chemical Bio Engineering Dpt., Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

2010.2 ~ 2014.8 Department of chemicalbio engineering, KAIST, Korea (B. S.)

2014.9 ~ 2016.8 Department of chemicalbio engineering, KAIST, Korea (M. S.)

Co-authors:

G. Seon, KAIST, Daejeon, REPUBLIC OF KOREA
J. Park, KAIST, Daejeon, REPUBLIC OF KOREA
H. Joo, KAIST, Daejeon, REPUBLIC OF KOREA
Y.K. Chang, KAIST, Daejeon, REPUBLIC OF KOREA

Session reference: 3BV.3.41

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrolysis of Microalgae by Using Layered Transition Metal Oxide

Short introductive summary:

Microalgal hydrolysate are promising useful biochemical production feedstock due to its high biomass production yield. To find better microalgae which has a lot of carbohydrates and high sugar yield, we used Chlorella and Nannochloropsis species. Microalgae was hydrolyzed by layered transition metal oxide and liquid acid.

Presenter: **Soonjae KWON, Korea Advanced Institute of Science and Technology, Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

Education
2013 B.S. in Dept. of Chemical & Biomolecular Engineering, KAIST
Ph.D. candidate (3 years)

Research Area
Acid hydrolysis of microalgae by using newly-synthesized solid catalyst.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Kwon, Korea Advanced Institute of Science and Technology, Daejeon, REPUBLIC OF KOREA
J. Park, Korea Advanced Institute of Science and Technology, Daejeon, REPUBLIC OF KOREA
Y.K. Chang, Korea Advanced Institute of Science and Technology, Daejeon, REPUBLIC OF KOREA

Session reference: 3BV.3.42
Subtopic: 3.6 Biorefineries
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Identification of a Novel Cellulose-binding Domain within the Endo-ß-1,4-xylanase KRICT PX-3 from Paenibacillus Terrae HPL-003

Short introductive summary:

The putative XBD in PX3 comprises a new N-terminal domain homologous to the catalytic thermostabilizing domains from other xylanases. Analysis of the main products released from xylan indicate that the recombinant enzymes act as endo-1,4-ß-xylanases but differ in their hydrolysis of xylan from beech wood, birch wood, and oat spelt.

Presenter: **In Taek HWANG, Korea Research Institute of Chemical Technology, Carbon Resources Institute, Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

In Taek Hwang received his BE, MS and PhD degrees in 1981, 1986 and 1996, respectively in applied biology and chemistry from Chonbuk National University. He has been a principal research scientist at KRICT since 2000. His current research work is focused on bioconservation in the biorefinery process, especially, discovery of enzymes and genes from various organisms applicable in biomass utilization including biocatalysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I.T. Hwang, KRICT, Taejeon, REPUBLIC OF KOREA
D.R. Kim, KRICT, Taejeon, REPUBLIC OF KOREA
H.K. Lim, KRICT, Taejeon, REPUBLIC OF KOREA
K.I. Lee, KRICT, Taejeon, REPUBLIC OF KOREA

Session reference: 3BV.3.43

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biorefinery: A Critical Technical Review

Short introductive summary:

Due to global environmental protection and legislation, there is a demand to significantly re-duce landfilled wastes and to use them as a raw material to produce biomaterials, biochemicals, or biofuels that can be alternative e.g. to petroleum based products. The paper introduces a brand new trend in waste processing technologies known as biorefinery.“Biorefinery is a dedicated integrative, multifunctional concept which uses bio-mass from a range of raw material sources for sustainable generation of a range of different prod-ucts and intermediate products (chemicals, materials, bioenergy including biofuels) while exploit-ing the biomass to the fullest extent possible” (VDI6310, 2016). Information about perspective wastes, suitable technologies and valuable products is reviewed. Process block diagrams of per-spective biorefinery concepts are presented in dependence on type of waste material. Critical technical study of key treatments and SWOT analyses are presented.

Presenter: **Lukas KRATKY, Czech Technical University in Prague, Department of Process Engineering, Prague, CZECH REPUBLIC**

Presenter's biography:

Lukás Krátký is postdoc and junior lecturer at Department of Process Engineering of FME CTU in Prague. He is an expert in disintegration and hydrothermal treatment of biomass, in designing of machines, equipment and bioprocess technologies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Kratky, Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Process Engin, Prague, CZECH REPUBLIC

T. Jirout, Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Process Engin, Prague, CZECH REPUBLIC

A. Kutsay, Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Process Engin, Prague, CZECH REPUBLIC

Session reference: 3BV.3.44

Subtopic: 3.6 Biorefineries

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

BioEconomy with Algae - Life Cycle Sustainability Assessment including Biophysical Climate Im-pacts (Albedo) of an Algae-based Biorefinery

Short introductive summary:

Microalgae are currently considered to be highly attractive as a raw material for production of bioenergy and biomaterials in the future BioEconomy. The project FUEL4ME - Future European League 4 Microalgal Energy is driven by the urgent need of transforming the current energy system into a sustainable one, which pursues the European and global energy goals reducing GHG emissions, finding alternatives to fossil fuels and fostering the renewable energies. The project applies a life cycle sustainability assessment (LCSA) providing scientific indicators for economic (e.g. operational costs, investment cost, trade effects), environmental (global warming potential, primary energy demand, land use) and social aspects (e.g. regional cooperations, product responsibility, labour practices) of this new value chain and guides the development of the FUEL4ME process to realize the highest possible sustainability in comparison to a substituted reference system (fossil fuel and Omega-3 fatty acid from other sources).

Presenter: **Maria HINGSAMER, Joanneum Research Forschungsgesellschaft, Graz, AUSTRIA**

Presenter's biography:

Maria Hingsamer holds a diploma in Environmental System Sciences and is a scientist at JOANNEUM RESEARCH. She is working in the field of Life Cycle Sustainability Assessment (technological, economic and environmental) with a focus on biofuels, biorefineries and energy from microalgae.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Hingsamer, Joanneum Research Forschungsgesellschaft, Graz, AUSTRIA
N. Bird, Joanneum Research Forschungsgesellschaft, Graz, AUSTRIA
I. Kaltenegger, Joanneum Research Forschungsgesellschaft, Graz, AUSTRIA
G. Jungmeier, Joanneum Research Forschungsgesellschaft, Graz, AUSTRIA
D. Kleinegris, Wageningen UR - Food & Biobased Research, Wageningen, THE NETHERLANDS
P. Lamers, Wageningen University, THE NETHERLANDS
S. Boussiba, Ben-Gurion University of the Negev, Beer Sheva, ISRAEL
L. Rodolfi, Fotosintetica & Microbiologica S.r.l, Florence, ITALY
N.H. Norsker, Biotopic, Huelva, SPAIN
F. Jacobs, Evodos B.V, Raamsdonksveer, THE NETHERLANDS
M. Fenton, Cellulac, Chesterford, UNITED KINGDOM
R. Ranjbar, FeyeCon Development and Implementation B.V., Amsterdam, THE NETHERLANDS
M. Hujanen, Neste Oil Corporation, Helsinki, FINLAND
M. Sanz, IDconsortium SL, Madrid, SPAIN

Session reference: 4BO.13.1
Subtopic: 4.2 Sustainability, certification and standards
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

CleanAir by Biomass - Status Quo Analysis of the Model Region

Short introductive summary:

The CleanAir by Biomass program aims to prove and to demonstrate that the use of state-of-the-art technology combined with best-practice application lead to a significant improvement of air quality and to a compliance with European air quality regulations even in critical areas.
Therefore a rural region in Styria (Austria) was chosen where four different categories of measures for optimization of biomass combustion quality are implemented.
The effects of optimization measures are monitored and evaluated by field measurements as well as by air quality measurements over a duration of three years.

Presenter: **Christoph SCHMIDL, Bioenergy 2020+, Biomass Combustion Dpt., Wieselburg-Land, AUSTRIA**

Presenter's biography:

Diplomas in Environmental Engineering and Environmental Management at HBLVA Rosensteingasse(Vienna, Austria) and Chemical Engineering at University of applied sciences Fresenius (Idstein, Germany). PhD in Technical Chemistry at Vienna University of Technology (Vienna, Austria) on Gaseous and Particulate Emissions from Biomass Combustion. Between 2005 and 2009 research assistant at University of Technology in Vienna in the group Environmental Analytical Chemistry active in the field of particulate matter (PM10 and PM2.5) source characterization and source apportionment. Since 2009 Senior Researcher at the Austrian Biomass Competence Centre Bioenergy2020+ in the research group of small-scale combustion systems

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Klauser, Bioenergy 2020+, Graz, AUSTRIA
R. Sturmlechner, Bioenergy 2020+, Graz, AUSTRIA
M. Schwabl, Bioenergy 2020+, Graz, AUSTRIA
G. Reichert, Bioenergy 2020+, Graz, AUSTRIA
C. Schmidl, Bioenergy 2020+, Graz, AUSTRIA
A. Weissinger, Bioenergy 2020+, Graz, AUSTRIA
W. Haslinger, Bioenergy 2020+, Grazi, AUSTRIA
H. Stressler, Bioenergy 2020+, Graz, AUSTRIA

Session reference: 4BO.13.2
Subtopic: 4.2 Sustainability, certification and standards
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

The Global Bioenergy Partnership and its Sustainability Indicators

Short introductive summary:

The Global Bioenergy Partnership (GBEP) is an initiative that brings together public, private and civil society stakeholders in a joint commitment to promote bioenergy for sustainable development. In 2011, GBEP published a set of 24 sustainability Indicators for Bioenergy. The uniqueness of the GBEP Indicators lies in the fact that it is currently the only initiative seeking to build consensus among a broad range of national governments and international institutions on the sustainability of bioenergy and in the fact that the emphasis is on providing measurements useful for informing national-level policy analysis and development. The experience with the indicators in many countries will be presented.

Presenter: **Marco COLANGELI, GBEP - FAO, Climate and Environment Dpt., Rome, ITALY**

Presenter's biography:

Mr. Colangeli works as a Bioenergy Expert in FAO since 2011. He holds a BSc in Forestry and Environmental Science, a MSc in Environmental Science for Large Urban Areas from Universitá degli Studi della Tuscia, and a MSc in Environmental Science and Policy from PACE University of New York.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Colangeli, Food and Agriculture Organization of the United Nations, Rome, ITALY
A. Rossi, Food and Agriculture Organization of the United Nations, Rome, ITALY
M. Morese, Food and Agriculture Organization of the United Nations, Rome, ITALY

Session reference: 4BO.13.3
Subtopic: 4.2 Sustainability, certification and standards
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Strengthening the Food Security Provisions in Biofuel Sustainability Certification Systems

Short introductive summary:

From a farming background, I studied agricultural economics at the University of Reading in the UK, before joining the Home-Grown Cereal Authority (now part of the UK Agriculture Horticulture and Development Board) as an Economist. I became Senior Economist, then Director of Marketing & Economics from 1990, managing a team of 15 economists and statisticians responsible for providing market intelligence and policy analyses to the UK arable industry and government. In 2000 I moved to Ireland and worked as a Freelance Consultant on projects around the world (mainly sub-Saharan Africa, South America, Central Asia, Pacific) funded by World Bank, EU Commission, InterAmerican Development Bank, FAO, African, Caribbean and Pacific Secretariat, national governments and trade associations. In 2005 I joined University College Cork as a part-time lecturer and research fellow, lecturing on Food Economics and International Development and managing research projects in Ethiopia and Tanzania.

Presenter: **Stephen THORNHILL, University College Cork, Food Business and International Development Dpt., Cork, IRELAND**

Presenter's biography:

Consultant on agri-food markets and policy, as well as Lecturer and Research Fellow at University College Cork. Current research is on linkages between agriculture and nutrition, the food security impacts of bioenergy and circular economy impacts for the agri-food sector

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Thornhill, University College Cork, IRELAND

Session reference:	4BO.13.4
Subtopic:	4.2 Sustainability, certification and standards
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Comparative Socio-Economic Indicators for Sustanable Lignocellulosic Biomass in Brazil and the Southeast of the USA

Short introductive summary:

This paper presents the research conducted to assess socio-economic impacts of biomass production and conversion supply chain of two case studies: one for Brazil, a potential supplier of solid biomass, and the other for the US. The framework to conduct the study was modified from a previous set of indicators used to assess socio-economic impacts of biofuels productions based on previous work conducted by the researchers. This paper presents the assessment of both cases. New indicators were used to adapt to the case of forestry residues. These indicators included the Human Development Index, Gini coefficient and the income index.
The project identified the main stakeholders from the different parts of the supply chain and the potential biomass that could be used for pellet production. The logistics in the region to transport the biomass to the ports remains a main concern for the potential market in Brazil while these are well developed in the USA and provide additional income to the regions. The results of this project will contribute to the socio-economic assessment in other regions.

Presenter: **Rocio DIAZ-CHAVEZ, Imperial College, Centre for Environmental Policy, London, UNITED KINGDOM**

Presenter's biography:

Dr Diaz-Chavez is a Research Fellow at the Centre for Environmental Policy of Imperial College London has extensive work and academic experience She has participated in and coordinated work and academic experience in sustainability assessment and environmental management tools.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Diaz-Chavez, Imperial College, Centre for Environmental Policy, London, UNITED KINGDOM
A. Walter, Universidad Estadual de Campinas, Campinas, BRAZIL
P. Gerber, Universidade de Campinas, Camoinas, BRAZIL

Session reference: 4BO.13.5
Subtopic: 4.2 Sustainability, certification and standards
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Tar Cracking Over Olivine And Sand in a Cellular Fluidized Bed Reactor

Short introductive summary:

The required quality of the synthetic gas obtained from biomass gasification is a primordial factor for its optimal valorization. The presence of tars at variable concentrations is almost systematic and hinders direct use of the synthetic gas in energetic application.

The aim of this work is to study the cracking and reforming of tars in conditions representative of gasification in fluidized bed. Toluene is used as tar model.

Presenter: **Mathieu MORIN, INP Laboratoire de Genie Chimique, Toulouse, FRANCE**

Presenter's biography:

My name is Mathieu Morin. I am a PhD student in the field of biomass gasification. My works focus on the development of experimental and theoritical tools for determining intrinsic kinetic of biomass transformations.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Morin, Laboratoire de Genie Chimique, Toulouse, FRANCE
X. Nitsch, Laboratoire de Genie Chimique, Toulouse, FRANCE
S. Pecate, Laboratoire de Genie Chimique, Toulouse, FRANCE
M. Hemati, Laboratoire de Genie Chimique, Toulouse, FRANCE

Session reference: 2BO.14.1

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Tar Removal from Biomass Producer Gas by Using Biochar

Short introductive summary:

Tars in biomass gasification producer gas cause problems in downstream processes. A potential solution for removing them is the use of biochar produced in the gasifier. This work investigates the mechanism of interaction between tar model compounds and biochar, with the aim to optimize the process conditions to minimize the tar content in the gas stream. Biochar derived from a TwoStage gasifier is tested as bed material in a laboratory scale set up. The chosen model compounds are representatives of different tar classes: phenol, naphthalene, pyrene. The compounds are sampled by Solid Phase Adsorption (SPA) to evaluate the difference in concentration, before and after passing through a biochar bed. SPA measurements are validated by an additional
sampling of the outlet stream, performed by acetone-washing in a Petersen Column. The bed is tested at 250°C as well as in the temperature range 500-800°C. In the gas phase, concentration is measured by Gas Chromatography coupled with Mass Spectrometry (GC-MS) and calculated by stable isotope dilution analysis.
The nature of the tar-char interaction is investigated with desorption experiments in acetone, to assess the irreversible binding of the compounds on the biochar surface. In addition, Scanning Electron Microscopy and Energy Dispersive X-Ray Spectroscopy (SEM/EDS) are used to evaluate changes in the structure and in the composition of the biochar surface after the exposure to tars.
Preliminary results show a significant effect of biochar on the removal of phenol. Similar results are expected also for other model compounds. The bed temperature is expected to influence the irreversibility of the tar-char interaction. The set of results for the model compounds will be used for the development of a proof-of-concept, integrating the use of residual char from gasification in downstream tar removal.

Presenter: **Giulia RAVENNI, Technical University of Denmark, Chemical Engineering Dpt., Roskilde, DENMARK**

Presenter's biography:

Giulia obtained her Bachelor in Mechanical Engineering and Master in Energy Engineering at the University of Florence, Italy. Since October 2014, she works as a PhD student at the Technical University of Denmark (DTU).
Her project investigates novel solutions for tar removal from biomass producer gas, with a particular focus on the use of gasification residual char.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Ravenni, Technical University of Denmark, Roskilde, DENMARK
J. Ahrenfeldt, Technical University of Denmark, Roskilde, DENMARK
U.B. Henriksen, Technical University of Denmark, Roskilde, DENMARK
Z. Sárossy, Technical University of Denmark, Roskilde, DENMARK

Session reference: 2BO.14.2
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biomass Gasification and BioSNG Production: Use of Sorbents for Simultaneous H2 Enrichment and CO2 Removal for the Conditioning of Gas Composition

Short introductive summary:

Aim of the present work was the performance evaluation of Sorption Enhanced Water Gas Shift (SEWGS) materials in conditioning the composition of the gas produced at a 1 MWth biomass gasification pilot plant in presence of residual amount of tar. The selected sorbents were two hydrotalcites Mg/Al, a hydrocalumite Ca/Al and a mixed hydrotalcite Mg/Ca/Al and were used in cyclic tests of CO2-uptake/regeneration. The two Mg/Al materials were selected for SEWGS tests at 400 °C, the other two for evaluations at 600 °C. The GC analysis, indicated that a final gas stream almost containing H2 and the initial CH4 is obtained. Thus, concerning the gas composition adjustment and further conversion in BioSNG, the experimental results suggested a process design based on the splitting of the main product gas in two separate streams. One is treated with SEWGS sorbent for H2 production while the second one is used as base of synthesis for catalytic methane production by using the former H2-rich stream. By comparing the structural properties of the materials before and after tests, no relevant modification was observed, as well as no residual contaminant from tar was detected based on FTIR spectra.

Presenter: **Giacobbe BRACCIO, ENEA Research Centre, Solar Testing Laboratory and Biomass Section, Policoro, ITALY**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Barisano, ENEA Research Centre, Rotondella, ITALY
R. Agostini, ENEA Research Centre, Rotondella, ITALY
A. Villone, ENEA Research Centre, Rotondella, ITALY
F. Nanna, ENEA Research Centre, Rotondella, ITALY
K. Gallucci, University of L'Aquila, ITALY
P.U. Foscolo, University of L'Aquila, ITALY

Session reference: 2BO.14.3
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Reactive Test Gas Generation Combined with On-line Tar-Monitoring and Comparison with Off-line Liquid Samples Analysis

Short introductive summary:

Three nearly continuously operating on-line tar content monitoring devices were operated sim-ultaneously on a test gas generation system. The systems compared were the flame ionization detection based ‘FID online - Total Tar Analyzer 300’ from University Stuttgart and Ratfisch Analysensysteme GmbH, the monitoring system based on the light induced fluorescence (LIF) from TU Berlin and the Liquid Quench Sampling System developed at the Paul-Scherrer-Institute (PSI). Liquid samples were taken and analyzed for comparison. The testgas generator applied in this work is an adaptation of a system introduced by vtt/Finland. The test gas was generated via ethylene pyrolysis in a tube reactor operated at 900°C. Besides the pure eth-ylene pyrolysis further reaction conditions were examined by adding steam and toluene to the system. Results of this collaborative work showed a good development status of the analytical tools and their current capabilities e.g. by means of detection limits. Further the use of reactive test gas generation seems very promising in both the further development of on-line analytical tools and for use in long term testing of porous media used for gas cleaning

Presenter: **York NEUBAUER, TU Berlin, Institute of Energy Engineering, Berlin, GERMANY**

Presenter's biography:

York has a background in Energy- and Process Engineering. In his PhD-work he specialized in on-line tar analysis. He led research projects dealing with gas cleaning and gas quality assessment. Currently he is head of a junior research group, which examines utilization possibilities of process chars within the conversion processes. On-line gas monitoring remains a high priority topic in his work.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y. Neubauer, Berlin, GERMANY
A. Gredinger, University of Stuttgart, GERMANY
J. Borgmeyer, TU Berlin, GERMANY
M. Kleinhappl, -, Weiz, AUSTRIA
R. Farias Fujita, PSI, Villigen, SWITZERLAND
S. M. A. Biollaz, PSI, Villigen, SWITZERLAND

Session reference: 2BO.14.4
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Char Conversion Characterized by X-ray Tomography and SEM-EDS Analysis

Short introductive summary:

The evolution of ash layers in and on fuel particles during thermochemical conversion is of importance for both char conversion rates and for ash formation. In this study, X-ray tomography and SEM-EDS were used to gain knowledge of fuel and ash properties as a function of conversion degree during single fuel pellet char oxidation. Two types of pellets with significantly different compositions of ash forming elements were used; poplar and straw from wheat. Pellets were oxidized in a laboratory scale single pellet furnace and the fuels were quenched at different conversion degrees. The quenched pellets were investigated with high resolution SEM-EDS for cross section morphology and elemental mapping. Furthermore, synchrotron-based hard X-ray micro-tomography was used to image development of voids and ash formation in 3D based on mainly optical density and X-ray absorption variations. The two techniques are complementary in the sense that the 3D density information can be connected to the transport and transformation of inorganic elements monitored by the SEM-EDS. Thereby descriptions of release, transport and ash formation can be formulated.

Presenter: **Anna STRANDBERG, University of Umea, Applied Physics and Electronics Dpt., Umea, SWEDEN**

Presenter's biography:

Anna Strandberg is working as a PhD student at Thermochemical Energy Conversion Laboratory, department of Applied Physics and Electronics, Umeå University. Her PhD project focus on ash formation and interaction, and the influence of fuel conversion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Strandberg, Umea University, Umea, SWEDEN
M. Thyrel, Umea University, Umea, SWEDEN
M. Rudolfsson, Swedish University of Agricultural Sciences, Umea, SWEDEN
T.A. Lestander, Swedish University of Agricultural Sciences, Umea, SWEDEN
R. Backman, Umea University, Umea, SWEDEN
N. Skoglund, Umea University, Umea, SWEDEN
M. Brostrom, Umea University, Umea, SWEDEN

Session reference: 2BO.14.5
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Fermentation of Bio-Oil Derived from Microwave Pyrolysis

Short introductive summary:

Thermochemical processing of lignocellulosic biomass, performed by microwave (MW) pyrolysis, has the potential to become an alternative, energy efficient and non-enzymatic route for the production of a pyrolysate (bio-oil fraction) rich in various carbon source substrates. Bio-oil can subsequently be microbially converted into various fuels and chemicals. However, such bio-oils typically contain low levels of directly fermentable sugars, but high concentrations of both sugars in anhydrous form (often non-utilisable) and lignin derived phenolic compounds which are inhibitory towards microorganisms. We have developed a liquid based MW pyrolysis system which has been shown to selectively target (and thermally decompose) the cellulose and hemicellulose polymers of biomass, whilst the lignin macromolecule remains relatively intact. This ultimately produces a bio-oil feedstock with reduced inhibitor concentrations which may improve microbial carbon flux during fermentations towards high value carbon end point products.

Presenter: **Emily KOSTAS, University of Nottingham, Microwave Process Engineering Research Group, Nottingham, UNITED KINGDOM**

Presenter's biography:

Obtained an MSci (Hons) degree in Genetics from the University of Nottingham in 2012. Then completed a PhD from 2012-2016 in Bioenergy within the department of Bioscience. Currently working as a Postdoctoral research fellow in the Microwave Engineering Group at the University of Nottingham.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E.T. Kostas, University of Nottingham, UNITED KINGDOM
B. Shepherd, University of Nottingham, UNITED KINGDOM
J. Robinson, University of Nottingham, UNITED KINGDOM
E.T. Kostas, University of Nottingham, UNITED KINGDOM

Session reference:	3BO.15.1
Subtopic:	3.2 Pyrolysis and other biomass liquefaction technologies
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Constant Volume Pyrolysis of Biomass for the Production of Char with High Fixed-Carbon Content.

Short introductive summary:

Research regarding carbonization in sealed vessels, wherein the vapor products are held captive and in contact with the pyrolytic solid products, has opened up a potential field for producing a charcoal whose fixed-carbon yield remarkably attained the theoretical limiting value set by thermodynamics relatively quickly when compared to conventional methods.

In this work, the reproducibility of the experimental method, and the effects of pressure and temperature on the pyrolysis of cowboy oak sawdust and Norwegian spruce wood sawdust in a sealed reactor are studied. The preliminary results indicate that vapor-phase partial pressures of the volatile products, and not the total system pressure, exerts the dominant effect on the high fixed-carbon yields attained. An increase of the carbonization temperatures revealed a decrease in the char yield due to a devolatilization of the final charcoal without losing its promising carbon content, resulting in a charcoal with a higher percentage of fixed-carbon, hence, producing a higher-quality charcoal.

Presenter: **Maider LEGARRA ARIZALETA, Hawaii Natural Energy Institute, Honolulu, USA**

Presenter's biography:

I am a Spanish citizen getting the PhD in Mechanical Engineering at the University of Hawaii in Manoa. My research is conducted at the Hawaii Natural Energy Institute. It consists in charcoal manufacturing from pyrolysis of Norwegian wood

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Legarra Arizaleta, Hawaii Natural Energy Institute, Honolulu, USA
S. Van Wesenbeeck, Hawaii Natural Energy Institute, Honolulu, USA
S. Turn, Hawaii Natural Energy Institute, Honolulu, USA
T. Morgan, Hawaii Natural Energy Institute, Honolulu, USA
M. Antal, Hawaii Natural Energy Institute, Honolulu, USA
O. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
L. Wang, SINTEF Energy Research, Trondheim, NORWAY
G. Grønli, Norwegian University of Science and Technology, Trondheim, NORWAY

Session reference: 3BO.15.2

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Challenge of Lignin as a Chemical Resource

Short introductive summary:

Biobased platform chemicals can be provided through lignin, especially aromatic compounds. Lignin is a 3D-macromolecule which contains phenolic structures and a variety of functional groups. The ecological point of view of the exchange of crude oil production strains with biomass like lignin should be held high. Nevertheless, on the one hand lignin is a natural molecule which is built to resists environmental influences, so the use as a starting material held a lot of challenges. On the other hand, lignin could be a source of bifunctional molecules, like the monocyclic compounds catechol or guaiacol, which can be used as monomeric compounds for polymers. For the use as a chemical resource the whole mechanisms and behaviors must be understood.

Presenter: **Julia SCHULER, Karlsruhe Institute of Technology, Institute of Catalysis Research and Technology, Eggenstein-Leopoldshafen, GERMANY**

Presenter's biography:

Born 01/22/1988 in Heilbronn, Germany.Actually PhD at the Karlsruhe Institute of Technology, IKFT.M.Sc Bioprocess Engineering at the University of Kaiserslautern. B.Sc. Process&Environmental Eng. at the University of Applied Sciences Heilbronn.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Schuler, Karlsruhe Institute of Technology, GERMANY
U. Hornung, Karlsruhe Institute of Technology, GERMANY
J. Sauer, Karlsruhe Institute of Technology, GERMANY

Session reference: 3BO.15.3

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Understanding of Relationship between Lignin Structure and Depolymerization Behaviors in Supercritical Ethanol and Formic Acid Mixture

Short introductive summary:

For understanding of lignin conversion to bio-oil, first we analyzed lignin structure using Nitrobenzene oxidation and FT-IR. And then lignin were depolymerized in ethanol formic acid mixture.

Presenter: **Jaeyong PARK, Sungkyunkwan University, Mechanical Engineering Dpt., Suwon, REPUBLIC OF KOREA**

Presenter's biography:

Student

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Park, Sungkynkwan University, Suwon, REPUBLIC OF KOREA
A. Riaz, Sungkynkwan University, Suwon, PAKISTAN
J. Kim, Sungkynkwan University, Suwon, REPUBLIC OF KOREA

Session reference: 3BO.15.4

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Expanding the Feedstock Base for Thermochemical Biomass Conversion

Short introductive summary:

Sustainable and cost-competitive thermochemical production of biofuels and bio-chemicals at large scales will require a diverse biomass resource base. Because feedstock chemical and physical properties impact processes differently, it is likely that the economic tradeoffs between feedstock cost and product yield will indicate different optimal feedstocks or blends for each process. However, a comparison of performance data for variable biomass types in different processes at relevant scales is lacking. Here we report here on several “field-to-fleet” experimental studies to produce refinery-ready fuel blendstocks via catalytic hydrotreating of pyrolysis oils and vapor-upgraded pyrolysis oils using several high-volume U.S. biomass feedstocks. Also presented are empirical models that predict the performance of new blends and will ultimately allow conversion systems to respond to biomass availability and market conditions for feedstocks and products.

Presenter: **Daniel CARPENTER, National Renewable Energy Laboratory, National Bioenergy Center, Golden, USA**

Presenter's biography:

Daniel Carpenter is a Senior Scientist at the National Renewable Energy Laboratory. Current research interests include understanding the performance of low-cost, sustainable feedstocks in thermochemical conversion processes, and the design of laboratory and process analytical systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Carpenter, National Renewable Energy Laboratory, Golden, USA
T. Westover, INL, Idaho Falls, USA
D. Howe, PNNL, Richland, USA
S. Deutch, National Renewable Energy Laboratory, Golden, USA

Session reference: 3BO.15.5

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Global Wood Pellet Industry and Market - Current Developments and Outlook

Short introductive summary:

Wood pellets are an important good for an increased energy provision from biomass, supplying the heat and the energy sector in many countries. To describe the national and international market development a global wood pellets study has been undertaken within IEA bioenergy task 40 Sustainable Bioenergy Trade”. Therefore for more than 30 countries information on the regulatory framework, production, consumption, price trends, quality standards and trade aspects is collected and analyzed. The results are currently compiled to a comprehensive picture on the global wood pellet industry and market for the year 2015 and will be presented at the conference. Based on these results also an outlook on the global market until 2025 will be undertaken, including also a debate about the related needs for a healthy market development.

Presenter: **Daniela THRÄN, DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt., Leipzig, GERMANY**

Presenter's biography:

Head of Department "Bioenergy Systems" at DBFZ and "Bioenergy" at UFZ. About 50 scientists work in those departments. Since the end of 2011 holding the chair „Bioenergy Systems“ at the University of Leipzig. Member of the German Bioeconomy Council and the European Bioeconomy Stakeholder Panel.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Thrän, DBFZ-German Biomass Research Centre/UFZ, Leipzig, GERMANY
D. Peetz, DBFZ-German Biomass Research Centre, Leipzig, GERMANY

Session reference: IBO.16.1
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Co-firing Tests of Sugar Cane Harvesting Residues (RAC) with Coal and Pith in a Large-scale Boiler.

Short introductive summary:

This paper reports the trials for using sugar cane harvest residues (RAC) as a fuel on a cogeneration boiler (136 tph, 67 bar and 510°C) in co-firing with coal and bagasse pith, on experimental tests for fuel handling and combustion validation. This project was carried out by the Sugar Cane Research Center, Cenicaña.

Presenter: **Julian LUCUARA, Cenicana, Cali, COLOMBIA**

Presenter's biography:

Mechanical engineer with four year of expertise in research projects in the sugar industry of Colombia.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Lucuara Medina, Cenicaña, Cali, COLOMBIA
A. Gomez, Cenicaña, Cali, COLOMBIA
N. Gil Zapata, Cenicaña, Cali, COLOMBIA
J. Castillo, Ingenio La Cabaña, Cali, COLOMBIA
J. Paredes, Ingenio La Cabaña, Cali, COLOMBIA
J. Molina, Carvajal Pulpa Y Papel, Cali, COLOMBIA

Session reference: IBO.16.2
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Facing Safety Issues in Handling and Storage of Biomass Pellets in Large Scale

Short introductive summary:

The use of biomass pellets in large scale at power plants entail new safety aspects. Handling with front-loaders and conveyor belts can form high dust concentrations, which potentially can lead to explosion and additional fire. In storage facilities, the main risks are “self-heating”, which can lead to auto-ignition, and high dust concentrations with risk of explosions. DTI has in cooperation with DONG Energy made measurements on their facilities to obtain data for improvements. Dust was measured by sampling on filters during handling of wood pellets with front-loaders. Next, measurements of dust were made with an on-line dust analyser calibrated on data from the filter measurements. The front-loaders were then equipped with on-line analysers as a successfully dust warning tool. The on-line analysers were also used to monitor dust along conveyor belts and inside a silo in operation. Injection of nitrogen is used to avoid or extinguish a fire in silos. To investigate how quickly and efficient the nitrogen is distributed, oxygen was measured within a wood pellet silo during injection. The results are used for the evaluation of the dosage of nitrogen for a desired decrease in oxygen.

Presenter: **Jan HINNERSKOV JENSEN, Danish Technological Institute, Aarhus, DENMARK**

Presenter's biography:

Jan Hinnerskov Jensen has a B.Sc. in chemical engineering. He has worked for the power industry in Denmark for more than 25 years with focus on solid fuels, that is quality control and characterization of the fuels, as well as aspects of handling and storage. Since 2013 he is employed at the Danish Technological Institute as a consultant within solid biomass fuels.

.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.H. Jensen, Danish Technological Institute, Aarhus, DENMARK
J. Nyborg, Danish Technological Institute, Aarhus, DENMARK
M.G. Jespersen, Danish Technological Institute, Aarhus, DENMARK
J.K. Holm, DONG Energy, Gentofte, DENMARK

Session reference:	IBO.16.3
Subtopic:	6.3 Power & Heat processes and systems
Topic:	6. INDUSTRY SESSIONS

Hydrochar Potential application in European Steel Industry

Short introductive summary:
Objective of this study is to identify and analyse the benefits related to the utilization of food waste hydrochar as renewable carbon source to be used as reducing agent in blast furnaces in the steel industry.

Presenter: **Chuan WANG, Swerea MEFOS, Lulea, SWEDEN**

Presenter's biography:
Dr. Wang has been working at Swerea MEFOS for more than 10 years with focus on CO2 emission reduction, energy and material efficiency improvement. Chuan Wang has been working on several biomass projects, for instance, utilizing biomass for the steel industry.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
A. Salimbeni, Ingelia, Valencia, SPAIN
C. Wang, Swerea Mefos, Stockholm, SWEDEN
G. Wang, Ingelia/University of Science and Technology, Bejing, P.R. CHINA

Session reference: IBO.16.4
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Large Scale Utility CFB Technology in Worlds Largest Greenfield 100% Biomass Power Plant

Short introductive summary:

Major incentives on wind and solar power and decreasing consumption have nearly stalled thermal power investments in Europe. While fossil fuels are facing strong political pressures there seems to be market for CO2 neutral thermal power and heat production. Today’s market situation requires fuel flexible technologies, while maximum efficiency and economics of scale drive towards utility size solutions. The worldâ€™s largest greenfield biomass power plant in United Kingdom is taking the Circulating Fluidized Bed (CFB) combustion technology to the 300-MWe scale with sole biomass fuels. When this CHP plant enters commercial operation in January 2020, it will be the worldâ€™s largest and most advanced 100% biomass fired CFB based power plant. This paper presents the key technical features in large scale biomass CFB-boiler technology.

Presenter: **Teemu NEVALAINEN, Foster Wheeler Energia, Global Technology Dpt., Varkaus, FINLAND**

Presenter's biography:

Mr Teemu Nevalainen, M Sc. in engineering, has been working at Amec Foster Wheeler (Finland) since 1997. During 19 years of service he has worked in numerous positions regarding CFB Technology. Today he is working as Chief Engineer heading the Technology Management group which is part of the Amec Foster Wheeler Energia Group’s Global Technology.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Moqvist, Amec Foster Wheeler Energi, Norrköping, SWEDEN
T. Eriksson, Amec Foster Wheeler Energia, Espoo, FINLAND
K. Nuortimo, Amec Foster Wheeler Energi, Varkaus, FINLAND
M. Nikkilä, Amec Foster Wheeler Energia, Varkaus, FINLAND
T. Nevalainen, Amec Foster Wheeler Energia, Varkaus, FINLAND

Session reference: IBO.16.5
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Comparing Approaches for Lignin Valorisation by Formic Acid Assisted Solvolysis - What is the Best Option ?

Short introductive summary:

Lignin valorisation can be critical for the overall success of a sustainable forestry based biorefinery. Formic acid assisted solvolytic lignin conversion can give different product slates depending on the reaction conditions. This paper evaluates four different options for product slates, in terms of producing liquids for use as fuels or chemicals or combined production of liquids and active carbon. The evaluation includes LCA aspects.

Presenter: **Tanja BARTH, University of Bergen, Chemistry Dpt., Bergen, NORWAY**

Presenter's biography:

Tanja Barth is professor at the Department of Chemistry, University of Bergen, Norway. Her research addresses thermochemical biomass conversion for biofuel and chemicals production in an organic chemistry perspective, in parallel with and studies on petroleum composition and alteration.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Barth, University of Bergen, NORWAY
M. Oregui Bengoechea, University of Bergen, NORWAY
C. Løhre, University of Bergen, NORWAY
M. Kleinert, University of Bergen, NORWAY

Session reference: 3BV.4.1

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of Value-Added Chemicals through Glycerol Aqueous Phase Reforming Using Ni based Catalysts: Influence of Operating Conditions

Short introductive summary:

Biodiesel is a second-generation biofuel proposed as one of the substitutes of fossil fuels and according to EN 14214, some profiles and standards, which are not possible without additives, must be enforced. The production of biodiesel originates glycerol as by-product and its disposal is required. In this context, aqueous phase reforming (APR) process is proposed to valorize this stream. APR is a catalytic process performed at quite low temperatures and moderate pressures, allowing the production gases and liquids from an organic feedstock. The catalysts used in the process are generally metals, such as Pt, Pd or Ni among others, supported on different oxides (Al2O3, ZrO2, SiO2, among others), but most of them are focused on gases production. In this context, Ni/CeO2 catalyst is of interest because CeO2 presents a high oxygen mobility capability through the lattice and when Ni is added, oxygen vacancy in the CeO2 lattice is increased. Previous works of our research group have developed a Ni/CeO2 catalyst for glycerol APR process which leads mainly to liquid products.

Presenter: **Clara JARAUTA-CÓRDOBA, Universidad de Zaragoza, Chemical Engineering and Environmental Technologies Dpt., Zaragoza, SPAIN**

Presenter's biography:

Researcher in chemical engineering and now second year PhD. student.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. García, Universidad de Zaragoza, SPAIN
C. Jarauta-Córdoba, Universidad de Zaragoza, SPAIN
J. Ruíz, Universidad de Zaragoza, SPAIN
M. Oliva, Universidad de Zaragoza, SPAIN
J. Arauzo, Universidad de Zaragoza, SPAIN

Session reference:	3BV.4.9
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Metal-Organic Frameworks (MOFs)-Derived Catalysts for an Effective HMF-to-FDCA and HMF-to-DMF Conversions

Short introductive summary:

Metal–organic frameworks (MOF) consist of organic molecular linkers bonded to metal-based nodes. MOFs and have advantages such as tunable porosity, chemical stability, ultra-high specific surface area and ability to tune the surface chemistry. These features have enabled MOFs to find applications in diverse research fields, especially in heterogeneous catalysis. In this presentation, we will use MOFs-derived nanoporous nanoparticles as effective solid catalysts for converting 5-hydroxymethylfurfural (HMF), one of the most promising platform of lignocellulosic biomass, into dimethylfuran (DMF) and 2,5-furandicarboxylic acid (FDCA) through hydrogenation/hydrogenlysis and oxidation, respectively. The results obtained in this study indicated that high yields of DMF and FDCA could be separately obtained from HMF via the combination of our newly designed MOFs-based nanoporous catalysts with the liquid-phase hydrogen/oxygen sources.

Presenter: **Jyun-yi YEH, National Taiwan University, Chemical Engineering Dpt., Taipei, TAIWAN**

Presenter's biography:

I am a graduate student at Kevin Wu's lab from National Taiwan University. My reserch field is Synthesizing and Application of functional nanomesoporous particle. Badminton and eating delicious food are my favorite, I can't live without them.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. C. W. Wu, National Taiwan University, Taipei, TAIWAN

Session reference: 3BV.4.11

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Ethylene Glycol Production from Glucose over W-Ru Catalysts: Maximizing Yield by Kinetic Modeling and Simulation

Short introductive summary:

Catalytic conversion of biomass, including sugars, to ethylene glycol (EG) using tungsten based catalysts is of notable significance for a sustainable society. We previously studied concentrated glucose conversion to EG, and found the reaction temperature and reactant concentration significantly affect the EG yield. To quantitatively describe the catalytic performance of glucose conversion under various conditions, herein, we investigated the overall reaction kinetics in the presence of the binary catalyst of ammonium paratungstate and 4%Ru/AC. The study would provide valuable information for effectively controlling the reaction selectivity in bio-EG production using suitable reaction conditions.

Presenter: **Mingyuan ZHENG, Dalian Institute of Chemical Physics, Chinese Academy of Sciences, Dalian, P.R. CHINA**

Presenter's biography:

Dr. Zheng is interested in the biomass catalytic conversion to chemicals, high-performance hydrogenation catalyst synthesis and the applications. He has published over 50 peer-reviewed papers in many journals, and filed more than 30 patents.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Zhao, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
M. Zheng, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
R. Sun, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
Z. Tai, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
J. Pang, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
A. Wang, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
X. Wang, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA
T. Zhang, Dalian Institute of Chemical Physics, CAS, Dalian, P.R. CHINA

Session reference: 3BV.4.12

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Catalytic Conversion of Ethylene from Biomass Gasification Producer Gas into Valuable Aromatic Compounds

Short introductive summary:

Biomass gasification usually takes place at low-medium temperatures (750-900°C), so that the producer gas contains, besides CO, H2 and CO2, compounds such as CH4, C2-C4 gases, BTX and tars. Some of these compounds (e.g. ethylene, BTX) do not only have a harmful effect in synthesis processes as coking precursor of catalysts, but they also have a high economic value, even higher than the final product in e.g. bio-SNG processes. Therefore, the recovery of these valuable compounds from producer gas in co-production schemes offers a considerable improvement with respect to their costly conversion to syngas.

Despite the high value of ethylene, there is a technical challenge in its separation from producer gas. Conventional cryogenic technology is energy-intensive and cannot be economically applied in gasification applications. A smart alternative approach consists of the implementation of reactive separation processes, viz. the conversion of ethylene into other high-value compounds (e.g. aromatics) which can be more easily harvested from the gas. This work has experimentally evaluated the catalytic conversion of ethylene into BTX under relevant gasification conditions.

Presenter: **Berend VREUGDENHIL, Energy Research Centre of the Netherlands, Bio Energy & Efficiency Dpt., Petten, THE NETHERLANDS**

Presenter's biography:

Berend Joost (Berend) Vreugdenhil holds an M.Sc. degree in Chemical Engineering from the Technical University Delft. In 2006 he started his career at ECN within the Syngas and SNG group, where research is focussed on developing the technology to produce sustainable natural gas from biomass. The first four years at ECN he was involved in the gasifier research, looking into the effect of bed materials on gas composition, temperature effects and the influence of gasifying medium. Next to this he also looked into the behaviour of tar and more precisely the condensation behaviour of tar in a producer gas.Since beginning of 2011 he is responsible of the tar removal technology developed by ECN, named OLGA, and is coordinating the research program into further optimizing this technology and broadening the range of applications of OLGA. In 2015 he changed in his role to Innovation Manager Gasification, which entails setting out program for gasification within ECN. The area he now is responsible for is gasification, gas cleaning and gas upgrading. Next to the production of substitute natural gas (SNG) from biomass/waste also the production of valuable chemicals (BTX, ethylene) are routes that are being developed

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B.J. Vreugdenhil, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
Y.-T. Kuo, Industrial Technology Research Institute of Taiwan, Chutung, Hsinchu, TAIWAN
G. Aranda Almansa, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
M. Lok, Catalok, Den Haag, THE NETHERLANDS

Session reference: 3BV.4.15
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Reusable Heterogeneous Amberlyst-16 Catalyst for Acetic Acid Esterification

Short introductive summary:

Ethyl acetate finds its high relevance as an intermediate in food, paints, coatings, inks, and adhesives industries. The present study addresses the proficiency of strongly acidic Amberlyst-16 to catalyze the esterification reaction between acetic acid and ethanol.

Presenter: **Jorge Mario MARCHETTI, Norwegian University of Life Science, Mathematical Science and Technology Dpt., Aas, NORWAY**

Presenter's biography:

I am an associate professor at the Norwegian University of Life Science working on the field of transformation of waste into bio-fuels and biochemicals using green catalysis. I have been working in the field for over 15 years.
I am the author of a book in biodiesel as well as editor of a second.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. M. Marchetti, Norwegian University of Life Sciences, ÅS, NORWAY
M. R. Avhad, Norwegian University of Life Sciences, ÅS, NORWAY
M. V. Osborg, Norwegian University of Life Sciences, ÅS, NORWAY

Session reference: 3BV.4.17

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Heterogeneously Catalysed Acetylation of Glycerol Towards Triacetin in Batch and Continuous Mode

Short introductive summary:

Glycerol esterification with acetic acid to triacetin was investigated in batch and continuous mode. In the first case, ion exchange resins as well as inorganic materials (heteropolyacids supported on silica, alumina or silica-alumina) with high Brønsted acidity were used as catalysts. In the second case, supported heteropolyacids and mesoporous metal oxides were studied in gas phase reaction.
Batch runs were conducted around 100 °C with continuous water removal using toluene as entrainer, and shifting the chemical equilibrium in that way led to high triacetin selectivity. Ion exchange resins like Amberlyst-70 outperformed the heteropolyacids with regard to activity and selectivity.
In continuation, we established a continuous gas-phase process for the first time at 200-350 °C with inorganic Ti-based catalysts. Surprisingly, Lewis acidic materials without any Brønsted sites gave triacetin selectivity up to 48%. Glycerol acetylation competes with dehydration, but by setting proper conditions, more than 90% yield towards acetylation was achieved over more than 200 h on stream.

Presenter: **Udo ARMBRUSTER, Leibniz Institute for Catalysis at University of Rostock, Rostock, GERMANY**

Presenter's biography:

Study of chemistry at University of Karlsruhe (now KIT).
1997: PhD in Faculty of Chemical Engineering at University of Karlsruhe.
1999: Senior scientist at Insitute for Applied Chemistry in Berlin-Adlershof.
2006: Senior scientist at Leibniz Institute for Catalysis at University Rostock.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

U. Armbruster, LIKAT, Rostock, GERMANY
S. Kale, LIKAT, Rostock, GERMANY
A. Martin, LIKAT, Rostock, GERMANY

Session reference: 3BV.4.18
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Preparation and Characterization of Solid Superbasic-Superacidic Catalysts for Biodiesel Synthesis Using Catalyzed Transesterification

Short introductive summary:

In recently years, low-pollutant biodiesel has been widely considered as one of the renewable fuels that can replace the traditional petro-diesels in transportation. In addition, the biodiesel can be synthesized using waste soybean oil and solid catalysts via transesterification, which can be easily separated from as-prepared biodiesel. Similarly, transesterification or esterification can be also performed on superacidic ones without free fatty acid (FFA) contamination. Thus, solid superacidic SO42-/ZrO2/Al2O3 and superbasic Na/NaOH/Al2O3 or magnetic KF/CaO–Fe3O4 nanocatalysts were synthesized, characterized, and studied. Furthermore, the optimal synthetic processes, catalyst characterization, and catalyst granulation were also investigated in present study.

Presenter: **Chao-Lung CHIANG, Yuan Ze University, Chemical Engineering and Material Science Dpt., Taoyuan City, TAIWAN**

Presenter's biography:

I am a PhD student from Yuan Ze University in Taiwan. My research topics in MS and PhD programs are the development of porous materials for CO2 separative storage and the catalysis of CO2 for valuable chemicals fabrication. Until Now, I have more than 10 published articles in several journals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.L. Chiang, Yuan Ze University, Taoyuan, TAIWAN
K.S. Lin, Yuan Ze University, Taoyuan, TAIWAN
C.W. Shu, Yuan Ze University, Taoyuan, TAIWAN
H.Y. Chan, Yuan Ze University, Taoyuan, TAIWAN
J.C.S. Wu, National Taiwan University, Taipei, TAIWAN
K.C.W. Wu, National Taiwan University, Taipei, TAIWAN
Y.T. Huang, Chung Yuan Christian University, Taoyuan, TAIWAN

Session reference: 3BV.4.21
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Synthesis and Characterization of Mesoporous Polymer-Based Solid Acid Catalysts for Biodiesel Production via Transesterification of Palmitic Oil

Short introductive summary:

In this present work, the solid superacidic catalysts (PDVB-SO3H and PDVB-SO3H-SO2CF3) were synthesized with different solvents in optimal operation conditions to enhance the biodiesel production via esterification/transesterification. FT-IR spectra of PDVB-x-MeCN, PDVB-x-EAC and PDVB-SO3H-SO2CF3 samples at 1010, 1035, 1125, and 1220 cm-1 respectively, the band around 1035 cm-1 is notably associated with the presence of a C-S bond on the benzene rings. FE-SEM micrographs of the solid acid catalysts synthesized with acetonitrile showed that the catalysts were spherical structures with smooth surface. Based on the contact angle analyzer data for water with PDVB-x-MeCN, PDVB-x-EAC, and PDVB-SO3H-SO2CF3, all the samples exhibit the excellent hydrophobicity clearly. Catalytic tests show that PDVB-0.5-MeCN and PDVB-SO3H-SO2CF3 exhibit excellent catalytic activities in biomass esterification to biodiesel. The excellent catalytic activity and good recyclability of this work result from their characteristics such as large surface area, strong acid strength, adjustable hydrophobic-oleophilic and stable network which are important for their applications on biodiesel production industrie.

Presenter: **Kuen-Song LIN, Yuan Ze University, Department of Chemical Engineering & Materials, Tao-Yuan City, TAIWAN**

Presenter's biography:

I am a senior full professor in the department of chemical engineering and materials sciences, Yuan Ze University in Taiwan. Furthermore, I am also the director, Environmental Technology Research Center and dean, Research and Development in Yuan Ze University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K.S. Lin, Yuan Ze University, Taoyuan, TAIWAN
C.L. Chiang, Yuan Ze University, Taoyuan, TAIWAN
H.Y. Chan, Yuan Ze University, Taoyuan, TAIWAN
J.C.S. Wu, National Taiwan University, Taipei, TAIWAN
K.C.W. Wu, National Taiwan University, Taipei, TAIWAN
Y.T. Huang, Chung Yuan Christian University, Taoyuan, TAIWAN

Session reference: 3BV.4.22
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Activity and Selectivity of Noble and Transition Metal Catalysts for HDO of Lignin Monomer Model Compound Eugenol: A Microkinetic Approach

Short introductive summary:

Lignin, the world's most abundant renewable carbon reservoir, with its unique structure and chemical properties shows a great potential to be used as a feedstock for the production of numerous bulk and fine chemicals, particularly aromatic compounds. Moreover, valorization of lignin represents a key role in an economic and sustainable production of bio-refineries. Hydrodeoxygenation (HDO) has been regarded as the most promising route for lignin transformation into value-added chemicals. In the present study, HDO of representative lignin monomer model compound eugenol has been investigated over two types of metal catalysts, noble and transitions. Furthermore, the role in eugenol HDO mechanism and an influence on the product distribution of various supports have been tested as well including an effect of temperature and pressure on reaction course. Previously developed microkinetic model for eugenol conversion over Ru/C, has been upgraded in this study to describe the system behavior providing kinetic parameters for each used catalyst.

Presenter: **Ana BJELIC, National Institute of Chemistry, Chemical Engineering Dpt., Ljubljana, SLOVENIA REPUBLIC**

Presenter's biography:

PhD in Chemical Engineering at Faculty of Chemistry and Chemical Technology, University of Ljubljana
Topic of the PhD thesis: Lignin-derived fuels and chemicals
Master in Chemical Engineering at Faculty of Technology and Metallurgy, University of Belgrade

Co-authors:

A. Bjelic, National Institute of Chemistry, Ljubljana, SLOVENIA REPUBLIC
M. Grilc, National Institute of Chemistry, Ljubljana, SLOVENIA REPUBLIC
B. Likozar, National Institute of Chemistry, Ljubljana, SLOVENIA REPUBLIC

Session reference:	3BV.4.23
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Direct Conversion of Cellulose to High-Yield Methyl Lactate over Ga-doped Zn/H-Nanozeolite Y Catalysts in Supercritical Methanol

Short introductive summary:

The direct conversion of cellulose and woody biomass to lactic acid and alkyl lactates in high yield using heterogeneous catalysts is still challenging. In this study, the direct conversion of cellulose to ML in an unprecedented high yield of 57.8% over a Ga-doped Zn/H-nanozeolite Y (Ga-doped Zn/HNZY) bifunctional heterogeneous catalyst with controlled Lewis and Brønsted acid sites under supercritical methanol conditions was reported. The rationale for using nanozeolite (with a size of less than 200 nm) as the support is its large surface area and the presence of both mesopores and micropores, which can provide facile access to bulky molecules (such as cellulose and lignocellulose) to the active phase and high selectivity for targeted products. In addition, the enhancement of Lewis acidity by the doping of Ga in the Zn/nanozeolite Y framework accomplishes the highly selective conversion of cellulose to ML in a significantly high yield.

Presenter: **Jaehoon KIM, Sungkyunkwan University, School of Mechanical Engineering & SKKU Advanced Institute of Nano Technology, Suwon, REPUBLIC OF KOREA**

Presenter's biography:

2005 : Ph.D., North Carolina State University
2005-2007 : U.S. Army Research Office
2007-2013 : Korea Institute of Science and Technology
2013-present : Sungkyunkwan University

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Kim, Sungkyunkwan University, Suwon, REPUBLIC OF KOREA
D. Verma, Sungkyunkwan University, SuwonSuwon, REPUBLIC OF KOREA

Session reference:	3BV.4.24
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Improved Feasibility of the Biomass Supply Chain Through Solar Enhanced Drying

Short introductive summary:

The key objective of this paper is to present the solar enhanced drying system developed at VTT Jyväskylä, Finland. In addition, the first lessons learned are published.

Experiments have been conducted to measure the efficiency of the drying process and find ways to effectively operate the dryer at various solar irradiation conditions. Techno-economic calculations have been made and new algorithms developed to optimize the process in varying conditions, for example solar radiation, air humidity and electricity price.

Presenter: **Janne KÄRKI, VTT Technical Research Centre of Finland, Jyvaskyla, FINLAND**

Presenter's biography:

Mr. Janne Kärki works as a Senior Scientist at VTT’s Renewable Energy Processes- team. He holds a M.Sc. (Tech.) from Lappeenranta University of Technology, Department of Energy Technology. Mr. Kärki is specialised in techno-economic assessments of different low-carbon energy concepts.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Kärki, VTT Technical Research Centre of Finland, Jyväskylä, FINLAND
E. Tsupari, VTT Technical Research Centre of Finland, Jyväskylä, FINLAND
J. Raitila, VTT Technical Research Centre of Finland, Jyväskylä, FINLAND

Session reference: 3BV.4.26
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Hydrogen Production via Steam Reforming of Simulated Bio-oil: Influence of Interaction between Model Compounds

Short introductive summary:

Bio-oil obtained from pyrolysis or hydrothermal conversion of biomass is a potential resource for bio-hydrogen production. The composition of bio-oil is complex and adjustable, and different composition could influence hydrogen yields via interaction mechanism. The purpose of this work is to figure out how do interactions existing in steam reforming of bio-oil affect the hydrogen yield and what composition of bio-oil is in favor of hydrogen production. Relevant experimantal details are involved.

Presenter: **Junyu TAO, Tianjin University, School of Environmental Science and Engineering, Tianjin, P.R. CHINA**

Presenter's biography:

PhD. in school of environmental science and engineering of Tianjin university. My researches mainly focus on biomass and bio-energy.

Co-authors:

B. Yan, School of Environmental Science and Engineering, Tianjin University;Key Laboratory of Biomass-based, Tianjin, P.R. CHINA
G. Chen, School of Science, Tibet University;School of Environmental Science and Engineering, Tianjin Univers, Tianjin/Tibet, P.R. CHINA
J. Tao, School of Environmental Science and Engineering, Tianjin University, Tianjin, P.R. CHINA

Session reference: 3BV.4.27
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Nanobiocatalytic systems as efficient tool to release bioactive compounds from olive oil by-products

Short introductive summary:

Olive leaves can be found in high amounts in the olive oil industries (10% of the total weight of the olives) and they accumulate during pruning of the olive trees. In the present wok we focused on the development of robust enzyme-based nanoassemblies for the conversion of the phenolics contained in olive leaves, such as (oleuropein), to hydroxytyrosol and its derivatives. These nanobiocatalytic assemblies were developed through a novel bottom-up approach using simple and low-cost methods based on multi point covalent immobilization of various enzymes such as hydrolases and oxidoreductases onto functionalized carbon-based nano-scaffolds, including functionalized graphene-based nanomaterials, and porous carbon materials with designed pore architecture. The nanobiocatalysts developed were successfully used, under mild reaction conditions, for the bioconversion of oleuropein-rich extracts from olive leaves to hydroxytyrosol and its bioactive derivatives.

Presenter: **Ioannis ZARKADAS, Aristotle University of Thessaloniki, Chemical Engineering Dpt., Thessaloniki, GREECE**

Presenter's biography:

Qualified and experienced in waste management and chemical analysis for both solid and liquid wastes. Experienced in the scientific and technical matters of anaerobic digestion and composting of heterogeneous substrates including manures and the organic fraction of the municipal solid waste.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Alexandra Chatzikonstantinou, University of Ioannina, IOANNINA, GREECE
Elena Gkantzou, University of Ioannina, IOANNINA, GREECE
Dimitra Houhoula, Technological Educational Institute of Athens, ATHENS, GREECE
Ioannis Zarkadas, University of Thessaloniki, Thessaloniki, GREECE
Petros Katapodis, University of Ioannina, IOANNINA, GREECE
Dimostheni Sarigiannis, University of Thessaloniki, Thessaloniki, GREECE
Dimitrios Gournis, University of Ioannina, IOANNINA, GREECE
Haralambos Stamatis, University of Ioannina, IOANNINA, GREECE

Session reference: 3BV.4.30

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Effect of Composted Biomass Moisture on Pelleted Fertilizers from Swine Manure Solid Fraction

Short introductive summary:

In order to lower livestock farming environmental load alternative uses of animal waste have to be developed. Pelletization can profitably improve management of the solid fraction but operating parameters still need to be thoroughly defined. Swine manure solid fraction were composted with and without addition of sawdust as bulking agent and then underwent to compaction process into pellets at two levels (10% and 25%) of bulk moisture: The results of the investigation show that sawdust addition affect the surface of the pellets while pelletization of bulk biomass at 25% of moisture, showed better preservation of some important characteristics (e.g. total N, Humification rate) throughout the pelletization process

Presenter: **Massimo BRAMBILLA, Consiglio per la Ricerca in Agricoltura e l'analisi dell'economia Agraria, Unità di Ricerca per l'Ingegneria Agraria, Treviglio, ITALY**

Presenter's biography:

Graduated in Agricultural Science in 1996, in 2002 achieved the Ph.D. in Agricultural Chemistry. Since 2012 he is been working as full time researcher at CREA-Consiglio per la ricerca in agricoltura e l'analisi del'economia agraria. ORCID ID: http://orcid.org/0000-0002-0998-0522

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Brambilla, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per l’In, Treviglio, ITALY
E. Romano, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per l’In, Treviglio, ITALY
M. Cutini, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per l’In, Treviglio, ITALY
N. Pampuro, Institute for Agricultural and Earthmoving Machines (IMAMOTER), National Research Council of Italy (, Torino, ITALY
E. Cavallo, Institute for Agricultural and Earthmoving Machines (IMAMOTER), National Research Council of Italy (, Torino, ITALY
E. Foppa Pedretti, Dipartimento di Scienze Agrarie, Alimentari ed Ambientali, Universita` Politecnica delle Marche, Ancona, ITALY
C. Bisaglia, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per l’In, Treviglio, ITALY

Session reference: 3BV.4.31
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Novel Synthesis of 1,6-hexanediol under Mild Conditions and Two Steps Utilizing Metal Organic Framework Derived Bifunctional Carbon Supported Noble Metal with Liquid Hydrogen Source

Short introductive summary:

We proposed a novel method to synthesize 1,6-Hexanediol by only one or two step with high selectivity under mild conditions with bifunctional catalyst attached with noble metal. And preliminary we have alredy produced high selectivity of reaction intermediate, tetrahydrofuran-2,5-dimethanol, so we believe that this novel synthesis can produce high selectivity of 1,6-Hexanediol.

Presenter: **Jyun-yi YEH, National Taiwan University, Chemical Engineering Dpt., Taipei, TAIWAN**

Presenter's biography:

I am a graduate student at Kevin Wu's lab from National Taiwan University. My reserch field is Synthesizing and Application of functional nanomesoporous particle. Badminton and eating delicious food are my favorite, I can't live without them.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Yeh, National Taiwan University, Taipei, TAIWAN

Session reference:	3BV.4.33
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of Reactive Bottom Ashes from Combustion of Sugarcane Leaves Briquettes in a Fixed Bed Reactor for Use as a Cementitious Material

Short introductive summary:

This study investigated the feasibility to produce bottom ashes as a pozzolan material from combustion of sugarcane leaves briquettes (SCLB) to be used as partial replacement of ordinary Portland cement (OPC). To reduce the high ash, Cl and alkali oxides contents of sugarcane straw the samples were water washing previous densification improving their thermal behavior and grindability. The briquettes were burned under a controlled temperature below 800°C in a fixed bed reactor. The chemical composition and presence of amorphous substances in the ashes were determined by X-ray Fluorescence and Diffraction Analysis. The results showed SiO2, Al2O3, and Fe2O3 oxides content was 88.2% and 45% of amorphous material. The ash pozzolanic activity at 7 and 28 days was found to be 91% and 101% respectively which showed that qualify as a pozzolan. Cementitious mixing specimens containing 20% of SCLB ashes were made and evaluated by autoclave expansion, air contend of mortar, time of setting, fineness, chemical composition and compressive strength satisfying the requirements for Portlad pozzolan cements. The results showed that SCLB ashes are suitable for partial replacement of OPC.

Presenter: **Estela ASSUREIRA, Pontificia Universidad Católica del Perú, Engineering Dpt., Lima, PERU**

Presenter's biography:

I am a Mechanical Engineer and Master of Science from the Pontificia Universidad Católica del Perú (PUCP). At PUCP I am a principal professor at the Engineering Department teaching Fluid Mechanics and Turbomachinery courses. Since 1981, I am a Director of Coal and Biomass Research Group.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Assureira, Pontificia Universidad Católica del Perú, Lima, PERU

Session reference: 3BV.4.36

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Emissions and performance of a diesel engine fuelled with blends of diesel and biodiesel additivated with bio-oil

Short introductive summary:

Biodiesel is considered one of the most promising alternative fuels to petrol fuels. It consists of a mixture of alkyl esters obtained by transesterification of vegetable oils and animal fats with a short chain alcohol (mainly methanol or ethanol) and catalyzed by acids or bases (usually NaOH or KOH). Poor oxidation stability and cold flow properties of biodiesel are considered the main drawbacks for its wide utilization as fuel. Different synthetic additives have been used to improve biodiesel characteristics in order to fulfill the requirements defined in different standards, such as EN 14214 in Europe. As commercial additives are usually expensive, there is a motivation to explore new alternative low-cost additives. Phenolic compounds obtained from bio-oil have been used as a renewable additive for biodiesel, as they improve oxidation stability. In this work, the effect of the biodiesel additives on the performance of a diesel engine have been investigated.

Presenter: **Alberto GONZALO CALLEJO, Universidad de Zaragoza, Instituto de Investigación en Ingeniería de Aragón, Zaragoza, SPAIN**

Presenter's biography:

Researcher

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Dueso, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
J. Arroyo, Universidad de Zaragoza / Department of Mechanical Engineering, Zaragoza, SPAIN
F. Moreno, Universidad de Zaragoza / Department of Mechanical Engineering, Zaragoza, SPAIN
M. Muñoz, Universidad de Zaragoza / Department of Mechanical Engineering, Zaragoza, SPAIN
C. Monné, Universidad de Zaragoza / Department of Mechanical Engineering, Zaragoza, SPAIN
A. Bautista, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
N. Gil-Lalaguna, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
A. Gonzalo Callejo, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
J.L. Sánchez, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN

Session reference: 3BV.4.37

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of A Bio-Plastic from Wet Lignocellulosic Residual Feedstocks with Hydrothermal Carbonization as Key-Step

Short introductive summary:

Hydrothermal Carbonization (HTC) technology has been developed and reached technology readiness level 8. In the European Project FP-7 NEWAPP (http://www.newapp-project.eu/en/) it has been demonstrated that wet biomass waste resources such as green waste and garden prunings, food waste, the organic fraction of municipal solid waste (OFMSW), and others can be converted into hydrochar. It can be expected that in near future considerable amounts of hydrochar will reach the market. Hydrochar can be employed as solid fuel but higher value applications are highly desired from economical and ecological point of view.

Presenter: **Michael RENZ, Universitat Politecnica de Valencia, Institute of Chemical Technology, Valencia, SPAIN**

Presenter's biography:

M. Renz received his PhD in OC at the University of Würzburg, Germany. After a post-doctoral stay in Toulouse at the LCC he joined the ITQ (UPV-CSIC) in Valencia Spain. His research interests involve heterogeneous catalysis and biomass conversions.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Renz, Instituto de Tecnología Química (ITQ), Universitat Politècnica de València – Consejo Superior, Valencia, SPAIN
A. Corma, Instituto de Tecnología Química (ITQ), Universitat Politècnica de València – Consejo Superior, Valencia, SPAIN
M. Hitzl, Ingelia S.L., Valencia, SPAIN

Session reference:	3BV.4.38
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Purposeful Functionalization Of Waste Hardwood Lignocelluloses For Making Recycled Polymer-Based Composites

Short introductive summary:

The aim of the work was to extend the use of the wood value chain for obtaining a new value-added product from the birch wood sanding dust, waste lignocelluloses, of the JSC Latvijas Finieris, which is mainly used as an energy source. Wood-polymer composites (WPCs) are the biggest biomaterial group in Europe, and their forecasted production in 2020 is 450 000 t. Taking this into account, the purposeful functionalization of the lignocellulosic dust for obtaining a wood filler had been developed. Waste polypropylene, a polymeric municipal solid waste, served as a polymer matrix. The functionalization of the dust was carried out by its alkali hydrolysis with the followed modification. The modification was carried out by introduction of tertiary amino groups at the lignocelluloses surface. The texture of the obtained composites was characterized by the good homogeneity that was resulted in the enhanced mechanical properties (tensile, bending), the high values of contact angles and the low water sorption.

Presenter: **Anrijs VEROVKINS, Latvian State Institute of Wood Chemistry, Lignin Laboratory, Riga, LATVIA**

Presenter's biography:

Modification of lignocellulosic materials, Engineering science, Analytical chemistry. Participated in different local and international projects. Education: 1998-2013. Riga Technical Univ., Faculty of Material Science and Applied Chemistry, supervisor’s prof. Dr.habil.chem. Girts ZAKIS.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Shulga, Latvian State Institute of Wood Chemistry, Riga, LATVIA
B. Neiberte, Latvian State Institute of Wood Chemistry, Riga, LATVIA
S. Uzulis, JSC "Latvijas Finieris", Riga, LATVIA
A. Verovkins, Latvian State Institute of Wood Chemistry, Riga, LATVIA
J. Jaunslavietis, Latvian State Institute of Wood Chemistry, Riga, LATVIA
S. Vitolina, Latvian State Institute of Wood Chemistry, Riga, LATVIA
J. Brovkina, Latvian State Institute of Wood Chemistry, Riga, LATVIA
S. Livcha, Latvian State Institute of Wood Chemistry, Riga, LATVIA

Session reference: 3BV.4.39

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Can Biobased Chemicals Be Produced Via the Pathway of Anaerobic Digestion? A First Overview.

Short introductive summary:

The abstract is dealing with the possibility to produce chemicals via the anaerobic digestion. Thereby the work is part of a larger project, which is dealing with the energy system in Germany till 2050.

Presenter: **Eric BILLIG, Umwetlforschungszentrum UFZ, Bioenergie Dpt., Leipzig, GERMANY**

Presenter's biography:

Eric Billig studied environmental engineering in Berlin. He first started to work at the KIT in Karlsruhe and was responsible for experiments based on the pyrolysis of biomass. Shortly after that he changed to the DBFZ (German Biomass Research Center) in Leipzig, where her works since 2010 as research associate.Since 2012 he is dedicated to his PhD thesis which deals with the evaluation of biomethane and bio-SNG production plants.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Billig, UFZ, Leipzig, GERMANY

Session reference: 3BV.4.40

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Synthesis, Physicochemical Properties of DBU/CH3OH/CO2 and its Utilization in Dissolving Biomass

Short introductive summary:

A switchable ionic compound based on 1,8-diazabicyclo-[5.4.0]-undec-7-ene (DBU), CH3OH and CO2 was synthesized and characterized, and the basical physicochemical properties of DBU/CH3OH/CO2(DCC) concerning in a new biodiesel technology were studied. And the methanol solution of DCC was used to dissolve the camphor sawdust.

Presenter: **Houfang LU, Sichuan University, Chemical Engineering Dpt., Chengdu, P.R. CHINA**

Presenter's biography:

Houfang Lu
Sex: female, Nationality: Chinese

College of Chemical Engineering, Sichuan University, China

Research interests: production technology of biodiesel; conversion of biomass

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Lu, Schuan University, Chengdu, P.R. CHINA
Y. LIU, Schuan University, Chengdu, P.R. CHINA
B. Liang, Schuan University, Chengdu, P.R. CHINA

Session reference: 3BV.4.41

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sorption Enhanced Chemical Looping Reforming Process of Biogas for Cleaner Hydrogen Production

Short introductive summary:

The aim of this study is to compare a sorption enhanced chemical looping reforming (SECLR) and chemical looping reforming (CLR) without CaO looping process by using biogas as a fuel.

Presenter: **Amornchai ARPORNWICHANOP, Chulalongkorn University, Chemical Engineering Dpt., Bangkok, THAILAND**

Presenter's biography:

Amornchai Arpornwichanop received B.Eng. and D.Eng. degrees in chemical engineering from Chulalongkorn University (Thailand) in 1997 and 2003, respectively. Since 2003, he has been with the department of chemical engineering, faculty of engineering, Chulalongkorn University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Kasemanand, Chulalongkorn University, Bangkok, THAILAND
P. Tippawan, Chulalongkorn University, Bangkok, THAILAND
A. Arpornwichanop, Chulalongkorn University, Bangkok, THAILAND

Session reference: 3BV.4.42

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Activated Carbon Production from Wood Based Panels Waste and its Application as an Additive of Urea Formaldehyde Resin

Short introductive summary:

A huge amount of wastes is generated during production and post-processing of wood based panels such as MDF and particleboards. These wastes cause some problems for producers and industries, therefore the recycling of them to value-added products will be very attractive.
In this research, production of activated carbon(AC) from MDF sanding dust(it is daily generated in considerable amount in MDF factories) has been considered. Then the obtained AC was used as a additive for urea formaldehyde(UF) resin in manufacturing MDF boards. The aim was to decrease the formaldehyde emission form MDF boards. The reduction of formaldehyde emission from wood based panels containing UF resin is one the major tasks of researchers and producers.

presenter: Saeed Kazemi Najafi, Prof. in Wood Based Composites, Tarbait Modares University, Tehran. Iran

Presenter: **Saeed KAZEMI NAJAFI, Tarbiat Modares University, Wood & Paper Science & Technology Dpt., Nour, IRAN**

Presenter's biography:

I was born in Iran in 1969. I am Prof. In wood based composites and working in Tarbiat Modares University since 2002. I have published more than 70 papers in persian and english journals. My interest is to use lignocellusic and plastic wastes in wood based composites production.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Kazemi Najafi, Tarbiat Modares University, Tehran, IRAN
R. Zamani, Tarbiat Modares University, Tehran, IRAN
H. Younesi, Tarbiat Modares University, Tehran, IRAN

Session reference: 3BV.4.43
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of Bacterial Cellulose Using Opuntia and Citrus Waste as Feedstocks

Short introductive summary:

The fermentative production of Bacterial Cellulose (BC) using Opuntia and citrus-waste as feedstocks is presented. The optimization of the process in terms of biomass pretreatments and characterization, strains selection and modification as well as use of inducers will be discussed, showing the biotechnological potential of the proposed biomasses.

Presenter: **Diego ROMANO, University of Milan, Food, Environmental and Nutritional Sciences - DeFENS Dpt., Milano, ITALY**

Presenter's biography:

Assistant Professor at Dep. of Food, Environmental and Nutritional Sciences - DeFENS - University of Milan.
My current research is focused on the characterization and application of new microbial enzymes in industrially relevant and sustainable bioprocesses.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Romano, University of Milan, ITALY
V. De Vitis, University of Milan, ITALY
R.K. Mangayil, Tampere University of Technology, FINLAND
M.T. Karp, Tampere University of Technology, FINLAND
S. Farris, University of Milan, ITALY
B. Pecorino, University of Catania, ITALY
R. Selvaggi, University of Catania, ITALY
G. Chinnici, University of Catania, ITALY
F. Valenti, University of Catania, ITALY

Session reference:	3BV.4.47
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Properties of Biochar Produced by Slow Pyrolysis of Stabilized Sewage Sludge

Short introductive summary:

Application of biochar to agricultural soil is advantageous for several reasons. The main goal of this work is to study the influence of pyrolysis temperature and residence time of stabilized sewage sludge/biochar in a pyrolysis reactor on material and energy balance and on physical and mechanical properties of biochar.

Presenter: **Jaroslav MOSKO, Institute of Chemical Process Fundamentals of the CAS, Institute of Chemical Process Fundamentals, Prague 6 - Suchdol, CZECH REPUBLIC**

Presenter's biography:

PhD student at University of Chemistry and Technology Prague and at Institute of Chemical Process Fundamentals of the CAS. Defended master thesis (Fluidised-bed combustion of dry stabilized sewage sludge) at Faculty of Environmental Technology UCT Prague.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Mosko, Institute of Chemical Process Fundamentals of the CAS, Prague, CZECH REPUBLIC
M. Pohorelý, Institute of Chemical Process Fundamentals of the CAS, v. v. i., Prague, CZECH REPUBLIC
S. Skoblia, Department of Gaseous and Solid Fuels and Air Protection, UCT Prague, Prague, CZECH REPUBLIC
Z. Beno, Department of Gaseous and Solid Fuels and Air Protection, UCT Prague, Prague, CZECH REPUBLIC
B. Zach, Institute of Chemical Process Fundamentals of the CAS, v. v. i., Prague, CZECH REPUBLIC
M. Syc, Institute of Chemical Process Fundamentals of the CAS, v. v. i., Prague, CZECH REPUBLIC
S. Václavková, Institute of Chemical Process Fundamentals of the CAS, v. v. i., Prague, CZECH REPUBLIC
K. Svoboda, Institute of Chemical Process Fundamentals of the CAS, v. v. i., Prague, CZECH REPUBLIC

Session reference: 3BV.4.48
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Perspectives of High-valued Chemical Production from Marine Fungal-like Protists

Short introductive summary:

Fungal-like protists, also commonly called thraustochytrids, are unicellular heterotrophic protists and produce polyunsaturated fatty acids (PUFAs) (mainly Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid(DHA)) and isoprenoids (i.e., squalene and carotenoids). Because of their heterotrophic nature, they can be used to produce these high-valued chemicals through large-scale fermentation. Particularly, their high osmosis tolerance and special chemical productivity place them in a superior position to compete with their terrestrial counterparts, such as yeast, for the fermentation production of these chemicals. In this presentation, we will introduce our efforts in strain isolation and optimization processes of marine fungal-like protists for the production of DHA and squalene. Particularly, fermentation media and parameter optimization will be discuss for their maximal production yields. The scale-up process will be briefly mentioned in this presentation as well. Our results indicated that fungal-like protists feasible to be used to produce high-valued chemicals for commercial applications.

Presenter: **Guangyi WANG, Tianjin University, Environmental Science & Ecology Dpt., Tianjin, P.R. CHINA**

Presenter's biography:

Dr. Wang received his Ph.D. in Microbiology at the University of California at Davis in 2000 and thereafter worded as a Postdoctoral Fellow in the Department of Chemical Engineering at the University of California at Berkeley. In 2003, he joined the Universi

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Wang, Tianjin University, Tianjin, P.R. CHINA
Q. Wang, Tianjin University, Tianjin, P.R. CHINA

Session reference: 3BV.4.49

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Degradation of Lignin in Ionic Liquid with Mesoporous Solid Acids as Catalysts

Short introductive summary:

This study compared three different preparation methods of H2SO4/MCM-41 catalysts to degrade lignin in IL. According to pore structure analysis of H2SO4/MCM-41 and liquefied lignin yield comparison, the optimal preparation method of H2SO4/MCM-41 was soaking method. The greatest liquefaction efficiency obtained was 74.02% and more than 80% of the total liquefied products were substituted phenols, which was an excellent result and had enormously prospects to be considered for its industrial implementation. Vanillin, 1-(4-hydroxy-3-methoxyphenyl)-ethanone, vanillic acid and 4-hydroxy-3-methoxy-benzenepropanol were the main liquefied products. In view of the liquefaction efficiency and the phenolic products yield, the optimal condition was 200?, 4 h and lignin to BnMIMCl mass ratio of 1:10.

Presenter: **Man JIANG, Southwest Jiaotong University, School of Materials Science and Engineering, Chengdu, P.R. CHINA**

Presenter's biography:

Dr. jiang Man is now an associate professor of South West Jiaotong University of Chinese. After obtained her Ph.D degree in chemistry, she had began to devote to the field of utilization of agriculture residue based on isolation of its` three main components.

By now, isolation of straw cellulose has been realized in at least three environment protective ways efficiently, and the main idea of the ways is based on the degradation and then getting out hemicelluloses followed by attraction of cellulose or dissolution of lignin selectively. In very recent time, development of high value added products from the three components and the key scientific problems are being implemented.

In the progress of the research, Dr. jiang Man has published 15 research papers and obtained 2 Chinese authorized patents. The research is now supported by Chinese National Natural Science Fund (51303151) and Sichuan Province Science and Technology plan project (2011GZX0052).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Jiang, South West Jiaotong University, Chengdu, P.R. CHINA
G. Gou, South West Jiaotong University, Chengdu, P.R. CHINA

Session reference: 3BV.4.50

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Crystal-Plane Effect of Ceria on the Activity of Cu/CeO2 for Oxidative Steam Reforming of Methanol

Short introductive summary:

Hydrogen, one of the most interesting alternative energy, is forecasted to become a major source of the energy because it can be produced from renewable sources such as biomass. Methanol is one of the most promising liquid fuels for hydrogen production since it can be produced from biomass and it accounts for additional value of biomass and sustainable energy. In the present work, oxidative steam reforming of methanol (OSRM) reaction is intensively considered in hydrogen production by using catalysts. Moreover, it was reported that not only surface area but also shape and crystal plane of ceria catalyst essentially influenced on catalytic activity. This research has investigated both ceria morphologies and catalytic activity from the OSRM reaction. A single-crystalline was selectively prepared by hydrothermal method at various temperatures from 100 to 200 °C under 6 M NaOH concentrations.

Presenter: **Sivinee PETCHAKAN, The Petroleum and Petrochemical college, Petrochemical technology, Bangkok, THAILAND**

Presenter's biography:

I am a Master's degree student from the Petroleum and Petrochemical college under Chulalongkorn university, Thailand.
I graduated a Bachelor's degree from chemical engineering, King Mongkut's University of Technology North Bangkok.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Petchakan, The Petroleum and Petrochemical college, Bangkok, THAILAND
A. Luengnaruemitchai, The Petroleum and Petrochemical college, Bangkok, THAILAND
S. Wongkasemjit, The Petroleum and Petrochemical college, Bangkok, THAILAND

Session reference: 3BV.4.51
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Preparation of Lignin Blend Beads for the Removal of Hexavalent Chromium Ions

Short introductive summary:

In this study, we propose blending lignin with sericin or alginate for the preparation of beads for the removal of hexavalent chromium ions. Because of low viscosity of lignin, lignin itself cannot be prepared into bead forms. Therefore, we applied sericin or alginate to immobilize lignin into beads. Fabrication methods for sericin/lignin and alginate/lignin will be presented. Further we will present the adsorption capacity of both beads and analyze their adsorption behavior.

Presenter: **Ki Hoon LEE, Seoul National University, Research Institute of Agriculture and Life Sciences, Seoul, REPUBLIC OF KOREA**

Presenter's biography:

2012 Young Scientist Award by The Korean Fiber Society
2014 Excellent Article in “Fibers and Polymers” by The Korean Fiber Society
2014.02-present Institute of Green Bio Science Technology, Head of Planning & Cooperation

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H.W. Kwak, Seoul National University, REPUBLIC OF KOREA
M. Shin, Seoul National University, REPUBLIC OF KOREA
H.C. Woo, Seoul National University, REPUBLIC OF KOREA
H. Yun, Seoul National University, REPUBLIC OF KOREA
K.H. Lee, Seoul National University, REPUBLIC OF KOREA

Session reference: 3BV.4.53
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Establishing a Value Chain for Production of a Platform Chemical and Current Out of Paper Towels

Short introductive summary:

Cellulose waste fermentation - Bioelectrochemical cell - genetically modified microorganisms generate a variety of platform chemicals

Presenter: **Tina KLESSING, Karlsruhe Institute of Technology, Institute for Applied Biosciences, Karlsruhe, GERMANY**

Presenter's biography:

PhD in Karlsuhe (KIT)- "Establishing a value chain for production of a platform chemical and current out of paper towels".
2015: master thesis in the Department of Applied Biology ("Proof of principal analysis for using an microbial fuel cell for the treatment of municipal waste water")

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Klessing, Karlsruhe Institute of Technology - Institute for Applied Biosciences, Karlsruhe, GERMANY
J. Gescher, Karlsruhe Institute of Technology - Institute for Applied Biosciences, Karlsruhe, GERMANY

Session reference: 3BV.4.54

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Integrated Bioconversion of Algal Carbohydrates and Proteins to Liquid Fuels and Intermediate Value Products

Short introductive summary:

A primary challenge for achieving economically viable large-scale algae biomass production lies in the ability to efficiently convert the bulk of the biomass into sustainable commodities and recycle the major nutrients. Under high growth conditions, the dominant biochemical components of algae biomass are proteins and carbohydrates. Recent efforts employing metabolic engineering of microorganisms show considerable promise for achieving bioconversion of high protein biomass to fuels and chemicals. In this work, we demonstrated a process that integrates dilute acid and enzymatic pretreatment of microalgae with serial microaerobic fermentations for high yield bioconversion of algae biomass to C2-C8 alcohols, sesquiterpenes, and remineralized N/P nutrients.

We have demonstrated the flexibility of the technology for other biomass sources and organic waste streams, including algae from wastewater treatment and municipal solid waste in projects funded by the DOE. These applications illustrate the potential national impact for achieving enhanced ROI and increased RIN credits for renewable fuels production.

Presenter: **Mary TRAN-GYAMFI, Sandia National Lab, 08614, Livermore, USA**

Presenter's biography:

Member of Technical Staff in Biomass Sciences and Conversion Technologies at Sandia National Laboratory. My research has been mainly focused on conversion of algal and lignocellulosic biomass, utilizing fungal and engineered bacterial strains to convert biomass to valuable commodities.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Tran-Gyamfi, Biomass Science and Conversion Technologies, Livermore, USA
W. Wu, Biomass Science and Conversion Technologies, Livermore, USA
F. Liu, Biomass Science and Conversion Technologies, Livermore, USA
J.D. Jaryenneh, Biomass Science and Conversion Technologies, Livermore, USA
E. Monroe, Biomass Science and Conversion Technologies, Livermore, USA
B.C. Wu, Biomass Science and Conversion Technologies, Livermore, USA
R.W. Davis, Biomass Science and Conversion Technologies, Livermore, USA

Session reference: 3BV.4.57

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Dunaliella Tertiolecta Microalgae Harvesting using ABS Membranes in Vibratory Filtration

Short introductive summary:

Microalgae as unicellular photosynthetic microorganisms were found to be a promising feedstock for biomass production. They have ability of converting solar energy into chemical products and faster growth rate when compared to plants. Moreover, high content of lipids, carbohydrates and proteins as well as low requirements regarding cultivation conditions allow using microalgae as a material for various industrial purposes. One of the most expensive steps in microalgae processing for industrial use is dewatering. In the biofuel production microalgae harvesting is accounted about 20-30% of total cost of the entire process. Therefore, optimization of this stage in terms of energy consumption and efficiency is strongly recommended. Application of membrane microfiltration/ultrafiltration (MF/UF) is being considered as a proper technique for microalgae dewatering6. However, this method still requires some improvements due to fouling issues and relatively high cost of commercially available membrane materials. This work focuses on application of commercial materials as well as self-prepared acrylonitrile butadiene styrene (ABS) membranes in vibratory filtration Dunaliella tertiol

Presenter: **Monika HAPONSKA, Catalonia Institute for Energy Research / Universitat Rovira i Virgili, Bioenergy and Biofuels Dpt., Tarragona, SPAIN**

Presenter's biography:

.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Haponska, Universitat Rovira i Virgili, Tarragona, SPAIN
E. Clavero, Catalonia Institute for Energy Research, Tarragona, SPAIN
J. Salvadò, Universitat Rovira i Virgili, Tarragona, SPAIN
C. Torras, Catalonia Institute for Energy Research, Tarragona, SPAIN

Session reference: 1CO.1.1
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Micro-Algae Cultivation by Enriched CO2 from Diesel Tri-Generation System with Selective CCS and Direct Biofuel Conversion from Wet Micro-Algae by Super-Heated Methanol Vaper Method

Short introductive summary:

This paper presents a scenario of biofuel production from micro-algae. In the aspect about micro-algae cultivation, it is shown that an enriched CO2 aeration is effective to increase in oil content of micro-algae cell before the harvesting process, and its CO2 is effectively collected by MEA chemical absorption system on the tri-generation system with a diesel engine. In the aspect of process in algal-oil extraction and biofuel production, the super-heated methanol vapor(SMV) method is able to convert directly from wet micro-algae to biofuel, and SMV method has capability to reduce the energy consumption.

Presenter: **Koji YAMANE, University of Shiga Prefecture, Mechanical Systems Engineering Dpt., Shiga, JAPAN**

Presenter's biography:

1988 Received Ph.D from Hokkaido University
1988 Instructor in Kyoto University
1995 Associate Professor in The University of Shiga Prefecture
2001 Visiting Scientist in MIT
2002 Professor in The Univ. of Shiga Prefecture
2015 Dean of School of Engineering
2017 Executive Vice President

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Yamane, The Univ. of Shiga Prefecture, Hikone, JAPAN
K. Kawasaki, The Univ. of Shiga Prefecture, Hikone, JAPAN
S. Iwai, The Univ. of Shiga Prefecture, Hikone, JAPAN

Session reference: 1CO.1.2
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Microalgae Fractionation Into Bioproducts by Steam Explosion and Membrane Filtration

Short introductive summary:

Microalgae, a renewable biomass source of second generation, is in the focus of scientists and companies to be used as biorefinery raw material. However, the implementation of a microalgae biorefinery still requires the development of technologies, especially involving the harvesting and fractionation processes. Search for appropriate pretreatment cell disruption methods for microalgae is essential in order to increase the lipid extraction efficiency and/or to release the carbohydrates and sugars present in the cell. Furthermore, the application of membrane filtration could facilitate the different fractions. The initial experimental results show that the application of acid-catalysed steam explosion technique as a pre-treatment in the fractionation of microalgae allows the disruption of the cellular structure and hydrolises the carbohydrates, making lipids more accessible by solvent extraction. Regarding membrane filtration, membranes with pore size lower than 0.2 micrometers allowed the rejection of almost all the lipids and permitted the permeation of the aqueous phase of hydrolyzed carbohydrates. Following extraction could recover the lipids using less amount of solvent.

Presenter: **Joan SALVADÓ, Universitat Rovira i Virgili, Chemical Engineering Dpt., Tarragona, SPAIN**

Presenter's biography:

.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Lorente, Catalonia Institute for Energy Research, Tarragona, SPAIN
M. Haponska, Universitat Rovira i Virgili, Tarragona, SPAIN
C. Torras, Catalonia Institute for Energy Research, Tarragona, SPAIN
E. Clavero, Catalonia Institute for Energy Research, Tarragona, SPAIN
N. Descarrega, Catalonia Institute for Energy Research, Tarragona, SPAIN
J. Salvado', Universitat Rovira i Virgili, Tarragona, SPAIN

Session reference: 1CO.1.4
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Nutrient Usage in Microalgal Biotechnology: Updates on a Growing Problem and Strategies for Effective Usage

Short introductive summary:

Fertiliser nutrient inputs for microalgal cultivation can have a considerable impact on the economics and environmental sustainability of biomass production, contributing substantially to the uncertainty of the energy balance of cultivation processes. We have empirically explored the effect of varying the media N:P ratio on microalgal biomass production and biochemical composition. P usage could be at least halved (relative to N) while maintaining adequate growth of Nannochloropsis sp.. Furthermore, replacement of inorganic nutrients derived from fertilisers with those obtained from anaerobic digestate effluent was examined and proved to be a successful in decreasing fertiliser input (100% N and 32% P replacement). By employing these strategies, the cost and energy footprint of N and P supply can be reduced by 99% and 98%, respectively ($3 and 0.05 Gj per tonne biomass), compared to scenarios with nutrient requirements predicted by the Redfield Ratio (C106:N16:P1; $195 and 5.3 Gj per tonne biomass). This data has relevance to biomass producers seeking to reduce costs and LCA practitioners as a source of empirical data for assessing nutrient usage in microalgal cultivation.

Presenter: **Joshua MAYERS, Chalmers University of Technoology, Biology and Biological Engineering Dpt., Goteborg, SWEDEN**

Presenter's biography:

Research scientist interested in microalgal biotechnology, biorefinery development and bioenergy in general.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.J. Mayers, Chalmers University of Technology, Goteborg, SWEDEN
E. Albers, Chalmers University of Technology, Goteborg, SWEDEN
K.J. Flynn, Swansea University, UNITED KINGDOM

Session reference: 1CO.1.5
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

A Historical Perspective on Bioenergy Environmental Sustainability in EU Policies

Short introductive summary:

The widely accepted definition of sustainable development calls for a convergence among economic development, social equity, and environmental protection. This is meant to be reflected in the underlying pillars for bioenergy policies and incentives: climate change mitigation, energy security and rural development. With the new 2030 renewable energy policy proposal due to be released by the European Commission in 2016, it is the right time to take stock of the scientific debate around bioenergy sustainability and how this has driven and influenced bioenergy policies.

Our group at the Joint Research Centre has been involved in the debate on biofuels-bioenergy sustainability for many years now. We have often been at the interface between the scientific community, industrial stakeholders and policy makers and we have regularly acted as translators between the actors. With the launch of the Energy Union policy package, we feel it is the right time to present an historical perspective of the scientific and political process that has led to these latest decisions.

Presenter: **Luisa MARELLI, European Commission, JRC, Petten, ITALY**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Marelli, European Commission, JRC, Ispra, ITALY
J. Giuntoli, European Commission, JRC, Petten, THE NETHERLANDS
R. Edwards, European Commission, JRC, Ispra, ITALY

Session reference: 4CO.2.1
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biomass, Land-Use Changes and Environmental impacts: A Qualitative and Quantitative Review of Scientific Literature

Short introductive summary:

The recent development of biomass production for energy purposes has spurred interest in the effects of land-use changes (LUC) worldwide. The processes leading from increased biomass demand to environmental impacts in relation to LUC mays be analysed as a three-step causal chain starting with the identification of drivers, the assessment of LUC occurring in response to these drivers, and the associated environmental impacts. Here, we set out to review literature encompassing this causal chain to examine possible trends in the environmental balance of bio-based value-chains in relation to LUC. A body of 240 references was scrutinized with the following salient features: most articles focused on liquid biofuels, and annual crops, herbaceous species coming second; LUC types primarily involved the conversion of annual crops or grassland to perennial crops, and of grassland to annual crops; 66% of those occurred in Europe and North America; the emissions of greenhouse gases was the first impact category studied, while biodiversity was rarely evaluated. Overall, the substitution of fossile fuels by biofuels was beneficial, but a significant fraction concluded to the opposite.

Presenter: **Benoit GABRIELLE, AgroParisTech - INRA, Functional Ecology of Agro-Ecosystems Dpt., Thiverval-Grignon, FRANCE**

Presenter's biography:

Benoît GABRIELLE is currently a full professor in environmental biophysics with AgroParisTech (a Paris-based agriculture and forestry university), and affiliated with the French national institute of agricultural research (INRA). His research foci include biomass supply from energy crops.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Gabrielle, AgroParisTech, Thiverval-Grignon, FRANCE
A. Bispo, ADEME, Angers, FRANCE
M. El Akkari, INRA, Paris, FRANCE
D. Makowski, INRA, Thiverval-Grignon, FRANCE
O. Réchauchère, INRA, Paris, FRANCE
L. Bamière, INRA, Thiverval-Grignon, FRANCE
A. Barbottin, INRA, Thiverval-Grignon, FRANCE
V. Bellassen, INRA, Dijon, FRANCE
C. Bessou, CIRAD, Montpellier, FRANCE
P. Dumas, CIRAD, Montpellier, FRANCE
S. Gaba, INRA, Dijon, FRANCE
J. Wohlfahrt, INRA, Mirecourt, FRANCE

Session reference: 4CO.2.2
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Benefits of a Causal Analysis Framework to Inform Land-Use Change Modeling in the Context of Bioenergy

Short introductive summary:

A causal analysis framework was proposed to increase understanding of land-use change (LUC) and reliability of LUC models. This health-sciences-inspired framework can be applied in the context of bioenergy. Estimates of indirect LUC (ILUC) for bioenergy rely on economic simulation models that focus on specific causal pathways involving global commodity trade and use coarse land-cover data with simple land classification systems. The proposed framework begins with a definition of the change that has occurred and proceeds to a strength-of-evidence approach that includes plausibility of relationship, completeness of causal pathway, spatial co-occurrence, time order, analogous agents, simulation model results, and quantitative agent–response relationships. We discuss how LUC may be allocated among probable causes for policy purposes and how the application of the framework has the potential to increase the validity of LUC models and resolve controversies about ILUC, greenhouse gas emissions, and biofuels. Examples related to deforestation and grassland transitions are discussed.

Presenter: **Hans LANGEVELD, Biomass Research, Bennekom, THE NETHERLANDS**

Presenter's biography:

Over 25 years of experience in analysing and modeling of sustainable cropping systems, land use practices and renewable energy. Background in agronomy, soil science, communication science and development economics; specialised in sustainable land use and bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.A. Efroymson, Oak Ridge National Laboratory, Oak Ridge, USA
K.L. Kline, Oak Ridge National Laboratory, Oak Ridge, USA
A. Angelsen, Norwegian University of Life Sciences, As, NORWAY
P.H. Verburg, VU University Amsterdam, Amsterdam, THE NETHERLANDS
V.H. Dale, Oak Ridge National Laboratory, Oak Ridge, USA
J.W.A. Langeveld, Biomass Research, Wageningen, THE NETHERLANDS
N. Singh, Oak Ridge National Laboratory, Oak Ridge, USA

Session reference: 4CO.2.3
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Brazilian Sugarcane Expansion and Deforestation

Short introductive summary:

In Brazil, the sugarcane ethanol is the most important biofuel and its production increased in the last years, going from 4.3 to 10.1 million of harvested hectares in 1990-2015 period, with more intense growth in the 2000s. This sugarcane expansion has generated land use changes in Brazilian territory and deforestation is one of the most important topics in bioethanol sustainability. The Brazilian Forest Code has been recently updated and, there are some controversial questions about its effectiveness in prevent deforestation, especially related to an amnesty clause for the deforestation occurred before the year of 2008. This study aims to quantify, using satellite data and analysis, the direct deforestation caused by sugarcane expansion in Atlantic Forest and Cerrado, considering a period of intense sugarcane expansion, from 2002 to 2008. The direct deforestation quantified in this period also allowed to address deforestation area lost by the amnesty clause of the Forest Code concerning sugarcane expansion. Results showed a minor sugarcane expansion over natural vegetation, achieving 80 hectares of deforest.

Presenter: **Manoel Regis LEAL, CTBE - Brazilian Bioethanol Science and Technology Laboratory, Industry Division, CAMPINAS, BRAZIL**

Presenter's biography:

Dr. Manoel Regis Lima Verde Leal is a Researcher at the Industry Division of CTBE – Brazilian Bioethanol Science and Technology Laboratory/ CNPEM – Brazilian Research Center for Energy and Materials. His work is focused on the sugarcane bioenergy developments.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D.G. Duft, CTBE, Campinas, BRAZIL
T.A.D. Hernandes, CTBE, Campinas, BRAZIL
M.R.L.V. Leal, CTBE, Campinas, BRAZIL

Session reference: 4CO.2.4
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Hydrogen Production from Biomass via Gasification Process: The Results of the EU UNIfHY Project

Short introductive summary:

UNIfHY is a EU collaborative project funded under the FCH-JU. It stands for “UNIque gasifier for HYdrogen production” and involved 9 partners from 4 Member States (France, Germany, Italy and The Netherlands). Fitting into the European 2020 Energy Strategy which requires all EU countries to advance the use of renewable energy, and particularly to achieve a 10% share of renewable energy in the transport sector, UNIfHY developed thermochemical H_2 production process from various biomass feedstocks. The project is based on the utilization of plant components of proven performance and reliability to obtain a continuous process for H_2 production. Based on the data collected, LCA, evaluation of H_2 production cost and possible exploitation of the project results were finally carried out demonstrating that UNIfHY can reach economic production cost 3-10 €/Kg (within 4-0.04 t H_2/day sizes respectively) with low environmental impacts 0.0134 kg CO_2 per 1MJ H_2 produced (depending on feedstock) but targets have to be different for decentralised and centralised production. In the present contribution a comprehensive assessment of the project achievements will be presented and critically discussed.

Presenter: **Pier Ugo FOSCOLO, University of L’Aquila, Industrial Engineering Dpt., L’Aquila, ITALY**

Presenter's biography:

CV P.U. Foscolo
Born in Rome, Italy, November 24, 1948, married, two children, MEng in Chemical Engineering (1972).
Professor in Chemical Reaction Engineering (since 1989; University of L’Aquila, I), Associate Professor (1983 - 1989), Research Associate (1980 – 1982 - University College London, UK)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Barisano, ENEA, Rotondella, ITALY
E. Bocci, Guglielmo Marconi University, Rome, ITALY
P.U. Foscolo, University of L'Aquila, ITALY
S. Heidenreich, Filtersystems GmbH Werk Schumacher, Crailsheim, GERMANY
M. Rep, HYGEAR, Arnhem, THE NETHERLANDS
C. Courson, University of Strasbourg, FRANCE
J. Cornish, EPC, Herten, GERMANY
G. Braccio, ENEA, Rotondella, ITALY

Session reference: 3CO.3.1
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

CO Hydrogenation to Alcohols over SBA-15 Supported Fe, Co, and Cu: Binary vs Ternary Catalysts

Short introductive summary:

Fischer-Tropsch Synthesis (FTS), currently used to obtain hydrocarbons from syngas, comprises a very complex set of reactions that yield a wide variety of products. An important subset among those products are alcohols, and a novel field of study of this classical reaction involves its tuning towards the production of higher alcohols (C2+-OH). The present work aims to adapt classic FTS catalysts – based on Fe and Co as active components – towards the production of higher alcohols. Cu has also been considered as a potential component because of its activity towards methanol synthesis. Binary catalysts were synthesized to ascertain the effect of each metal on conversion of CO and selectivity towards alcohols. A ternary catalyst was also prepared to determine any possible synergistic effects between the three metals. Our results suggest that tuning of metallic loading can have interesting effects on the performance of catalysts towards higher alcohol synthesis.

Presenter: **Jordi PLANA-PALLEJÀ, Universitat Rovira i Virgili, Chemical Engineering Dpt., Tarragona, SPAIN**

Presenter's biography:

I am a third year Ph.D. student at Universitat Rovira i Virgili, in Tarragona. I am studying methods of production of higher alcohols from syngas, using modified Fischer-Tropsch synthesis. I have a degree in Chemical Engineering, as well as a Master in Nanoscience and Nanotechnology.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Plana-Pallejà, Universitat Rovira i Virgili, Tarragona, SPAIN
C. Berrueco, Catalonia Institute of Energy Research (IREC), Tarragona, SPAIN
D. Montané, Universitat Rovira i Virgili, Tarragona, SPAIN
S. Abelló, Catalonia Institute of Energy, Tarragona, SPAIN

Session reference: 3CO.3.2
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Chars from Thermo-Chemical Conversion Technologies: Physical and Chemical Characteristics and Their Behavior in Soils

Short introductive summary:

A literature review of the physical and chemical characteristics of chars produced from hydrothermal carbonization and pyrolysis is presented. A particular focus is placed on the behaviour of these carbonaceous solid products, when allpied as soil conditioners and amendant in soils.

Presenter: **Daniele BASSO, HBI, Rovereto (TN), ITALY**

Presenter's biography:

Daniele Basso (eng., Ph.D.) is the CEO and Founder of an innovative start up with social vocation called HBI S.r.l.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Basso, HBI S.r.l., Rovereto, ITALY
D. Wuest, University of Hohenheim, Stuttgart, GERMANY
A. Kruse, University of Hohenheim, Stuttgart, GERMANY

Session reference:	3CO.3.3
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Improvement of the Agronomic Properties of Poor Soils After Amendment of Biochar Produced by the Pyrolysis of Thick Fraction Pig Manure

Short introductive summary:

The storage of pig manure has an impact on the quality of the air, the groundwater and surface water because of the release of NH3, N2O and volatile organic compounds and has an odour nuisance. Pyrolysis as thermochemical conversion method for pig manure entails several benefits such as: a shorter conversion time, the absence of non-biodegradable and toxic substances destroying pathogens that can be found in manure and the conversion to value-added products: biochar, bio-oil and biogas. The produced fertilizer-like biochar is thus suitable as an alternative to present chemical fertilizers due to the high concentrations of N, K and P and has beneficial effects as carbon sequester and soil amendment acting as improver of soil quality and crop productivity. Additional, available heavy metals are immobilised in the biochar and not leachable.

Presenter: **Jens MAGGEN, Hasselt University, Applied and Analytical Chemistry Dpt., Diepenbeek, BELGIUM**

Presenter's biography:

PHD Researcher
Hasselt University, Diepenbeek
September 2013 – Present
President
Youth Division of the Royal Flemish Chemical Society (Jong-KVCV)
August 2014 – Present
Master Thesis
Imec, Leuven
September 2012 – June 2013
Internship
Imec, Leuven
February 2012 – June 2012

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Maggen, Hasselt University, Diepenbeek, BELGIUM
R. Carleer, Hasselt University, Diepenbeek, BELGIUM
J. Yperman, Hasselt University, Diepenbeek, BELGIUM
S. Schreurs, Hasselt University, Diepenbeek, BELGIUM

Session reference: 3CO.3.4
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sustainable Redesign of BPA-based Polymers via Strategic Assemblies of Wood-derived Building Blocks

Short introductive summary:

Bisphenol A (BPA)-based polymers are utilized ubiquitously in today's society as the bisphenolic structure of BPA provides molecular rigidity and toughness to polymer networks resulting in outstanding thermal and mechanical performance. However, the use of BPA in polymers has received a great deal of scrutiny because BPA is a known endocrine disruptor. Human exposure from polymers occurs through leaching of BPA from resins and food and beverage can coatings, thus, driving the search for suitable alternatives that are both renewable and nontoxic. Fortunately, governments, academia, and the private sector are making significant strides in supplying society with biofuels and wood-derived building blocks (xylochemicals) from biomass processed in second-generation lignocellulosic biorefineries. The strategic and efficient utilization of xylochemicals for polymers, including replacing BPA-based polymers, is imperative to transforming our society from a largely hazardous, petroleum-based, linear economy to a safer, renewable-based, circular economy. In this paper, we present our work on fundamentally understanding the processing-structure-property-toxicity relationships of epoxy resins, vinyl ester resins, polycarbonates, and polyesters based on xylochemicals that are BPA-free

Presenter: **Joseph STANZIONE, Rowan University, Chemical Engineering Dpt., Glassboro, USA**

Presenter's biography:

Joseph Stanzione, III is an assistant professor of chemical engineering at Rowan University (New Jersey, USA). His main research interest is in the utilization of building blocks derived from biomass in the development of polymers, polymer additives, and composites.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Stanzione, Rowan University, Glassboro, USA
G. Palmese, Drexel University, Philadelphia, USA
J. Sadler, Army Research Laboratory, Aberdeen Proving Ground, USA
J. La Scala, Army Research Laboratory, Aberdeen Proving Ground, USA

Session reference:	3CO.3.5
Subtopic:	3.7 Production and application of biobased chemicals
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Demand-Driven Biogas Production in Full-Scale by Model Predictive Feed Control

Short introductive summary:

For future energy supply systems with high proportions of renewable energy sources biogas plants are a promising option. They have the potential to supply demand-driven electricity to compensate the divergence between energy demand and supply by uncontrolled sources like wind and solar power. So far biogas plants have been designed to produce a stable and constant energy output. The major aim of the presented investigation was to proof the general flexibility of the anaerobic processes under full scale conditions for an energy output according to the grid demand. A model predictive control (MPC) was developed to predict feeding sequences to fulfill a demand-driven utilization timetable and react effectively to alterations. Full-scale experiments showed a high flexibility in the gas production and high process resilience towards pulse feeding. Depending on the used substrates the necessary gas storage demand could be reduced by more than 60 % compared to the common constant feeding operation. The flexibilization of existing biogas plants can contribute substantially to balance demand and production within the future energy system.

Presenter: **Eric MAUKY, DBFZ-German Biomass Research Centre, Biochemical Conversion Dpt., Leipzig, GERMANY**

Presenter's biography:

Eric Mauky is since 2008 Research associate at the DBFZ - Deutsches Biomasseforschungszentrum gemeinnützige GmbH and since 2013 Doctoral student at the University of Rostock.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Mauky, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
S. Weinrich, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
H.F. Jacobi, Hessian State Laboratory, Gießen, GERMANY
J. Liebetrau, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
M. Nelles, DBFZ-German Biomass Research Centre, Leipzig, GERMANY

Session reference:	5CO.4.1
Subtopic:	5.2 Bioenergy and grid balancing
Topic:	5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

GIS-based Optimization Model for the Smart Design of a Nationwide Bio-SNG Production System for Ireland

Short introductive summary:

Seven European gas transmission system operators, including Gas Networks Ireland (GNI), have signed a joint declaration proclaiming the aim to establish a 100% CO_2-neutral gas supply by 2050. The production of bio-SNG through a nationwide gasification and methanation (GaM) systems can constitute the basis of renewable gas production from indigenous biomass. Previous studies showed the potential of biomass in the Republic of Ireland but the low energy content and scattered distribution of the resources require smart design to abate costs and emissions.
This work presents a geographical information system (GIS) based model optimization of GaM system supply chain for tactical (annual) and strategic (multi-year) decision-making, whose aim is to minimize the marginal cost and operational CO_2 emissions of bio-SNG supply and production. The supply chain is designed considering biomass harvesting/collection, transport, pre-treatment, gasification, gas cleaning and upgrading, and injection into the gas grid.

Presenter: **Alessandro SINGLITICO, National University of Ireland, College of Engineering and Informatics, Galway, IRELAND**

Presenter's biography:

Alessandro Singlitico got his Master Degree in Energy Engineering at the Politecnico di Milano (Italy) in 2014. Since 2015 is working on his PhD at National University of Ireland Galway, researching on a life cycle assessment of bio-SNG production via a nationwide system of gasification in Ireland.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Singlitico, National University of Ireland, Galway, IRELAND
I. Kilgallon, Gas Networks Ireland, Cork, IRELAND
J. Goggins, National University of Ireland, Galway, IRELAND
R.F.D. Monaghan, National University of Ireland, Galway, IRELAND

Session reference:	5CO.4.2
Subtopic:	5.2 Bioenergy and grid balancing
Topic:	5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Concept and Practical Implementation of Integrated Flexible Biogas-Intermittent RE-Battery Storage for Reliable and Secure Power Supply to Meet Actual Load Demand at Optimal Costs

Short introductive summary:

A practical implementation of flexible biogas with an intermittent renewable energy source and an energy storage in a virtual power plant (VPP) is shown. It provides reliable and secure power supply, and coversdifferent load schemes regarding varying electricity prices. Methods applied were building a VPP, and developing a power management system (PMS) for theVPP. PMS is based on an agent-concept, the optimization algorithms are based on linear programming. Sensitivity analysis of different load schemes is done for different market integration approaches. The results show that electricity from RES combined in a VPP delivers a secure power supply on low costs, when optimally integrated to energy markets e.g. futures market. It is also shown that the average optimized costs are influenced depending on the share of adjustable components (biogas, battery), e.g. in winter costs are higher due to less PV power.

Presenter: **Dodiek Ika CANDRA, Hochschule Aschaffenburg, Engineering Science Dpt., Aschaffenburg, GERMANY**

Presenter's biography:

Dodiek currently works on a Virtual Power Plant project in cooperation between the Hochscule Aschaffenburg and the University of Rostock. His specializations are power plant optimization and renewable energy application in developing countries.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D.I. Candra, University of Applied Sciences Aschaffenburg, GERMANY
K. Hartmann, University of Applied Sciences Aschaffenburgrg, GERMANY
M. Nelles, University of Applied Sciences Aschaffenburg, GERMANY

Session reference: 5CO.4.3
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Showcase Biocat: Balancing the Electricity Grid with the Gas Grid Via Biological Methanation

Short introductive summary:

Renewable electricity production is environmentally friendly but due to its volatile electricity generation profile grid balancing is a challenge. Electrochaea’s BioCat project in Copenhagen, Denmark shows that the electricity grid can be balanced very well by using the gas grid, and both benefit. In the BioCat project electricity and biogas from a waste water treatment plant will be upgraded to biogas by biological Power-to-Gas that can be injected to the national gas grid. Thus, surplus energy can be utilized while stabilizing the electricity grid at the same time by using the good buffer abilities of the local gas grid.

Presenter: **Doris HAFENBRADL, Electrochaea, Planegg-Steinkirchen, GERMANY**

Presenter's biography:

Doris joined Electrochaea as CTO after 19 year of working in biotech and pharmaceutical industry. Doris dedicated her doctoral research in mircobiology to the study of hyperthermophilic archaea in the laboratory of Prof. Dr. Karl Stetter at the Archaea Centre at the University of Regensburg.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Hafenbradl, Electrochaea, Planegg-Steinkirchen, GERMANY

Session reference:	5CO.4.4
Subtopic:	5.2 Bioenergy and grid balancing
Topic:	5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

The Potential Role of Waste Biomass in the Future Urban Electricity System

Short introductive summary:

The share of intermittent renewable electricity (IRE) in the future urban electricity system is expected to increase significantly. Sufficient back-up capacity is needed in the period when IRE output is low. Bioenergy is both dispatchable and carbon-neutral, and can hence be a promising option to back up IRE. The objective of this study is to explore the potential of urban waste biomass in backing up IRE in an urban electricity system. An urban electricity system model is developed to project future electricity generation configurations for cities. Given the projected electricity generation configuration, the potential demand for bioenergy as back-up capacity is estimated by simulating hourly electricity demand and the supply of IRE for a whole year. The estimated potential demand for bioenergy is then compared with the potential supply of bioenergy from the urban waste stream. The complementarity of wind and solar energy is found to be able to reduce the demand for back-up capacity from bioenergy. Bioenergy storage as a buffer is found to be necessary due to the monthly fluctuations in both the supply and demand
of waste biomass.

Presenter: **Yu JIANG, Wageningen University, Biobased Chemistry and Technology Dpt., Wageningen, THE NETHERLANDS**

Presenter's biography:

Yu Jiang is a PhD student at Wageningen University & Research in the Netherlands. He has a background in Environmental and Resources Economics. His research interests lie in the field of energy system modelling and bioenergy policy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y Jiang, Wageningen University & Research, Wageningen, THE NETHERLANDS
E van der Werf, Wageningen University & Research, Wageningen, THE NETHERLANDS
E.C van Ierland, Wageningen University & Research, Wageningen, THE NETHERLANDS
K.J Keesman, Wageningen University & Research, Wageningen, THE NETHERLANDS

Session reference:	5CO.4.5
Subtopic:	5.2 Bioenergy and grid balancing
Topic:	5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Chemical Analysis of Soybean Methyl ester (SME) as Biodiesel

Short introductive summary:

Present research paper is related to making Soybean Methyl Ester as Biodiesel in Iran. In this case SME was made by transesterification of raw soybean oil. SME's properties were teste and compare with conventional diesel fuel in Iran.

Presenter: **Hamid MASHHADI, Islamic Azad University-Arak Branch, Biosystem Engineering Dpt., Arak, IRAN**

Presenter's biography:

I am faculty member of Arak Islamic Azad University as the most nongovernmental universities of Iran since 1999. I have been attendance in a lot of international conference related to Agricultural Machinery and Energy. The most of my activity are about biodiesel and renewable energy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Mashhadi, Islamic Azad University-Arak Branch, Arak, IRAN
M. Mohsenifar, Islamic Azad University-Dezful Branch, Dezful, IRAN

Session reference: 3CV.1.4

Subtopic: 3.3 Oil-based biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Blends of Pyrolysis Oil and Crude Glycerin

Short introductive summary:
A study about physical-chemical properties of homogeneous blends of pyrolysis oil and glycerin.

Presenter: **Lucas COSTA, UNICAMP, Energy Dpt., Paulínia - SP, BRAZIL**

Presenter's biography:
Lucas Costa is a physicist with master’s degree in Mechanical Engineering obtained at Unicamp, Brazil, studing pyrolysis of bio-oils. Since August 2013 he's been continuing his studies in this area as PhD student advised by Prof. Dr. Caio Glauco Sánchez.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
L.F.C. COSTA, UNICAMP, CAMPINAS, BRAZIL
C.G. SÁNCHEZ, UNICAMP, CAMPINAS, BRAZIL

Session reference: 3CV.1.5
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Subcritical Thermal Liquefaction of Process Rejects of a Wastepaper-based Paper Mill Using Waste Soybean Oil and Ethanol as Solvents for Bio-fuel Production

Short introductive summary:

In this study, the feasibility of applying the subcritical thermal liquefaction (STL) technique in the co-utilization of process rejects of a wastepaper-based paper mill (PRWPM) with the organic wastes from waste soybean oil (WSO) and ethanol as STL solvent for the production of high quality bio-fuels was addressed. The details about the experimental conditions as well as the compositions of bio-fuels are important for a better understanding of the bio-waste STL pathways in liquefaction media.

Presenter: **Je-Lueng SHIE, National I-Lan University, Environmental Engineering Dpt., I-Lan, TAIWAN**

Presenter's biography:

Prof. Shie now is a distinguished professor at the Department of Environmental Engineering, National I-Lan University, Taiwan. Publications include 81 articles in scientific journals (including 62 SCI journals), 108 articles in conference proceedings, 37 reports, and 5 patents until 2016.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Je-Lueng Shie, National I-Lan University, Yi-Lan, TAIWAN

Session reference: 3CV.1.7

Subtopic: 3.3 Oil-based biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Copper Ferrite Spinel Oxide Catalysts for Methanolysis of Palm Oil

Short introductive summary:

Copper ferrite spinel oxide (CuFe2O4) samples with calcination temperatures ranging from 500 to 900 oC were synthesized using the sol-gel combustion method. Each calcined sample was further characterized and carefully analyzed for its structure, morphology, porosity, magnetic property and reducibility. For the first time, the catalytic performance of the ferrite spinels was employed in palm oil methanolysis. The characterization results revealed that the major part of the active species was divalent ions of Cu2+ and Fe2+ and that they played a crucial role in the activity of the considered spinel catalysts. The catalytic behaviors strongly depended on the crystallinity of spinel structures and operating parameters, such as the catalyst loading and methanol to oil molar ratio. The CuFe2O4 calcined at 700 oC was the most active and selective for methanolysis with palm oil. No activity decline was observed over the catalyst after it was reused for 5 cycles without any post-treatment. Easy and effective catalyst separation could be obtained when magnetization was applied to the magnetic spinel catalysts.

Presenter: **Kajornsak FAUNGNAWAKIJ, National Science and Technology Development Agency, National Nanotechnology Center, Pathumthani, THAILAND**

Presenter's biography:

Dr. Faungnawakij is a principal researcher at NANOTEC, Thailand. He has published 70 articles (h-index=22), and filed 30 patents on his research on biomass&biofuel. He has received prestigious awards; National Young Scientist Award 2011, Wiley-CST Award for Contribution to Green Chemistry 2012.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Luadthong, National Nanotechnology Center, Pathuntani, THAILAND
P. Khemthong, National Nanotechnology Center, Pathuntani, THAILAND

Session reference: 3CV.1.10

Subtopic: 3.3 Oil-based biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

An Alternative Process for CO2 Separation by IL Based Chemical Absorption

Short introductive summary:

State-of-the-art of the major biogas upgrading step is the CO2 separation, which is often done by chemical absorption equipped with aqueous amine solutions. The major disadvantages of these solvents are their high thermal energy demand for CO2 desorption at a high temperature level. Applying ionic liquids for the removal of CO2 from gas streams is discussed in science ever since the substances gained public attention in early 21st century. But, by now they have not yet reached a breakthrough in absorption processes due to several weaknesses.
The R&D on CO2 separation at DVGW-EBI does not only focus on improving the solvent or its chemistry but on adapting the separation process itself for exploiting the advantages of ionic liquids and compensating for their disadvantages. With the alternative setup and the proposed operating concept, the major disadvantages of ionic liquids (e.g. too high solvent viscosity, slow mass transfer, etc.) can be overcome. The ionic liquids based CO2 separation process as proposed by DVGW-EBI is able to reduce the energy demand of biogas upgrading by more than 50 % and could therefore be a reasonable alternative for commercial CO2 separation processes.

Presenter: **Markus ROSCHITZ, DVGW Research Centre, Karlsruhe, GERMANY**

Presenter's biography:

From 2006 to 2009 vocational training as laboratory assistant at the former research center karlsruhe (now KIT Campus North)

From 2009 to 2015 studies in chemical engineering with master of science as graduation

Since 2015 working as project engineer at the German Association for Gas and Water

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Ortloff, DVGW Research Center at EBI, Karlsruhe, GERMANY
M. Roschitz, DVGW Research Center at EBI, Karlsruhe, GERMANY
F. Graf, DVGW Research Center at EBI, Karlsruhe, GERMANY
T. Kolb, KIT, Engler-Bunte-Institute, Karlsruhe, GERMANY

Session reference: 3CV.1.14

Subtopic: 3.4 Biomethane

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biogas Upgrading by Chemical Absorption with Amino Acid Salt Solutions

Short introductive summary:

One possibility to increase the efficiency of biogas plants is to upgrade the biogas and fed it into the national gas grid. In order to maintain the required quality, the contained carbon dioxide must be separated. Scrubbing with amines in an absorber column is one way to remove carbon dioxide and is considered as state-of-the-art. Commonly used amines are produced on crude oil base.
Laboratory results have shown that aqueous solutions of selected amino acid salts are promising prospects as alternative solvents. Amino acids are natural products and non-toxic.
These alternative solvents were investigated in an existing technical scale scrubber plant and the results are compared with commercial used solvents regarding their stability, deposition rate and energy consumption.

Presenter: **Marc Oliver SCHMID, University Stuttgart, Institute of Combustion an Power Plant Technology, Fuels and Flue Gas Cleaning Dpt., Stuttgart, GERMANY**

Presenter's biography:

vocational training as an energy electronics
study Environmental Engineering at Hochschule Esslingen
and Energy Technologies at University Stuttgart
since 2015: research scientist at Institute of Combustion an Power Plant Technology
main focus in CO2 capture technology and biogas upgradin

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.O. Schmid, Institute of Combustion and Power Plant Technology, University of Stuttgart, Stuttgart, GERMANY
B. Klein, Institute of Combustion and Power Plant Technology, University of Stuttgart, Stuttgart, GERMANY
G. Scheffknecht, Institute of Combustion and Power Plant Technology, University of Stuttgart, Stuttgart, GERMANY

Session reference: 3CV.1.16
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biogas For Internal Combustion Engines (South Africa)

Short introductive summary:

Methane is the important component in biogas, as it is a highly flammable gas that can be utilised as a fuel in internal combustion engines. This is achieved after the purification and upgrading of biogas to bio-methane through scrubbing of the biogas. The bio-methane is compressed and stored before it is fed into a modified and tuned petrol engine. In this research, a modified and tuned Toyota 4Y engine was used. The efficiency of the biogas powered engine was then compared to that of the petrol powered engine.

Presenter: **Patrick MUKUMBA, University of Fort Hare, Physics Department, Alice, SOUTH AFRICA**

Presenter's biography:

I am a renewable energy specialist, focusing mainly on biogas technology and wind energy. Currently, I am a renewable energy researcher at university of Fort Hare, South Africa.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Mukumba, University of Fort Hare, Alice, SOUTH AFRICA
G. Makaka, University of Fort Hare, Alice, SOUTH AFRICA
S. Mamphweli, University of Fort Hare, Alice, SOUTH AFRICA
A. Mutungwazi, University of Fort Hare, Alice, SOUTH AFRICA

Session reference: 3CV.1.17
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Model-Based Techno-Economic Assessment of Partially Upgraded Biogas and the Decentralized Utilization for Mobility in Agriculture

Short introductive summary:

The aim of the study is to provide a model based assessment system of the production, storage, and decentralized utilization of partially upgraded biogas as tractor fuel. In contrast to common upgrading systems, the methane enrichment is reduced to a certain extent enabling a suitable combustion process operating the vehicle engine.
Based on available technologies determined by an extensive market research, upgrading, storage and fuelling concepts are developed and evaluated taking the technical and economic feasibility into account. The evalua-tion includes model based investigations of several processes for the upgrading and storage system. An overall model summarising the process-related design, peripheral sub-processes, safety requirements and economic analysis, conceived as an evaluation tool represents the key purpose of the research project.
The validation of the simulation results regarding the estimation of the methane enrichment process is performed via laboratory scaled experimental studies.

Presenter: **Abdessamad SAIDI, Technische Hochschule Ingolstadt, Institute of New Energy Systems, Ingolstadt, GERMANY**

Presenter's biography:

Since 04/2016
Research Assistant, Technische Hochschule Ingolstadt
11/2014 - 02/2016
Research Assistant, Graz University of Technology
02/2014 - 08/2014
Graduant,Rolls-Royce Power Systems AG
11/2007 - 09/2014
Degree in Mechanical Engineering, University of Duisburg-Essen

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Saidi, Institute of new Energy Systems, Technische Hochschule Ingolstadt, Ingolstadt, GERMANY
M. Beringer, Regineering GmbH, Denkendorf, GERMANY
M. Sonnleitner, Institute of new Energy Systems, Technische Hochschule Ingolstadt, Ingolstadt, GERMANY
U. Männl, Regineering GmbH, Denkendorf, GERMANY
S. Innerhofer, Regineering GmbH, Denkendorf, GERMANY
M. Goldbrunner, Institute of new Energy Systems, Technische Hochschule Ingolstadt, Ingolstadt, GERMANY

Session reference: 3CV.1.18
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Improvements in the Use of Green Sulphur Bacteria for Hydrogen Sulphide Removal

Short introductive summary:

The work presented here is the follow-up of the research carried out on a patented pilot plant called COIL for H2S removal from biogas. The goal of the research is to improve the overall efficiency of the clean-up process, limiting the elemental sulphur encrustations. Furthermore, a biotrickling filter prototype called BLUAY has been used to check the generation of H2 by bacteria is nitrogenase. So trials have been conducted with a different species of green-sulphur phylum Chlorobia, the salty water specie C. phaeovibrioides and the fresh water one C. limicola. Furthermore, consortia of these species with Desulphuromonas acetoxidans have been characterized as well. Modifications led to improvement of coil plant up to 135%.

Presenter: **Luigia LONA, ENEA Research Centre, DTE Dpt., Rome, ITALY**

Presenter's biography:

Graduated with maximum degree mark in biology, currently Ph.d student c/o Enea I'm working about hydrogen sulphide removal.
On this argument I have published two articles and a book chapter.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Lona, ENEA, Roma, ITALY
V. Pignatelli, ENEA, Roma, ITALY
F. Girardi, ENEA, Roma, ITALY
E. Petrucci, Università La Sapienza, Roma, ITALY
A. Aliboni, ENEA, Roma, ITALY
N. Corsaro, ENEA, Roma, ITALY
C. Felici, ENEA, Roma, ITALY
E. De Luca, ENEA, Roma, ITALY

Session reference: 3CV.1.19
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biomethane Utilisation Options: Financial and Environmental Analysis

Short introductive summary:

Biomethane offers greater versatility over raw biogas with regard to displacing carbon intensive processes, such as transport fuel and natural gas grid injection. However, biogas to CHP is a robust process that is less dependent on subsidies than biomethane utilisation. Hence, understanding the financial and environmental tradeoffs, linked with biomethane production instead of biogas to CHP is critical for maximising the uptake of biomethane in the UK.

Presenter: **Alexander LAMOND, University of Nottingham, Faculty of Engineering, Nottingham, UNITED KINGDOM**

Presenter's biography:

I'm a PhD student investigating techno-economic and environmental impacts of biogas utilisation pathways. I studied chemical engineering as an undergraduate, after which I worked and travelled around Australia for a year before accepting the PhD position at the University of Nottingham.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.R. Lamond, University of Nottingham, UNITED KINGDOM
J. Mckechnie, University of Nottingham, UNITED KINGDOM
G.S. Walker, University of Nottingham, UNITED KINGDOM

Session reference: 3CV.1.21
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biogas Blending into the Gas Distribution Grid: The Case Study of a Small Municipality.

Short introductive summary:

A steady state and multi-species thermal-fluid-dynamic model of a gas network is applied to a portion of the Italian distribution network.
The receiving potential capacity of the existing infrastructure is assessed: the maximum allowable percentage of injectable biogas is calculated on a nodal basis, referring to the actual gas network configuration. A fundamental hypothesis on gas quality constraints has been assumed: prescriptions set by UNI/TR 11537:2016 are evaluated on the network as a whole (i.e., after blending the injected gas with grid gas) rather than at the injection point, as prescribed by the current EU legislation. By exploiting the quality-tracking feature of the model, the constraints of quality assessment at the network level are thus relaxed.
Once the blending limit is known for each node, the amount of injectable biogas is calculated accordingly, taking into account the amount of natural gas already flowing through the node itself.
The node with the major injection capability is the designated one for biogas injection and used for the simulation of the case study. Fluid-dynamic aspects of gas blending are described and commented.

Presenter: **Marco CAVANA, Politecnico di Torino, Energy Dpt., Torino, ITALY**

Presenter's biography:

PhD student in Energetics at Polytechnic University of Turin, on integration of the gas network and the electricity grid. I graduated in Energy Engineering (MSc) in Turin in July 2016, with a final project on distributed injection of biogas into distribution grids, developed at Risø DTU (DK).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Cavana, Politecnico di Torino, ITALY
A. Lanzini, Politecnico di Torino, ITALY
P. Leone, Politecnico di Torino, ITALY

Session reference: 3CV.1.22

Subtopic: 3.4 Biomethane

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Brewer’s Spent Grain Valorization Using Phosphoric Acid Pretreatment for Second Generation Bioethanol Production

Short introductive summary:

Brewer’s spent grain constitutes a byproduct of beer making process yearly generated in big amounts and lacking of economic feasible applications. This lignocellulosic residue was characterized and pretreated by dilute phosphoric acid according to a rotatable central composite design to evaluate the effect of phosphoric acid concentration (2-6% w/v) and pretreatment temperature (140-180ºC). The influence of these factors on the hemicellulosic sugar solubilisation and the subsequent enzymatic hydrolysis was evaluated. Optimal pretreatment conditions were determined by maximizing both hemicellulosic sugar recovery in liquids and enzymatic hydrolysis yield.

Presenter: **Inmaculada ROMERO, University of Jaen, Chemical, Enviromental and Material Engineering Dpt., Mancha Real, SPAIN**

Presenter's biography:

Inma Romero is a teacher and researcher at the University of Jaén, Spain. She researches mainly about bioethanol production and other added-value products from lignocellulosic residues (rapeseed straw, olive tree biomass, sunflower stalks and brewer's spent grain).

Co-authors:

I. Romero, University of Jaén, SPAIN
E. Ruiz, University of Jaén, SPAIN
C. Cara, University of Jaén, SPAIN
V. Lorite, University of Jaén, SPAIN
J.A. Rojas, University of Jaén, SPAIN
J.C. López-Linares, University of Jaén, SPAIN
E. Castro, University of Jaén, SPAIN
S. Mussatto, Technical University of Denmark, Lyngby, DENMARK

Session reference: 3CV.1.25
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Effect of the Hydrolysis Pre-treatment of Cachaza for Bioethanol Production

Short introductive summary:

Cachaza is an agro-industrial waste obtained from the sugar cane industry with a high quantity of reducing sugars, owing desirable for ethanol production by fermentation using S. cerevisiae. Due to the complex composition of Cachaza, this waste should be pretreated to recover the highest amount of reducing sugar for the following bioethanol production. Hydrolysis have shown promising results for others agro-industrial wastes. Thus, the aim of this research was to assess the effect of the hydrolysis method that may allow for a higher ethanol concentration during the fermentation process. Cachaza samples were hydrolyzed at three different pH. pH had a significant effect on the ethanol concentration (P0.05), probably due to the formation of side products which affected the fermentation performance. Moreover, the effect of the initial concentration of Cachaza in fermentation was also tested. When 38 wt% of Cachaza was fermented, 7.6 vol% of ethanol was obtained after 48 h, with an ethanol yield of 66%. Higher Cachaza concentrations showed an inhibitory effect that decrease both, the ethanol concentration and the ethanol yield, probably due to the high osmotic pressure of the medium.

Presenter: **Maria GÓMEZ, Universidad de La Sabana, Chemical Engineering Dpt., Bogotá, COLOMBIA**

Presenter's biography:

Chemical Engineer,MSc in Sustainable Energy Engineering, PhD in Energy Technology. Research in energy access for remote areas and renewable energy. Over fourteen years of professional experience in environmental and energy systems performance. Fields of interest:Energy access,Energy and environment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Cobo, Universidad de La Sabana, Bogota, COLOMBIA
N. Sanchez, Universidad de La Sabana, Bogota, COLOMBIA
R. Ruiz, Universidad de La Sabana, Bogota, COLOMBIA
M. Gomez, Universidad de La Sabana, Bogota, COLOMBIA
A. Plazas, Universidad de La Sabana, Bogota, COLOMBIA
J. Vasquez, Universidad de La Sabana, Bogota, COLOMBIA

Session reference: 3CV.1.30
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Using Paddle Dryer Apparatus to Perform Enzymatic Hydrolysis on Steam Pretreated Wheat Straw at High Solids Loading

Short introductive summary:

Experimental data on obtaining sugars via enzymatic digestion from pretreated substrates (steam exploded) containing inhibitors for fermentation. The detoxyficatio is achieved by using a paddle dryer.

Presenter: **Francesco ZIMBARDI, ENEA Research Centre, Energy Technologies Dpt., Rotondella, ITALY**

Presenter's biography:

Graduated in industrial chemistry, fellow at the combustion institute of Naples 4y before joining ENEA a public body depending from the ministry of economy. His current interests are biomass pretreatment for sugar/biofulel production and thermal conversion of biomass by gasification and pyrolysis.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Zimbardi, ENEA, Rotondella, ITALY
V. Viola, ENEA, Rotondella, ITALY
G. Arcieri, ENEA, Rotondella, ITALY
N. Cerone, ENEA, Rotondella, ITALY
M. Carnevale, ENEA, Rotondella, ITALY
V. Valerio, ENEA, Rotondella, ITALY

Session reference:	3CV.1.32
Subtopic:	3.5 Bioethanol and sugars from lignocellulosic biomass
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Alkaline Peroxide Oxidation Pretreatment of Corn Cob And Rice Husks for Bioconversion into Bio-Commodities: Enzymatic Convertibility of Pretreated Corn Cob to Reducing Sugar

Short introductive summary:

Pre-treatment was conducted in an air bath at catalyst to biomass ratio of 1:10. A slurry of the mixture was made by using solutions of hydrogen peroxide of different concentrations. Sodium hydroxide was added to the peroxide solutions to bring the pH of the medium to 11.5 (NaOH loading varied with percent hydrogen peroxide in mixture). Treatment of lignocelluloses with A mixture of slurry was made by adding water at a ratio of 20 g/g dry biomass. Percent H2O2 (volume by volume) in mixtures acted as oxidizing agent.A statistical 23 central composite design was used to develop a statistical model for the optimization of process variables. The CCD contains 20 experiments carried out in duplicate. The three variables chosen were designated as A(Temperature), B(Time), C(% v/v H2O2) each at five coded levels. Data as well as analysis of variance (ANOVA), the regression analysis and the plotting of response surfaces were performed to establish optimum conditions for the hydrolysis with MINITAB 15 statistical software and then interpreted. Application of CCD on the enzymatic process generated a second order polynomial equations for validated reducing sugars yield.

Presenter: **Augustine O. AYENI, University of the Witwatersrand, Chemical Engineering Dpt., Johannesburg, 2000, SOUTH AFRICA**

Presenter's biography:

Augustine O. Ayeni completed his PhD from Covenant University, Ota, Nigeria. He was awarded a postdoctoral fellowship at Wits University, South Africa in 2015. He has published more than 15 papers in reputable journals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Ayeni, University of Witwatersrand, Johannesburg, SOUTH AFRICA
A. Awosusi, University of Witwatersrand, Johannesburg, SOUTH AFRICA
M. Daramola, University of Witwatersrand, Johannesburg, SOUTH AFRICA

Session reference: 3CV.1.34
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Bottlenecks in Lignocellulosic Ethanol Production: Xylose Fermentation and Cell Propagation

Short introductive summary:

We propose a model propagation strategy for evaluating physiology of yeast cultures during propagation for the improvement of simultaneous saccharification and co-fermentation processes.

Presenter: **Marlous VAN DIJK, Chalmers University of Technology, Industrial Biotechnology Dpt., Göteborg, SWEDEN**

Presenter's biography:

I have a background in fermentation technology and microbial physiology. Currently I am studying yeast physiology during lignocellulosic ethanol production processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. van Dijk, Chalmers University of Technology, Göteborg, SWEDEN
L. Olsson, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 3CV.1.36

Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Study on the Requirement of Nitrogen Sources by Scheffersomyces Stipitis NRRL Y-7124 to Produce Ethanol from Xylose Based-media

Short introductive summary:

This study aimed at evaluating the requirement of nitrogen sources by the yeast Scheffersomyces stipitis NRRL Y-7124 to produce ethanol from xylose based-media. Different nitrogen sources were evaluated, which were used to supplement a defined xylose-based medium and also the hemicellulosic hydrolysate produced from rice straw. Interesting results were achieved, which revealed that it is important to add nitrogen sources to the medium to achieve efficient ethanol production by this yeast strain. However, from rice straw hydrolysate medium, the nitrogen supplementation was not necessary, suggesting that this hydrolysate contains enough nitrogen source to provide an efficient xylose conversion to ethanol.

Presenter: **Solange MUSSATTO, Technical University of Denmark, Novo Nordisk Foundation Center for Biosustainability, Kongens Lyngby, DENMARK**

Presenter's biography:

Solange Mussatto is Head of a Research Group at the Technical University of Denmark. She has over 18 years of expertise in the areas of Biomass Pretreatment and Fermentation Technology with focus on the development of processes for a sustainable conversion of biomass into bio-based products.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L.M. Carneiro, Department of Chemical Engineering, Engineering College of Lorena, University of São Paulo, Lorena / SP, BRAZIL
I.C. Roberto, Department of Biotechnology, Engineering College of Lorena, University of São Paulo, Lorena / SP, BRAZIL
S.I. Mussatto, Novo Nordisk Foundation Center for Biosustainability, Technical University of Denmark, Kongens Lyngby, DENMARK

Session reference:	3CV.1.37
Subtopic:	3.5 Bioethanol and sugars from lignocellulosic biomass
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Evaluation Of A Pilot-Scale Continuous Tubular Reactor For Pretreatment Of Agave Bagasse.

Short introductive summary:

Bioethanol production from lignocellulosic residues is usually affected by inhibitory compounds (organic acids, phenolic compounds and furaldehydes). The inhibitor compounds are formed during the pretreatment step; these compounds affect the fermentative process because they disturb the physiology of the yeast [1]. In this study, a pilot-scale continuous tubular reactor (CTR) was evaluated for the pretreatment of agave bagasse (AB), in order to estimate the efficiency on the saccharification and the formation of inhibitor compounds and the final effect on the fermentation process. The CTR includes three main process stages: extrusion, autohydrolysis and steam explosion.

Presenter: **Arturo SANCHEZ, Centro de Investigacion y de Estudios Avanzados del IPN, Bioenergy Futures Laboratory, Zapopan, MEXICO**

Presenter's biography:

(B.Sc. Chem. Eng., 1985; M. Chem. Eng., 1989; Ph.D., 1994). He is currently a Senior Scientist at Cinvestav-Gdl, Mexico. His research interests include advanced biofuels process engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Amaya-Delgado, CIATEJ, Zapopan, MEXICO
A. Sánchez, CINVESTAV-Gdl, Zapopan, MEXICO
J. Nova, CIATEJ, Zapopan, MEXICO
D. Sandoval, CIATEJ, Zapopan, MEXICO
F. Rodríguez, CINVESTAV-GDL, Zapopan, MEXICO

Session reference: 3CV.1.39

Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Butanol Production from Volatile Feedstocks. Development of an Optimized Bioprocess

Short introductive summary:

Our research work is focusing on fluctuating substrate compositions in multifeedstock biorefineries. In my PhD thesis I investigate the influence of fluctuating organic acid and sugar concentrations on solventogenesis during butanol fermentation.

Presenter: **Florian GATTERMAYR, Kompetenzzentrum Holz, WCB Dpt., Linz, AUSTRIA**

Presenter's biography:

PhD-Student

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Gattermayr, Kompetenzzentrum Holz GmbH, Linz, AUSTRIA
V. Leitner, Kompetenzzentrum Holz GmbH, Linz, AUSTRIA
C. Herwig, Technical University Vienna, Wien, AUSTRIA

Session reference:	3CV.1.42
Subtopic:	3.5 Bioethanol and sugars from lignocellulosic biomass
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Lignocellulose - Degradation by Thermophilic Bacteria Isolated from Hot Spring in Southern Thailand

Short introductive summary:

Cellulases is enzyme to hydrolysis steps in the conversion of lignocellulosic biomass to yield bioethanol. Cellulases from thermophiles have attracted attention due to their high thermal and chemical stability to organic solvents, detergents, low and high pH for industrial applications. Hot springs in areas of Southern part has of significant plant biomass-rich sediment resulting high diversity of plant biomass-degrading microorganisms.10 cellulolytic bacteria was isolated. Belong to family Bacillaceae through 16S rDNA sequencing match. All isolates has extracellular enzymes capable to hydrolysis CMC, Avicel, Xylan, Filter paper, Sugarcane and EFB as substrate. Maximum enzyme cellulase activity was found in isolate PK12, the isolate was identified as Geobacillus thermoleovarans. Maximum total cellulase activity was U/ml with containing of 0.133 U/ml Endo-glucanase and 0.0187 U/ml .Exo-glucanase at pH 8 and temperature of 65°C. PK12 has maximum lignocellulase (cellulases and xylanase) production from sugarcane baggase with contain 0.18 U/ml of endo-glucanase, 0.21 U/ml of exo-glucanase and 0.25 U/ml of xylanase after 14 days of incubation.

Presenter: **Apinya SINGKHALA, Thaksin University, Biology Dpt., Phatthalung, THAILAND**

Presenter's biography:

2012 - Present Ph.D. student of Biotecnology program, Thaksin University, Thailand
Field of Specialization; Energy Biotechnology , Microbial Ecology, Thermophilic Bacteria, Molecular Biological Techniques
Publication (1) doi:10.1016/j.ijhydene.2015.03.068 (2) DOI: 10.1016/j.indcrop.2016.11.002

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Singkhala, Thaksin University, Phatthalung, THAILAND
C. Niyasom, Thaksin University, Phatthalung, THAILAND
N. Kare- Birkeland, University of Bergen, Bergen, NORWAY
S. O - Thong, Thaksin University, Phatthalung, THAILAND

Session reference: 3CV.1.51
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Simulation of Flow and Design of Agitated Large-Volume Biorectors

Short introductive summary:

Industrial fermenters are designed as large-volume devices with a volume of several tens of m3 with side-entry impellers. For this reason, experimental modelling of mixing in those batches is very difficult and subsequent scale-up of the obtained results. In the literature, we very often encounter modelling of these processes that the geometric similarity is not entirely keep and particularly the ratio of impeller diameter to vessel diameter. Another manner is the replacement of the modelling impeller, which during maintaining geometric similarity has a very small and during production unattainable diameter, by same directed jet generating same flow as the impeller. Comparison of the adequacy of this replacement on the base of CFD simulations has been done within this study. The results of the CFD simulations have been experimentally verified in the vessel with diameter 1.6 m.

Presenter: **Tomas JIROUT, Czech Technical University in Prague, Process Engineering Dpt., Prague 6, CZECH REPUBLIC**

Presenter's biography:

Professor; Head of department - Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Process Engineering
Research and professional interests: Mixing and mixing equipment; Technology and equipment for biotechnology and biorefinery; Design of equipment

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Jirout, Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Process Engin, Prague, CZECH REPUBLIC
O. Potociar, Czech Technical University in Prague, Faculty of Mechanical Engineering, Department of Process Engin, Prague, CZECH REPUBLIC

Session reference:	3CV.1.52
Subtopic:	3.5 Bioethanol and sugars from lignocellulosic biomass
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biodiesel Production from High Acid Value Waste Cooking Oil Using Supercritical Methanol: Esterification Kinetics of Free Fatty Acids

Short introductive summary:

In this study, low quality waste cooking oil with high total acid value, has been used for biodiesel production. The main factors affecting the reaction has been analysed using Response Surface Methodology (RSM). A quadratic model representing the interrelationships between reaction variables and free fatty acids (FFA) conversion has been developed. Analysis of variance (ANOVA) has been used for checking the significance of the predicted model. Numerical optimisation concluded the optimum conditions for maximum conversion of FFA at methanol to oil (M:O) molar ratio, temperature, pressure and time of 35:1, 260oC, 110 bar and 16 minutes, respectively for 98% conversion. The predicted optimum conditions have been validated experimentally resulting in 97.7% conversion of FFA with 0.3% relative error. Kinetic and thermodynamic data of the esterification reaction has been studied resulting in pseudo first order reaction with reaction rate constant (k) of 0.00103 s-1, activation energy of 34.5 kJ/mol and Arrhenius constant of 1.26 s-1. Finally, a kinetic reaction has been simulated resulting in 97% conversion of FFA with 0.716% relative error from the experimental results.

Presenter: **Omar ABDELAZIZ, Lund University, Chemical Engineering Dpt., Lund, SWEDEN**

Presenter's biography:

Omar Abdelaziz is a PhD Student at the Department of Chemical Engineering, Lund University. His main fields of interest include biorefineries, bioenergy, process simulation & integration and biomass valorisation.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

O. Aboelazayem, London South Bank University, UNITED KINGDOM
M. Gadalla, The British University in Egypt, Cairo, EGYPT
B. Saha, London South Bank University, London, UNITED KINGDOM
O. Abdelaziz, Lund University, SWEDEN
C. Hulteberg, Lund University, SWEDEN

Session reference: 3CV.1.53
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Naturally Derived Heterogeneous Catalyst for Ethyl Esters Synthesis

Short introductive summary:

Ethyl esters are gaining consistent scientific as well as industrial relevance because of its application as biodiesel, alcohol markers in forensic cases, and internal standards in food analysis.
The present study covers both experimental as well as simulation research for the synthesis of ethyl esters from avocado oil using heterogeneous calcium diglyceroxide catalyst, which was generated from a waste Mytilus Galloprovincialis shells.

Presenter: **Jorge Mario MARCHETTI, Norwegian University of Life Science, Mathematical Science and Technology Dpt., Aas, NORWAY**

Presenter's biography:

I am an associate professor at the Norwegian University of Life Science working on the field of transformation of waste into bio-fuels and biochemicals using green catalysis. I have been working in the field for over 15 years.
I am the author of a book in biodiesel as well as editor of a second.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.R. Avhad, Norwegian University of Life Sciences, Ås, NORWAY
M. Sánchez, Complutense University, Madrid, SPAIN
A. Bouaid, Complutense University, Madrid, SPAIN
M. Martínez, Complutense University, Madrid, SPAIN
J. Aracil, Complutense University, Madrid, SPAIN
J.M. Marchetti, Norwegian University of Life Sciences, Ås, NORWAY

Session reference: 3CV.1.54
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Molecular Insight into Aryl O-demethylation by a Novel Demethylase Offers a New Tool for Lignin Valorization

Short introductive summary:

Lignin is one of the most abundant natural polymers on earth, and as such, serves as a rich and renewable source of valuable aromatic compounds, which can be used as precursors for the synthesis of plastics, fuels, and fine chemicals. Enzymatic conversion, or biocatalysis, of lignin-derived aromatics offers a sustainable method of lignin valorization that can improve the economic feasibility of biofuel production. Here we discuss aryl demethylation and a single domain enzyme capable of performing this reaction.

Presenter: **Amanda KOHLER, Joint BioEnergy Institute, Emeryville, USA**

Presenter's biography:

I am a postdoctoral research fellow working for Sandia National Laboratories in the Enzyme Optimization team at the Joint BioEnergy Institute. My work is focused on lignin degradation and valorization with an emphasis on understanding how different key lignin degradation enzymes function.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.C. Kohler, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA
M.J.L. Mills, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA
P.D. Adams, Joint BioEnergy Institute, Lawerence Berkeley National Laboratory, UC Berkeley, Emeryville, USA
B.A. Simmons, Joint BioEnergy Institute, Lawerence Berkeley National Laboratory, Emeryville, USA
K.L. Sale, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA

Session reference: 3CV.1.55

Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Understanding Factors Controlling Depolymerization and Polymerization in Catalytic Breaking of ß-Ether Linked Model Lignin Compounds by Versatile Peroxidase

Short introductive summary:

Lignin constitutes 15-28% of the total dry weight of biomass and represents a significant source of renewable aromatics, which have value as precursors in the production of fuels and specialty chemicals via chemical and synthetic biology routes. While nature has evolved enzymatic routes to breaking down and utilizing lignin, using these enzymes to convert lignin into defined aromatic compounds remains a challenge, in large part due to our lack of understanding of the factors that drive the equilibrium between depolymerization and polymerization of lignin by oxidative lignin modifying enzymes. In this work, we show the polymerization - depolymerization equilibrium is primarily a function of the intrinsic structure of lignin.

Presenter: **Kenneth SALE, Sandia National Laboratory, Biomass Science and Conversion Technologies Dpt., Livermore, USA**

Presenter's biography:

I am a staff scientist at Sandia National Laboratories and Director of Enzyme Optimization at the Joint BioEnergy Institute. My group's work is focused on the structure and function of enzymes involved in catalyzing depolymerization of the plant polymers cellulose, xylose and lignin.

Co-authors:

J. Zeng, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA
M.J.L. Mills, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA
B.A. Simmons, Joint BioEnergy Institute, Lawerence Berkeley National Laboratory, Emeryville, USA
M.S. Kent, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA
K.L. Sale, Joint BioEnergy Institute, Sandia National Laboratories, Emeryville, USA

Session reference: 3CV.1.56
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Improve Economic Competitiveness of Palm Oil Based Biodiesel in Indonesia through Biorefinery Pathway

Short introductive summary:

Biofuel policy instruments have largely steered the expansion of the industry, promoting investments and creating markets in the country. Despite the growth, biodiesel use is still below the expectations in terms of target achievement. Low profit from biodiesel sale forcing the industry to operate far below the installed production capacity, triggers deficit of biodiesel supply. The current production pathway of biodiesel in a standalone biodiesel configuration is perceived to be unprofitable without government subsidy. On the other hand, palm oil agroindustry generates multiple products and large quantities of biomass, thus have potential to implement integrated biorefinery concept. The study proposes an economic evaluation to examine the competitiveness of two biodiesel production scenarios in Indonesia, a standalone biodiesel pathway and an integrated biorefinery pathway. Which biodiesel production's pathway is more cost effective? As to ensure the security of feedstock supply to the industry, the competitiveness of the system is also measured by the maximum purchase feedstock price industry can pay at different alternative oil prices.

Presenter: **Fumi HARAHAP, KTH Royal Institute of Technology, Energy Technology Dpt., Stockholm, SWEDEN**

Presenter's biography:

Fumi's current research focus is on towards coherent policies promoting sustainable bioenergy development in Indonesia. With her research, Fumi aims at providing recommendations and approaches to serve the basis of policy instruments aimed at enhancing the benefits of present commitments towards bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Harahap, Division of Energy and Climate Studies, KTH Royal Institute of Technology, Stockholm, SWEDEN
S. Silveira, Division of Energy and Climate Studies, KTH Royal Institute of Technology, Stockholm, SWEDEN
D. Khatiwada, Division of Energy and Climate Studies, KTH Royal Institute of Technology, Stockholm, SWEDEN

Session reference: 3CV.1.57
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Pulp and Paper Effluents for Biomethane Production: an Underestimated Potential for Green Economy Development.

Short introductive summary:

The presented work is part of a four-years demonstration project receiving financial support from the European LIFE programme for Climate Change Mitigation. The project, entitled"EffiSludge for LIFE" An innovative concept to improve resource and energy efficiency in treatment of Pulp and Paper industry effluents, aims to modify conventional wastewater treatment (WWT) operation at pulp and paper mill sites to reduce energy demand and related carbon foot print. This can be achieved by onsite processing of generated wastewater sludge for biomethane production. The project, that is a cooperation between Scandinavian Biogas Fuels
AB (Sweden) and Biokraft AS (Norway), is implemented at the Norske Skog mill located at Skogn (Norway). EffiSludge for LIFE is an ongoing project that will last until December 2019.

Presenter: **Francesco OMETTO, Scandinavian Biogas Fuels, Stockholm, SWEDEN**

Presenter's biography:

Francesco Ometto is a Project Manager at Scandinavian Biogas Fuels AB(SE). Part of the Biogas Research Center (BRC), Francesco's R&D activities focus on forestry and aquatic biomass for biogas production. Francesco hold a PhD on renewable energy obtained at Cranfield University (UK) in 2014.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Session reference: 3CV.1.58

Subtopic: 3.3 Oil-based biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Deploying Photocatalytic Technology for the Conversion of Cellulose Feedstocks to High Value Products

Short introductive summary:

The conversion of cellulose is a challenging process and one that traditionally requires a high level of energy input either through temperature or pressure. The generation of harmful by-products and emissions are additional limitations that are associated with current technologies. Photocatalysis, however, operates under ambient conditions and has the potential to generate minimal harmful compounds. Photocatalysis is a light driven chemical reaction which generates charged species (e- and h+) on the catalyst surface as a result of photon excitation. These charged species are capable of undergoing redox reactions which can convert cellulose via oxidation and reduction to a range of valuable and useful products. The primary objective of this work was to determine the applicability of photocatalytic technology for cellulose conversion and bioenergy production. In the work presented here, commercially available catalyst TiO2 was deployed along with lab standard sources of cellulose (a- and micro crystalline cellulose) to generate both fermentable sugars and high value platform chemicals (analysis by HPLC-RI) and hydrogen (analysis by GC-TCD) under ambient conditions.

Presenter: **Nathan SKILLEN, Queens University Belfast, Belfast, UNITED KINGDOM**

Presenter's biography:

Dr Nathan Skillen is currently a research and teaching fellow in the School of Chemistry and Chemical Engineering at Queen’s University Belfast. His primary research interests include the development of photocatalytic technology specifically focusing on reactor design and light delivery modules.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Skillen, Queens University Belfast, Belfast, UNITED KINGDOM
P.K.J. Robertson, Queens University Belfast, Belfast, UNITED KINGDOM
S. Naragajan, Birmingham City University, Birmingham, UNITED KINGDOM
A.W. Don, Robert Gordon University, Aberdeen, UNITED KINGDOM
L. Lawton, Robert Gordon University, Aberdeen, UNITED KINGDOM
J.T.S. Irvine, St. Andrews University, St. Andrews, UNITED KINGDOM

Session reference: 3CV.1.59

Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Mapping Indirect Land Use Change and the Effect of ILUC Mitigation Measures

Short introductive summary:

Many of the concerns about the sustainability of the bio-economy are related to direct or indirect land use change (LUC) resulting from biomass feedstock production. In this study, we demonstrate an approach to spatially explicitly assess land use change dynamics as a result of an increased biofuel demand, and the effect of measures to avoid undesired indirect land use changes (ILUC). A modelling framework combining a global Computable General Equilibrium (CGE) model and a spatially explicit LUC model is developed to quantify and map the effects of an increased biofuel demand, and ILUC mitigation measures. This is demonstrated for a case study of an increase in ethanol demand in Brazil. The increase in ethanol production in Brazil from 23.9 in 2012 to 54.2 bln litres in 2030 requires an expansion of 3.5 Mha sugar cane, which results in a net loss of 0.9 Mha of natural vegetation. Almost all mitigation measures decrease the indirect land use change resulting from an increased bioethanol demand. Especially combining the measures is an effective way to mitigate ILUC. However, an integrated approach targeting all land uses in all regions is required to avoid negative effects of

Presenter: **Floor VAN DER HILST, Utrecht University, Energy & Resources, Copernicus Institute, Utrecht, THE NETHERLANDS**

Presenter's biography:

Floor works as Assistant Professor for the Copernicus Institute at Utrecht University. Her work focuses on land-use change related to biomass production and its impacts. She combines methodology and model development with fieldwork experience.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. van der Hilst, Utrecht University, THE NETHERLANDS
J.A. Verstegen, University of Münster, Munster, GERMANY
G. Woltjer, Wageningen Economic Research, ., THE NETHERLANDS
E.M.W. Smeets, Wageningen Economic Research, ., THE NETHERLANDS
A.P.C. Faaij, University of Groningen, ., THE NETHERLANDS

Session reference: 4CP.1.1
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Policy Lessons to Mobilize Sustainable Biomass Resources for the Biobased Economy: Conclusions from the Projects Biomass Policies, S2Biom and BioTrade2020+

Short introductive summary:

So far policy conditions have been extremely important for the deployment of biofuels and bioenergy. Different EU-wide and national/regional policies are playing a role in the mobilization, supply, conversion and end-use of biomass for energy as well as other purposes. To develop a robust bio-based economy, it will require both the access to renewable feedstock in sufficient quantities, of guaranteed quality and at a competitive price and stimulating the market demand, without disrupting food supply and other markets.
Within the European sister projects Biomass Policies, S2Biom and BioTrade2020+ different steps were taken to provide guidelines for policy frameworks. The projects were complimentary with Biomass Policies focusing on the role of domestic biomass and the aspect of resource efficiency, BioTrade2020+ on how to include (sustainable) international biomass in the picture, and S2Biom on mobilizing lignocellulosic biomass in Europe and broadening its use to biobased economy. This paper will summarize the main policy conclusions of the three projects.

Presenter: **Luc PELKMANS, CAPREA Sustainable Solutions, Mol, BELGIUM**

Presenter's biography:

Luc Pelkmans (°1971)worked as project manager biobased economy for VITO in Belgium from 1996 to 2017. Currently he is Technical Coordinator of the IEA Bioenergy Technology Collaboration Programme. He is also manager of the consultancy firm CAPREA Sustainable Solutions.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Pelkmans, VITO NV, Mol, BELGIUM
C. Panoutsou, Imperial College, UNITED KINGDOM
A. Uslu, ECN, Amsterdam, THE NETHERLANDS
E. Alakangas, VTT, Jyvaskyla, FINLAND
L. Wenzelides, FNR, Gülzow, GERMANY
D. Sanchez Gonzales, CENER, Sarriguren, SPAIN
R. Guisson, VITO NV, Mol, BELGIUM

Session reference: 4CP.1.2
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Integrated Bioenergy Hybrids - Flexibility for a Low-Emission Energy System

Short introductive summary:

The global energy supply system is in transition from one that relies on centralized energy production from polluting energy sources to a system that relies on non-polluting sources that are dominantly abundant and intermittent. The new energy system is characterized by distributed production relying on locally available sources, requiring seamless integration and control of various energy inputs. Bioenergy as a storable and dispatchable energy source is foreseen to has a key role as a stabilizing element in power supply systems with increasing amount of intermittent energy sources. On the other hand, as bioenergy is often sustainably available only at limited quantities, sharing the energy supply contribution with other RE sources reduces the pressure from biomass availability. This work reviews the status of bioenergy RES hybrids in target regions, Finland, Austria and Germany, develops estimates on their future potential and suggests key actions for the next five years needed to spur investment in bioenergy hybrids technologies.

Presenter: **Elina HAKKARAINEN, VTT Technical Research Centre of Finland, Renewable Energy Processes Dpt., Espoo, FINLAND**

Presenter's biography:

Elina Hakkarainen, M.Sc. (Tech.), works as a research scientist at VTT Technical Research Centre of Finland Ltd. Her work mainly covers dynamic modelling and simulation, and concept development and evaluation of renewable energy and renewable energy hybrid technologies. Her specific interests include solar energy applications, energy transition, and the role of renewable energy hybrid technologies in the low-emission energy system.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Hakkarainen, VTT Technical Research Centre of Finland Ltd, Espoo, FINLAND
I. Hannula, VTT Technical Research Centre of Finland Ltd, Espoo, FINLAND

Session reference: 5CP.2.1
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Integrating Power -to -gas into Sugarcane Ethanol Industry. A Mobility Oriented Optimization

Short introductive summary:

Concerns about climate change have motivated the quest for less carbon intensive technologies. In the energy sector, this explains the increasing use of technologies for renewable generation, especially solar and wind, and the substitution of fossil fuels by biofuels. However, sources like solar and wind are variable, causing challenges in supply□demand grid balance. Consequently, measures to increase grid flexibility are required, including the use of energy storage technologies. Power□to□gas is a promising one, providing seasonal storage as well as converting electricity into a different energy carrier that can be used outside the electricity sector, as in transportation applications. This study relevance is the integrated evaluation of a seasonal storage technology within the biofuel sector, increasing renewable energy penetration in energy mix and reducing GHG emissions. The goal is to integrate renewable electricity surpluses, transformed into hydrogen, which is used to convert biogenic CO2 from ethanol production facilities into biomethane. This renewable carrier can displace fossil fuels in either transport applications or electricity generation, mitigating CO2 emissions.

Presenter: **Alexandre DE BARROS GALLO, University of São Paulo, Institute of Energy and Environment, São Paulo, BRAZIL**

Presenter's biography:

Bachelor in Mechanical Engineering at Escola Politécnica - USP and Master in Science and Executive Engineering at Mines Paristech. Had experiences in the Energy sector (energy management and energy storage), currently pursuing a Master's degree at Institute of Energy and Environment - USP.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.B. Gallo, USP - Institute of Energy and Environment, São Paulo, BRAZIL
M.M. Santos, USP - Institute of Energy and Environment, São Paulo, BRAZIL
H.K.M. Costa, USP - Institute of Energy and Environment, São Paulo, BRAZIL
E. Moutinho dos Santos, USP - Institute of Energy and Environment, São Paulo, BRAZIL
M.T.W. Fagá, USP - Institute of Energy and Environment, São Paulo, BRAZIL

Session reference: 5CP.2.2
Subtopic: 5.1 Integration of bioenergy with other renewable and conventional energy sources
Topic: 5. BIOENERGY IN INTEGRATED ENERGY SYSTEMS

Gobigas - First Full-Scale Demonstration of Biomethane from Forest Residues

Short introductive summary:

The Gothenburg Biomass Gasification (GoBiGas) project is the first large-scale demonstration of utilising forest residues for the production of biomethane. The €164 million investment may unlock a substantial market and complement the valuable volumes of waste-based biogas from anaerobic digestion for transportation, industry, CHP and heating. The plant produced its first biomethane in December 2014 and succeeding in proving it possible to contiuously use wood pellets over a period of two months. The plant is now expanded with a feeding system for wood chips in order to access less expensive renewable resources, while development of producing biomethane from wood chips continues.

Presenter: **Martin SEEMANN, Chalmers University of Technology, Energy Technology Dpt., Göteborg, SWEDEN**

Presenter's biography:

Martin Seemann (Assoc. Prof.) received the Ph.D. degree in chemical engineering from ETH Zürich, Switzerland. Since 2008, he is a senior researcher at the department of Energy and Environment at Chalmers University of Technology, Sweden. His research interestsare the fundamentals of fuel conversion for heat and power production in large scale facilities.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Zinn, Göteborg Energi, Göteborg, SWEDEN
I. Gunnarsson, Göteborg Energi, Göteborg, SWEDEN

Session reference: ICP.3.1
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

New Industrial Development in Fluidised Bed Combustion of Waste and Biomass

Short introductive summary:

Improbed is a new combustion method that allows the oxygen in the combustion air to be used much more efficiently by replacing the commonly used silica sand with an oxygen-carrying mineral. The mineral increases the oxygen distribution in the free board and provides a number of benefits, such as increased boiler load and combustion efficiency, reduced emissions and reduced risk of agglomerations. The new method is a result from a gasification research program at Chalmers University of Technology and has since developed into a commercial concept through close research collaboration between Chalmers and E.ON. The Improbed concept is now operating continuously at E.ON's waste fired boiler at Händelöverket in Norrköping and there are other biomass and waste fired boilers evaluated for Improbed operations.The presentation will focus on the findings from test operations of the Improbed concept and the background to the positive effects.

Presenter: **Lars BIERLEIN, E.ON, Malmo, SWEDEN**

Presenter's biography:

Lars Bierlein is project manager at Business Innovation E.ON Sweden focusing at emerging energy solutions. Lars is responsible for the commercial development of the Improbed concept for improved combustion in fluidized bed boilers.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Fredriksson Moeller, E.ON Gasification Development, Malmö, SWEDEN
L. Bierlein, E.ON, Malmo, SWEDEN

Session reference: ICP.3.2

Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)

Topic: 6. INDUSTRY SESSIONS

Influence of Endophytic Root Bacteria on the Growth, Cadmium Tolerance

Short introductive summary:

In order to develop bioenergy plant in heavy metal polluted arer, and increase productivity of bioenergy plants switchgrass (Panicum virgatum L.) grown in cadmium (Cd) contaminated condition, five kinds of plant growth promoting endophyte bacteria (PGPB)strains (Bj05, Le14, Ps14, So02, and Bo03) isolated from the plants grown in Cd contaminated soil were treated.

Presenter: **Qingsheng CAI, Nanjing Agricultural University, College of Life Sciences, Nanjing, P.R. CHINA**

Presenter's biography:

Dr. Qingsheng Cai, a professor in College of Life Sciences, Nanjing Agricultural University, China. She majored in plant physiology and high biomass crop sciences, having researched on developing bioenergy plants or crops in heavy metal polluted area by in virtro and in vivo regulation.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Q. Cai, Nanjing Agricultural University, P.R. CHINA
S. Afzal, Nanjing Agricultural University, P.R. CHINA
N. Begum, Nanjing Agricultural University, P.R. CHINA
H. Zhao, Nanjing Agricultural University, P.R. CHINA
Z. Fang, Nanjing Agricultural University, P.R. CHINA
L. Lou, Nanjing Agricultural University, P.R. CHINA

Session reference: 1CO.5.1
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

From Irrigated to Rainfed Agriculture in a Mediterranean Environment: The Shift in Biomass Yield of the Arundo Energy Crop over the Seasons

Short introductive summary:

A long-term study of the potential of different clones of Arundo donax L. for biomass production was conducted in central Spain under a Xeric Mediterranean climate characterized by 430 mm annual precipitation, 13.4ºC annual mean temperature and 4-month dry period in summertime. The crop was managed according a perennial cultivation system that involved annual harvests of the aboveground biomass. From crop establishment to the fifth year of the experiment, the crop was optimally irrigated throughout the annual growing cycle; the crop management was changed to dry farming in the fifth and sixth year. In line with literature data, the water regime turned out to be more important to biomass production than the type of clone or the age of the crop. Higher variation was recorded in the years under the dry management, which could be related to differences in plant stored reserves across the field experiment. Yield losses varied among clones. The value of the mean loss obtained in this work could be extrapolated to other locations with similar environmental conditions, for an early estimation of yield losses of Arundo crop in the event of water shortage

Presenter: **Maria Dolores CURT, Universidad Politecnica de Madrid, Agricultural Production Dpt., Madrid, SPAIN**

Presenter's biography:

Professor at the College of Agricultural Engineering of Madrid. PhD Agricultural Engineer. Member of the Agro-energy Group of the 'Universidad Politecnica de Madrid' (GA-UPM). Contributor to numerous national and European projects and scientific articles in the field of Bioenergy.

Co-authors:

M.D. Curt, Universidad Politecnica de Madrid, Madrid, SPAIN
M. Sanz, Universidad Politecnica de Madrid, Madrid, SPAIN
P.V. Mauri, IMIDRA, Madrid, SPAIN
A. Plaza, IMIDRA, Alcala de Henares, SPAIN
J. Cano-Ruiz, IMIDRA, Alcala de Henares, SPAIN
J. Sanchez, Universidad Politecnica de Madrid, Madrid, SPAIN
P.L. Aguado, Universidad Politecnica de Madrid, Madrid, SPAIN
J. Fernandez, Universidad Politecnica de Madrid, Madrid, SPAIN

Session reference: 1CO.5.2
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Pure And Mixed Perennial Biomass Crops for a Constraint Marginal Land in North-Central Spain (a 6-Year Study)

Short introductive summary:

Growing energy crops in marginal lands is frequently encouraged by policy makers to minimize land-use competition with food crops. In this article, the term “marginal land” is referred to lands with biophysical constraints but also areas with low economic competitiveness where farm margin of existing agriculture (e.g. wheat and barley) has been below opportunity costs. The cultivation of hardy grasses selected for non-food biomass includes tolerant perennial grasses with long growing periods and summer dormancy, which may increase farming intensification alternatives in low competitive lands. Combination of annual and perennial species with traditional crops could decrease negative restrictions to aerial biomass productivity and partially reduce monoculture effects. The results showed that tall wheatgrass (var. Alkar) reported an average productivity around 4.6 t DM.ha-1.year-1, being the highest yield of the 10 alternatives studied. All alternatives yielded between 2.8 and 4.8 t DM.ha-1.year-1 Tall wheatgrass (var. Alkar, Jose and generic) clearly showed the highest productivity.

Presenter: **Carlos Sixto CIRIA RAMOS, CIEMAT, Biomasa Dpt., Lubia (Soria), SPAIN**

Presenter's biography:

Agricultural Engineer at Lérida University. phD researcher in Energy Department of Centre for Energetic Environmental and Technological Research (CIEMAT), Biomass Unit in the Centre for the Development of Renewable Energy Sources (CEDER). Research activity is close to biomass production, economic,

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.S. Ciria Ramos, CEDER-CIEMAT, LUBIA-SORIA, SPAIN
J.E. Carrasco, CEDER-CIEMAT, LUBIA-SORIA, SPAIN
J. Perez, CEDER-CIEMAT, LUBIA-SORIA, SPAIN
E. Maletta, CEDER-CIEMAT, LUBIA-SORIA, SPAIN
R. Barro, CEDER-CIEMAT, LUBIA-SORIA, SPAIN
P. Ciria, CEDER-CIEMAT, LUBIA-SORIA, SPAIN

Session reference: 1CO.5.3
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Long-Term Yields of Perennial Grasses in Mediterranean Region

Short introductive summary:

The submitted abstract presented the long term yields (up to 17 years) performance of three perennial grasses (switchgrass, miscanthus and giant reed) in Greece. This research work had been funded by several EU research projects such as Switchgrass for Energy, Bioenergy chains and OPTIMA. The long term yields data have been collected from field trials established on marginal and low-fertility lands and under different cultural practices.

Presenter: **Efthymia ALEXOPOULOU, Center for Renewable Energy Sources, Biomass Dpt., Pikermi Attikis, GREECE**

Presenter's biography:

She is an agriculture engineer grantuated from the Agricultural University in Athens (AUA) with PhD on the “Adaptability and biomass productivity of the non-food crop Kenaf in Greece”. She is responsible for Energy Crops Unit in Biomass Department of Center for Renewable Energy Sources.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Alexopoulou, CRES, Athens, GREECE
M. Christou, CRES, Athens, GREECE
I. Papamichael, CRES, Athens, GREECE
K. Tsiotas, CRES, Athens, GREECE

Session reference: 1CO.5.4
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Fostering Sustainable Feedstock Production for Advanced Biofuels on Underutilised Land in Europe

Short introductive summary:

In context of growing competition between land uses, bioenergy development is often seen as one of possible contributors to such competition. However, the potential of underutilized land (contaminated, abandoned, marginal, fallow land etc.) which is not used or cannot be used for productive activities is not exhausted and offers an attractive alternative for sustainable production of different biomass feedstocks in Europe. Depending on biomass feedstocks, different remediation activities can be carried out in addition. Bioenergy crops have the potential to be grown profitably on underutilized land and can therefore offer an attractive source of income on the local level contributing to achieving the targets of the Renewable Energy Directive (EC/2009).

Presenter: **Rita MERGNER, WIP, Munich, GERMANY**

Presenter's biography:

M.A. RitaMergner is a Project Manager at WIP in the Biomass Unit. She graduated in Public Management and Law and is experienced in policy analysis, formation and implementation as well as policy research in the field of renewable energies, especially in biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Mergner, WIP, Munich, GERMANY
R. Janssen, WIP, Munich, GERMANY
D. Rutz, WIP, Munich, GERMANY
M. Colangeli, GBEP - FAO, Rome, ITALY

Session reference: 1CO.5.5
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Biomass Consumption Scenarios for Energy and Chemicals in the EU and Neighbouring Countries until 2030

Short introductive summary:

An integrated assessment for the project S2Biom (EU-H2020) shows that current policy decisions are of paramount importance to future biomass use, both for energy and chemical purposes. It shows policy measures have a significant impact on the type of biofuels and processing technologies for bioenergy that will be deployed, and the total cost of the biomass system. Also, current policy decisions have a long-lasting effect as they provide the outset for biomass chain development (path dependency).

Analyses show that a scenario with restricted biomass potential leads to a shift in resource use, but a large share of lignocellulosic biomass remains unutilized, because cheaper extra-European imports will be favored over more expensive domestic biomass chains. We also analyzed various ‘what if’ scenarios, showing the impact of e.g. biomass demand for materials, and the role of path dependency.

ECN’s RESolve-Biomass model, the key tool for this study, assesses the impacts of meeting the demand for bioenergy (power, heat, fuels) and six key biochemicals in the EU28 and surrounding countries until 2030, using a least-cost optimization approach.

Presenter: **Marc LONDO, Energy Research Centre of the Netherlands, Policy Studies Dpt., Amsterdam, THE NETHERLANDS**

Presenter's biography:

Marc Londo is a senior researcher at ECN Policy Studies, working on integrated assessments and other research supporting policy, in the field of renewables in general and biomass in particular. He is also guest researcher at the Copernicus Institute of Utrecht University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.M. Kraan, Energy Research Centre of the Netherlands, Amsterdam, THE NETHERLANDS
M.H. Londo, Energy Research Centre of the Netherlands, Amsterdam, THE NETHERLANDS
J. van Stralen, Energy Research Centre of the Netherlands, Amsterdam, THE NETHERLANDS
A. Uslu, Energy Research Centre of the Netherlands, Amsterdam, THE NETHERLANDS

Session reference: 4CO.6.1
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Comparison of Effectiveness of Support Policies for Sustainable Development of the Bioenergy Sector: Bioenergy Development in the UK & Nordic Countries

Short introductive summary:

This research evaluates and compares the effectiveness of support schemes for developing bioenergy in the electricity and heating sector in; Sweden, Denmark, Finland and the UK. The research analyses the success of bioenergy policies across the countries, using both quantitative and qualitative evaluation techniques. Regression analyses is undertaken to measure where both the implementation of bioenergy support policies and where key performance characteristics such as GDP and energy prices, have had an identifiable impact on the development of the bioenergy sector. This is supported by qualitative analysis where an evaluation of the success and problems of support policies for the bioenergy sector within each country is provided by industry, Governmental and academic stakeholders during interviews and communicated at a workshop. The research evaluates the successes and failures of support policies within each country, and how the different country's wider performance characteristics are shown to influence the bioenergy sector. The successes and failures of the four countries are identified and potential wider lessons highlighted.

Presenter: **Patricia THORNLEY, SUPERGEN Bioenergy Hub, Manchester, UNITED KINGDOM**

Co-authors:

A. Welfle, University of Manchester, UNITED KINGDOM
P. Thornley, University of Manchester, UNITED KINGDOM
S. Cross, Aalto University, Espoo, FINLAND
S. Syri, Aalto University, Espoo, FINLAND
M. Mikaelsson, UK Foreign & Commonwealth Office, Stockholm, SWEDEN

Session reference: 4CO.6.2
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Evaluation of Governmental Policies to Stimulate Biofuels Use in Aviation

Short introductive summary:

The aviation sector is one of the fastest growing sources of greenhouse gas (GHG) emissions. Limiting or reducing the GHG from aviation is therefore a key element of climate change policy. The use of biobased jet fuels is one of the few options available. The goal of this project is to evaluate the direct and indirect effects of different policy measures to stimulate the production and use of biofuels in aviation in 2030 by the Dutch government. This mainly exists of closing the price gap between kerosene and biobased (advanced) jet fuels (advanced, made from lignocellulose), which depends on the price of kerosene, carbon dioxide and of biobased jet fuels in 2030. The selected policy measures are evaluated with an aviation sector model (AERO-MS) in combination with a general equilibrium model (MAGNET). AERO-MS provides detailed insights in the effects on the aviation sector, like number of passengers and price of tickets. MAGNET gives insights in the macro-economic effects, such as changes in production of other sectors in the economy (oil production, biomass production, biofuel production, etc.), but also on government spending, private consumption etc.

Presenter: **Anouk VAN GRINSVEN, CE Delft Consultancy, Fuels and Cities Dpt., Delft, THE NETHERLANDS**

Presenter's biography:

Anouk van Grinsven is a researcher with CE Delft in the Netherlands. She is an expert in transport fuel policy with special attention to alternative energy carriers in various transport modes, both at the EU level as well as at the national level.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Smeets, Wageningen Economic Research, The Hague, THE NETHERLANDS
A. Van Velzen, TAKS, Utrecht, THE NETHERLANDS
A. Van Grinsven, CE Delft, Delft, THE NETHERLANDS
H. Bartelings, Wageningen Economic Research, The Hague, THE NETHERLANDS
J. Faber, CE Delft, THE NETHERLANDS

Session reference: 4CO.6.4
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Can Lignocellulosic Biomass Reconcile Agricultural Productivity, the Bioeconomy and Climate Change Mitigation in the EU?

Short introductive summary:

This study aims to evaluate the role of lignocellulosic biomass (LB) as a sustainable biomass feedstock in the bioeconomy and its potential conflicts with food and feed markets. We develop scenarios to look at how different land category uses, i.e. arable and pasture, for LB cultivation would affect land use competition between food and bioeconomy crops in the EU. Furthermore, we investigate agricultural emission changes from indirect land use change outside of the EU due to LB induced agricultural trade changes between the EU and the rest of the World.

Presenter: **Hyung Sik CHOI, University of Hohenheim, Agricultural and Food Policy Group, Stuttgart, GERMANY**

Presenter's biography:

Dr. HyungSik CHOI currently work at the Agricultural and Food Policy Group, University of Hohenheim, Stuttgart, Germany. Current research focus is assessing the impacts of lignocellulosic biomass deployment in Europe.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H.S. Choi, University of Hohenheim, Stuttgart, GERMANY
H. Grethe, Humboldt-University of Berlin, Berlin, GERMANY
S. Entenmann, Humboldt-University of Berlin, Berlin, GERMANY

Session reference: 4CO.6.5
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Chemicals from Biomass: Chemistry, Synthesis, Engineering and Sustainability Analyses

Short introductive summary:

Bio-based products, such as food and pharmaceutical ingredients, fine, specialty and platform chemicals, polymers and fibres, biofuel and bioenergy in chronological order have the highest sustainability potential encompassing triple bottom line social-environmental-economic criteria, compared to equivalent functional products from fossil resources. These products have to be produced in an integrated system, biorefinery, to achieve highest resource efficiency and sustainability. For newer biorefinery businesses, targeting such chemicals as bio-based products alongside bioenergy and biofuel product, which has a higher demand and lower market price, is more profitable option, compared to biofuel or bioenergy production facility. However, purity and grades of such chemicals will be a key consideration for market uptake. Therefore, chemistry to produce these chemicals at highest grades is imperative to optimise across the scale from molecules through reaction-separation processes to integrated biorefinery systems. This paper for the first time presents analyses of feasibility and sustainability of production across the scale for five 'sleeping giant' top most chemicals.

Presenter: **Mobolaji SHEMFE, University of Surrey, Centre for Environment and Sustainability, Guildford, UNITED KINGDOM**

Presenter's biography:

I joined the Centre for Environmental Strategy as Research Fellow in June 2016. Before joining CES, I obtained my PhD from Cranfield University in 2016, having previously obtained an MSc in Petroleum Refining Systems Engineering in 2010 at the University of Surrey.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Sadhukhan, University of Surrey, Guildford, UNITED KINGDOM

Session reference: 3CO.7.1

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Recyclable Green Process for Bio-Adipic Acid

Short introductive summary:

We wish to present a recyclable synthetic process of biomass-based adipic acid using ionic liquids as a reaction media.
With the efficient recycling process for the rhenium catalyst and the reagents, the overall synthetic process for bio-adipic acid would become cost-efficient and eco-friendly.

Presenter: **Young Gyu KIM, Seoul National University, School of Chemical and Biological Engineering, Seoul, REPUBLIC OF KOREA**

Presenter's biography:

1994-Present Professor, Seoul National University
2015-Present Vice President, The Korean Society of Industrial and Engineering Chemistry
2006-Present Deputy Director, The BK21/PLUS Program
2012-2014 Chief Editor, Applied Chemistry for Engineering

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y.G. Kim, Seoul National University, REPUBLIC OF KOREA
N. Shin, Seoul National University, REPUBLIC OF KOREA
S. Kwon, Seoul National University, REPUBLIC OF KOREA
Y. Lee, Seoul National University, REPUBLIC OF KOREA
N. Kim, Seoul National University, REPUBLIC OF KOREA
H.M. Yang, Seoul National University, REPUBLIC OF KOREA
C.H. Hong, Seoul National University, Gyeonggi-do, REPUBLIC OF KOREA

Session reference: 3CO.7.2
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Polyurethane Foams Produced from Pyrolysis Oil: Production and Possible Application

Short introductive summary:

Rigid polyurethane (PU) foams are widely used for instance in building insulation. Both components of typical Systems are produced from fossil oil resources.

The liquid products from fast pyrolysis of biomass contain a large variety of organic compounds with –OH functional groups. This gives rise to the idea to substitute the polyol component in PU foams. Following some exploratory experiments a more systematic study is under way to examine the possibility of such substitution. Biooils derived from woody and herbaceous biomass were produced using a laboratory plant for ablative fast pyrolysis. The biooils were pretreated and samples of PU foams produced with a varying amount of biooil substituting the polyol component. Especially the biooils produced from straw showed good insulation property expressed as low thermal conductivity. The achieved thermal conductivity of 0.0283 W/mK with a substitution degree of 80 % was 8 % lower than for the foams produced from commercial components (0.0308 W/mK). These results show high potential for the application of bio-based intermediates in the building sector.

Presenter: **Tim SCHULZKE, Fraunhofer-Institut UMSICHT, Biorefinery and Biofuels Dpt., Oberhausen, GERMANY**

Presenter's biography:

I studied chemical engineering at University of Dortmund, where I received my diploma in 1992. From then on I work at Fraunhofer UMSICHT, since January 1st, 2013 as group manager Thermochemical Process and Hydrocarbons in department Biorefinery & Biofuels.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Lakovleva, Kazan National Research Technological University, Kazan, RUSSIAN FEDERATION
Q. Cao, Ruhr-University, Bochum, GERMANY
S. Conrad, Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, Oberhausen, GERMANY
S. Zabelkin, Kazan National Research Technological University, Kazan, RUSSIAN FEDERATION
A. Grachev, Kazan National Research Technological University, Kazan, RUSSIAN FEDERATION
T. Schulzke, Fraunhofer Institute for Environmental, Safety and Energy Technology UMSICHT, Oberhausen, GERMANY

Session reference: 3CO.7.3

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Polymer Nanocomposites Based on Lignin Nanoparticles: Development, Characterization and Potential Applications

Short introductive summary:

This present work is focused on the formation of lignin nanoparticles by means of an ultrasonic treatment and their incorporation into a waterborne polyurethane matrix with the purpose of modifying their chemical, physical and mechanical response. The characteristics of such nanolignin particles were investigated through various experimental tests, including TEM and SEM micrographs, infrared spectroscopy, contact angle and tensile test.

Presenter: **Maria Nelly GARCIA GONZALEZ, Polytechnic of Milan, Chemistry, Materials and Chemical Engineering Dpt., Milan, ITALY**

Presenter's biography:

PhD student in Materials Engineering at the Department of Chemistry, Materials and Chemical Engineering “Giulio Natta” at the Politecnico di Milano.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.N. Garcia Gonzalez, Polytechnic of Milan, ITALY
G. Griffini, Polytechnic of Milan, ITALY
S. Turri, Polytechnic of Milan, ITALY
M. Levi, Polytechnic of Milan, ITALY

Session reference: 3CO.7.4

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Synthesis of Bio-Sourced Epoxy Resins using Depolymerised Lignin Streams

Short introductive summary:

Producing bio-aromatic chemicals from lignin, is an area that has attracted increased research interest in recent years. Nevertheless, the complex structure of the lignin bio-polymer makes it a challenging material for chemists to work with.One strategy that has been extensively developed for depolymerising lignin is hydrogenolysis using pressurised hydrogen as a reductant. In our research, we have applied hydrogenolysis to native softwood lignin to produce low molecular weight biophenols that can serve as functional building blocks for new bio-based epoxy resins. The goal is to develop alternatives to Bisphenol A which is commonly used in the synthesis of epoxy resins, but is derived from petroleum, and has health and environmental concerns.

Presenter: **Elias FEGHALI, SCION/VITO, Rotorua/Mol, NEW ZEALAND**

Presenter's biography:

Elias is currently a postdoctoral fellow working on a collaborative international project between SCION (New Zealand) and VITO (Belgium). His research focuses on the production of highly functionalized bio-aromatics from lignin and the development of novel bio-based polymers and materials.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Feghali, Vito/Scion, Rotorua, NEW ZEALAND
D. van de Pas, Scion, Rotorua, NEW ZEALAND
K. Servaes, Vito, Mol, BELGIUM
K. Torr, Scion, Rotorua, NEW ZEALAND

Session reference: 3CO.7.5

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

High Quality Fuel by Steam Explosion

Short introductive summary:

Sustainable biomass combustion provide affordable way to mitigate global warming. Advanced biofuels can substitute fossil fuels in backup and peak boilers, in co-combustion, and in boilers that are converted from coal to biomass. Torrefaction as an upgrade alternative has been studied for a decade, but the development is still ongoing. An new and interesting thermally treated biomass is the steam exploded ”black” pellet. Steam explosion provides high wet durability and high energy density compared to white pellets. This application for production of densified biomass fuels with continuous process of steam explosion is new. Results for grinding and combustion tests of steam exploded pellets at an existing heat only plant at Finland are presented.

Presenter: **Tero JORONEN, Valmet, Bioenergy R&D Dpt., Tampere, FINLAND**

Presenter's biography:

Dr. Joronen is working currently for Valmet and Tampere University of Technology. At Valmet he works as R&D Manager for Bioenergy R&D. At TUT he works as a Industry Professor, leading several energy related research projects. He has over 20 years of experience on industrial R&D.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Joronen, Valmet, Tampere, FINLAND
P. Björklung, Valmet, Sundvall, SWEDEN
M. Bolhàr-Nordenkampf, Valmet, Vienna, AUSTRIA

Session reference: ICO.8.1
Subtopic: 6.2 Thermochemical conversion processes
Topic: 6. INDUSTRY SESSIONS

Concept for Utilization of Waste Fuels in a Small Scale Updraft Gasifier System

Short introductive summary:

Highterm Research Ges.mbH has developed the E3 small scale power plant in cooperation with ENTRADE Energiesysteme AG. This gasifier was developed for wood pellets as a standard fuel because of the homogeneity in comparison with e.g. wood chips.

Besides the ongoing improvement of the E3 as standardized gasifier, other concepts are developed including a larger unit with twice the power output and an updraft gasification unit in order to extend the applicable range of fuels towards problematic waste materials with high ash content. The downdraft gasification unit is equipped with an automated temperature controlled adjustment of filling levels adjusting the reaction zones inside the gasifier to optimum conditions. With this concept a gas with a tar load as low as 15 g/Nm³ is produced suitable for further purification steps in a patented system or for caloric utilization. The new development is suited to help bridging the exigency of obtaining a high quality gas suitable for direct energetic use from low quality fuels and thus opening new fields for research and marketing of biomass CHP.

Presenter: **Moritz HUSMANN, Highterm Research, Graz, AUSTRIA**

Presenter's biography:

University education as process engineer at Friedrich Alexander University in Erlangen from 2007 to 2013. Since 2013 PhD candidate at Graz University of Technology in the field of allothermal biomass gasification. Joined Highterm Research Ges.mbH in Graz, part of the ENTRADE group, in Oktober 2016.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Zuber, Highterm Research, Graz, AUSTRIA
H. Brugger, Highterm Research, Graz, AUSTRIA
G. Binder, Highterm Research, Graz, AUSTRIA
S. Siddiqui, Entrade Energiesysteme, Düsseldorf, GERMANY
M. Husmann, Highterm Research, Graz, AUSTRIA

Session reference: ICO.8.2
Subtopic: 6.2 Thermochemical conversion processes
Topic: 6. INDUSTRY SESSIONS

Biomass CHP Systems in Commercial Agricultural Processing

Short introductive summary:

Paper presents the work of West Biofuels to develop gassification-to-CHP CHP applications in commercial agricultural processing in California and the feedstock, system, and financial considerations to make these systems viable.

Presenter: **Matthew SUMMERS, West Biofuels, Woodland, USA**

Presenter's biography:

Dr. Matthew Summers leads the technical development and research operations of West Biofuels. He supervises numerous staff and contractors and all aspects of technology development. Dr. Summers has many years of experience as a technical consultant on biomass-to-energy systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Summers, West Biofuels, Woodland, CA, USA
C. Liao, West Biofuels, Woodland, CA, USA
B. Bruning, West Biofuels, Woodland, CA, USA
M. Hart, West Biofuels, Woodland, CA, USA
G. Faussone, INSER, Torino, ITALY

Session reference: ICO.8.3
Subtopic: 6.2 Thermochemical conversion processes
Topic: 6. INDUSTRY SESSIONS

Commercial Gasification of Waste Paper Residues - Feedback on the Commissioning of a 12MW Plant

Short introductive summary:

This work aims at offering an industrial feedback on the commissioning of a 12MW air blown CFB gasification plant set up by Leroux & Lotz Technologies in the Netherlands.

Presenter: **Timothée NOCQUET, Leroux & Lotz Technologies, Eybens, FRANCE**

Presenter's biography:

Timothée Nocquet has a Master of Chemical Engineering of INPL in France / the University of Karlsruhe in Germany and a PhD in Chemical Engineering.
Since 2013, he has been working as a R&D Engineer at Leroux & Lotz Technologies, a global solution provider for energy generation from 1 to 150MWth.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Nocquet, Leroux & Lotz Technologies, Grenoble, FRANCE
B. Cluet, Leroux & Lotz Technologies, Grenoble, FRANCE
C. Marty, Leroux & Lotz Technologies, Grenoble, FRANCE
M. Al Haddad, Leroux & Lotz Technologies, Grenoble, FRANCE

Session reference: ICO.8.5
Subtopic: 6.2 Thermochemical conversion processes
Topic: 6. INDUSTRY SESSIONS

Hydrothermal carbonization as an effective way of densification of agro-industrial residues for energy exploitation: energy, chemical and thermal properties of olive mill wastes hydrochar pellets

Short introductive summary:

High performance densified bio-fuel was produced via hydrothermal carbonization (HTC) of olive mill industry wastes. HTC of olive pulp and olive mill wastewater (OMW) was carried out in a self-designed and self-built 2500-mL stainless steel (AISI 316) batch reactor. Olive pulp was hydrothermally carbonized in the presence of OMW at variable temperature (180, 200, 220 and 250 °C), fixed residence time (3 h) and solid to liquid mass loads of 30% on a dry basis. HTC wet solid residues were directly densified by a lab-scale pelletizer designed and built at our lab. The effect of HTC temperature, residual moisture, densification condition and starch addition on the energy properties and thermal and mechanical stabilities of the pelletized material was investigated by mean of calorimetric, thermogravimetric, proximate and elemental analyses and ATR-FTIR spectroscopy. Results showed that HTC induced partial dehydration and decarboxylation of the parent material leading to high energy densified bio-fuel with a HHV as high as 32.5 MJ/kg (HTC temperature of 250 °C). OP hydrochar pellet is a promising high performance bio-fuel for commercial stove and gasification systems.

Presenter: **Daniele ANTOLINI, Free University of Bolzano, Faculty of Science and Technology, Bozen-Bolzano, ITALY**

Presenter's biography:

biography

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Volpe, University of Trento, Trento, ITALY
M. Lucian, University of Trento, Trento, ITALY
L. Fiori, University of Trento, Trento, ITALY
D. Antolini, University of Trento, Trento, ITALY
M. Grigiante, University of Trento, Trento, ITALY

Session reference: 3CV.2.1
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Valorisation of Early Harvested Miscanthus for Unitisation In Combustion Via Hydrothermal Carbonisation

Short introductive summary:

To meet combustion quality requirements conventional harvesting of miscanthus for energy purposes occurs late winter/ early spring. This late harvesting is so that the plant fully senesces; dropping leaves and translocating nutrients to the rhizome, which in term lowers nitrogen, chlorine, ash and alkaline metals content. This however leads to a significant decline in dry matter yield. To maximise energy from miscanthus, autumn or green harvesting is required, however this fuel will be incompatible with combustion unless a pre-treated to overcome the combustion limitations imposed by the inorganic chemistry. Hydrothermal carbonisation (HTC) is one such pre-treatment which can overcome the fuels inorganic chemistry, while simultaneously increasing energy density and modifying combustion behaviour making both autumn and winter fuels suitable for pulverised boiler and co-firing applications.

Presenter: **Aidan SMITH, University of Leeds, Energy Research Institute, Leeds, UNITED KINGDOM**

Presenter's biography:

I am 3rd year PhD student at Leeds University. My research looks into the fate and influence of inorganics and heteroatoms during hydrothermal carbonisation of biomass. Prior the PhD I spent six years working on environmental issues associated the mining and renewable energy sector.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.M. Smith, University of Leeds, UNITED KINGDOM
I. Shield, Rothamstead Research, Harpenden, UNITED KINGDOM
A.B. Ross, University of Leeds, UNITED KINGDOM

Session reference: 3CV.2.2

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

A Layered Particle Approach to Model the Conversion of Thermally Thick Particles

Short introductive summary:

The pyrolysis of biomass particles is described using a time-efficient stochastic reactor. The existing model is extended to account for heat and mass transfer limitations that occur in large particles. In order to keep the advantage of low computational cost, the particle is discretized into a certain number of isothermal layers, which are subsequently heated up from the outside and exchange heat and mass with each other. This approach implements a single particle model into a reactor model and can at the same time be coupled with a detailed chemical mechanism that accounts for all steps of the pyrolysis process.

Presenter: **Kathrin WEBER, Norwegian University of Science and Technology, Energy and Process Engineering Dpt., Trondheim, NORWAY**

Presenter's biography:

Interests of Research:
- Thermochemical conversion processes
- Solid fuels (fossil and biomass)
- Biochar production
- Experimental/modelling

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Weber, Norwegian University of Science and Technology, Trondheim, NORWAY
T. Li, Norwegian University of Science and Technology, Trondheim, NORWAY
T. Løvås, Norwegian University of Science and Technology, Trondheim, NORWAY
C. Perlman, LOGE AB, Lund, SWEDEN
F. Mauss, Brandenburg University of Technology, Cottbus, GERMANY

Session reference: 3CV.2.3
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Comparison of Two Processes to Decrease CO2 Reactivity of Biochar for Metallurgical Industry

Short introductive summary:

Biochars produced from softwood and hardwood were analyzed in TGA experiments to compare CO2 reactivity to fossil coal and coke samples at different temperatures. A reduction of CO2 reactivity for biochar was investigated for two production processes to make higher yields and quality charcoal available in metallurgical processes: A high temperature slow pyrolysis operated at temperatures up to 1300°C and a two-stage pyrolysis process, where biomass is pyrolyzed at temperatures of at least 700°C and then liquid by-product is decomposed on a tempered biochar bed in a second process stage. The surface area of the biochar was determined by BET. Liquid by-products were analyzed before and after the second process in GC-FID and HPLC to determine the reacting agents.
In contrast to classical charcoal the reactivity with CO2 is reduced by both processes. An increased reduction of CO2 reactivity is observed for biochar production temperatures larger 1000°C and long residence times in one stage pyrolysis. It is shown that same reactivity can be obtained by a two-stage process. Mostly high-molecular tar compounds decomposed on the biochar bed and increased the the suitable char yield.

Presenter: **Gerrit SURUP, University of Agder, Engineering Sciences Dpt., Grimstad, NORWAY**

Presenter's biography:

2009 Diplom (MSc in Mechanical Engineering)
2010-2011 Research Fellow at Leibniz-Institut für Agrartechnik und Bioökonomie
2012 MSc in Renewable Energy
2011 - 2015 Research Engineer at Air Liquide Research and Development
since 2015 PhD Fellow at University of Agder

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Surup, University of Agder, Grimstad, NORWAY
H.K. Nielsen, University of Agder, Grimstad, NORWAY
T. Vehus, University of Agder, Grimstad, NORWAY
P.A. Eidem, Eramet Norway AS, Trondheim, NORWAY

Session reference: 3CV.2.4
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Experimental Investigation of Thermal Conductivity of Raw and Torrefied Biomass Fuels

Short introductive summary:

Experiments to measure the bulk thermal conductivity of a range of raw and torrefied biomass materials have been carried out in a hot box apparatus at NUI Galway.

Presenter: **Rory MONAGHAN, National University of Ireland Galway, Mechanical Engineering Dpt., Galway, IRELAND**

Presenter's biography:

Lecturer of Energy Systems Engineering in Mechanical Engineering at the National University of Ireland Galway. Research interests include advanced simulation of thermal-fluid systems, including combustion, gasification and thermal performance of buildings.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.P. O'Hagan, NUI Galway, Galway, IRELAND
S. Layden, NUI Galway, Galway, IRELAND
P. Layden, Arigna Fuels, Roscommon, IRELAND
R. Johnson, Arigna Fuels, Roscommon, IRELAND
J. Goggins, NUI Galway, Galway, IRELAND
R.F.D. Monaghan, NUI Galway, Galway, IRELAND

Session reference:	3CV.2.5
Subtopic:	3.1 Production of thermally treated solid biofuels
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biomass Pyrolysis With Bio-Oil Recycle to Increase Energy Recovery in Biochar

Short introductive summary:

Upgraded biomass, such as biochar, is a promising alternative to replace coal consumption in metallurgical processes, especially in blast furnaces. Biochar can be applicable for metallurgical processes if chemical and physical properties, such as carbon content, heating value, and mechanical strength, satisfy their requirement. When varying reaction conditions of conventional biomass pyrolysis processes, biochar yield and its qualities show trade-off. This study aims at increasing char yield by recycling bio-oil without negative impact on char qualities.

Presenter: **Aekjuthon PHOUNGLAMCHEIK, Luleå University of Technology, Engineering Sciences and Mathematics Dpt., Lulea, SWEDEN**

Presenter's biography:

I am PhD student at the Division of Energy Engineering at Luleå University of Technology. My research focusses on biochar production for metallurgical processes, which is conducted under the supervision of Assoc. Prof.Kentaro Umeki.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Phounglamcheik, Energy Engineering, Luleå University of Technology, Luleå, SWEDEN
K. Umeki, Energy Engineering, Luleå University of Technology, Luleå, SWEDEN
T. Wretborn, Energy Engineering, Luleå University of Technology, Luleå, SWEDEN

Session reference: 3CV.2.6

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Assessing the Heat and Energy Balances of Hydrochar Production via Hydrothermal Carbonization of Olive Pomace

Short introductive summary:

Hydrothermal carbonization (HTC) is considered an advantageous technology for the efficient conversion of wet biomass (80%) into coal-like products (hydrochar). Detailed heat and energy requirements are a prerequisite for process optimization and proper technology assessment. In this work, laboratory HTC experiments are carried out for the production of hydrochar from olive pomace (OP). The experiments involve changes in carbonization conditions (e.g., biomass to water ratio). A detailed mass balance of the HTC process of OP is firstly presented, with a good closure for the main products: solid (hydrochar), liquid (bio-oil mixed with water) and small fraction of gases (mainly CO2). It is then shown that increasing the biomass/water has almost no effect on the exploitable energy (i.e., energy density of the resulting hydrochar) while it increases by about 20% the consumed energy during the HTC of OP. In addition, the HTC treatment increases the higher heating values (HHV) of the hydrochar by 27% compared to raw OP (22.5 MJ/kg). However, the energetic recovery of bio-oil is between 67% and 77%, while the HHV of gaseous phase is very low (~ 0.2 MJ/kg).

Presenter: **Stephane BOSTYN, CNRS - Université d'Orléans, ICARE Dpt., ORLEANS, FRANCE**

Presenter's biography:

Knowledge in hydrothermal treatment from sub to supercritical water, knowledge in extraction

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Missaoui, CNRS-ICARE UPR3021, Orléans, FRANCE
S. Bostyn, CNRS-ICARE UPR3021, Orléans, FRANCE
V. Belandria, CNRS-ICARE UPR3021, Orléans, FRANCE
B. Sarh, CNRS-ICARE UPR3021, Orléans, FRANCE
I. Gokalp, CNRS-ICARE UPR3021, Orléans, FRANCE

Session reference: 3CV.2.8
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Upgrading of Pyrolysis Chars in Syngas Purification: Characterization and Implementation in a Fixed Bed Column

Short introductive summary:

Millet husks (MH) and buckwheat husks (BH) are agricultural wastes generated worldwide at levels of several million tons. Only in Europe millet and buckwheat production was 129,809 and 402,710 tons respectively in 2014 (Food and Agriculture Organization of the Unated Nations, 2014). These wastes don’t have alternative uses therefore they make great candidates to be recycled without affecting other practices. Considering this, BH and MH were tested as novel precursors for preparing pyrolyzed chars and activated carbons (AC) by physical activation. Pyrolysis of MH and BH was carried out under nitrogen flow at 500 °C during 30 min for each waste in a rotating quartz tube. Similarly, one-step physical activation was accomplished at 850 °C with CO2 as activating agent for a period of 80 min. A fixed bed column was set up to test chars and ACs in syngas purification using ethylbenzene (EB) as tar surrogate. In line with our results from characterization, MH and BH differ from each other mainly in terms of ash content and inorganic composition. Their different nature influenced formation of gas, liquid and solid in pyrolysis, resulting in high char yields (38%). Furthermore, MH-c

Presenter: **Audrey VILLOT, Ecole des Mines de Nantes, Nantes, FRANCE**

Presenter's biography:

She obtained her PhD in Chemical Engineering from the Savoie University in 2010. From 2010 to 2011, she holds a position of attached temporary teaching and research (ATER) in the engineering school of Polytech Annecy-Chambéry. Since 2011, she is Assistant Professor at the Ecole des Mines de Nante

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Pena, Ecole des mines de Nantes, Nantes, FRANCE
A. Villot, Ecole des mines de Nantes, Nantes, FRANCE
C. Gerente, Ecole des mines de Nantes, Nantes, FRANCE

Session reference: 3CV.2.9
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Energy Potential from Buckwheat Husks Through a Thermochemical and Biochemical Approaches

Short introductive summary:

Study concerning the recovery of buckwheat husks is still scarce in literature. In this context, the aim of this study was to investigate the possibility to recovery the buckwheat husks through energy vectors or materials with added value. For that, two processes were studied and compared: i) the pyrolysis and ii) the anaerobic digestion. For this purpose, the physico-chemical characteristics of buckwheat husks were firstly determined. Then pyrolysis and AD of buckwheat husks were conducted. An effort is made also to evaluate and compare the energy and/or material conversion efficiency of the two pathways.

Presenter: **Audrey VILLOT, Ecole des Mines de Nantes, Nantes, FRANCE**

Presenter's biography:

She obtained her PhD in Chemical Engineering from the Savoie University in 2010. From 2010 to 2011, she holds a position of attached temporary teaching and research (ATER) in the engineering school of Polytech Annecy-Chambéry. Since 2011, she is Assistant Professor at the Ecole des Mines de Nante

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Villot, Ecole des Mines de Nantes, FRANCE
M Elsayed, Ecole des Mines de Nantes, FRANCE
J. Pena, Ecole des Mines de Nantes / ADEME, Nantes / Angers, FRANCE
C. Gerente, Ecole des Mines de Nantes, FRANCE
Y. Andres, Ecole des Mines de Nantes, FRANCE

Session reference: 3CV.2.10

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

A Complete 1-D Model For Biomass Torrefaction Process and Results Validations Referred To An Experimantal Scale Reactor

Short introductive summary:

The purpose of this work consists in presenting the experimental measurements carried out on a laboratory scale torrefaction plant and the results of a one-dimensional (1-D) mass and energy balance model of torrefaction. This analysis was developed to simulate the process in view of setting up a scaling procedure and extend the results of the developed lab-scale reactor to industrial scale plants.

Presenter: **Marco BRIGHENTI, University of Trento, Civil, Environmental and Mechanical Engineering Dpt., Trento, ITALY**

Presenter's biography:

I’m a young and motivated engineer and a Phd student in the field of renewable energies. Since when I was attending the high school, I focused my efforts and drove my formation with the aim of working to improve the sustainability of the energy system and I’m pursuing my goals as a researcher.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Brighenti, University of Trento, Trento, ITALY
M. Grigiante, University of Trento, Trento, ITALY
D. Antolini, Free University of Bozen-Bolzano, Bozen, ITALY

Session reference: 3CV.2.11
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Synthesis of Hybrid Sludge Containing Green Carbon and Its Fuel Characterization

Short introductive summary:
Hybrid Sludge is simple and easy sewage sludge upgrading technology with moisture removal, higher calorific value, and prevention of water reabsorption.

Presenter: **Young-Joo LEE, Korea Institute of Energy Research, Clean fuel laboratory, Daejeon, REPUBLIC OF KOREA**

Presenter's biography:
solid biofuel

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Lee, Korea Institute of Energy Research, Daejeon, REPUBLIC OF KOREA
P. Park, Dongwon Heavy Industries CO., LTD, Gyeonggi-do, REPUBLIC OF KOREA
Steve Jeon, Pusan National University, Busan, REPUBLIC OF KOREA
C. Choi, Korea Institute of Energy Research, Daejeon, REPUBLIC OF KOREA

Session reference: 3CV.2.12
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of High Purity Lignin from Rapeseed Meal Using a Microwave-Assisted Hydrothermal Process

Short introductive summary:

This work addresses an efficient microwave-assisted hydrothermal process for the production of high purity lignin from rapeseed meal, the by-product of the extraction of oil from rapeseed. The isolated lignin was thoroughly characterised by determining its purity using the standard TAPPI method and analysing its physicochemical properties by Elemental Analysis, Pyrolysis-GC/MS, Simultaneous Thermal Analysis (STA), 13C solid Nuclear Magnetic Resonance (NMR) and Fourier Transform Infrared Spectroscopy (FTIR).

Presenter: **Javier REMON NUÑEZ, University of York, Chemistry Dpt., York, UNITED KINGDOM**

Presenter's biography:

Javier Remón, BSc, MS and PhD in Chemical Engineering, is a Postdoctoral researcher in the Green Chemistry Centre of Excellence at the University of York, UK. His research interests lie in the use of different waste-to-energy environmentally friendly processes for biofuels production.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Remon, University of York, UNITED KINGDOM
L. Zhou, University of York, UNITED KINGDOM
J. Fan, University of York, UNITED KINGDOM
D. Macquarrie, University of York, UNITED KINGDOM
V. Budarin, University of York, UNITED KINGDOM
J. Clark, University of York, UNITED KINGDOM

Session reference: 3CV.2.13

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Pyrolysis Kinetics of Wet-Torrefied Forest Residues

Short introductive summary:

This work aims to examine the pyrolysis kinetics of raw and wet-torrefied forest residues as well as influence of wet torrefaction conditions on the kinetics.

Presenter: **Øyvind SKREIBERG, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Dr. Øyvind Skreiberg (49) is Chief Scientist within stationary bioenergy at SINTEF in Trondheim, Norway, having 25 years of broad bioenergy experience, contributed to about 350 scientific publications, presentations and reports andrepresentedNorwaysince 1998 in IEA Task 32 Biomass combustion and cofiring.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Q.V. Bach, NTNU, Trondheim, NORWAY
Ø. Skreiberg, SINTEF, Trondheim, NORWAY

Session reference: 3CV.2.14

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Hydrothermal Decomposition of Wastes Resulting from the Agro-Industrial Activities under Liquid and Supercritical Water Conditions

Short introductive summary:

The purpose of this contribution is the experimental study of the decomposition of organic materials in an aqueous environment, in order to quantify the yields in liquid and/or solid fuel than can be obtained under different operating conditions.

Presenter: **Alessandro Antonio PAPA, University of L’Aquila, Department of Industrial and Information Engineering and of Economics, L’Aquila, ITALY**

Presenter's biography:

Alessandro Papa is a PhD student at the Department of Industrial and Information Engineering and Economics of the University of L'Aquila. His research area is focused on hydrothermal processes applied to the conversion of waste material.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Di Giacomo, University of L'Aquila, ITALY
A. Gallifuoco, University of L'Aquila, ITALY
F. Scimia, University of L'Aquila, ITALY
L. Taglieri, University of L'Aquila, ITALY
A.A. Papa, University of L’Aquila, ITALY

Session reference: 3CV.2.16

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Gasification Behaviours of Different Biomass Charcoals under CO2 Atmosphere

Short introductive summary:

The purpose of this study was to study the impact of pyrolysis temperature and calcination treatment on properties of woody biomass charcoal focusing on gasification reactivity under CO2 atmosphere. The experimental work was carried out using Norway spruce charcoal produced at two different carbonization temperatures (650 and 800 °C). In addition, gasification of pine wood charcoal produced at 650 °C was also carried out for comparison purpose. Considering the possible negative effects of the volatile content on metal production processes, the studied charcoal samples were also calcinated at 1000 °C for 1 hour to eliminate the volatile matters. Both uncalcinated and calcinated charcoals were gasified in a furnace setup at 850 °C under CO2 atmosphere with continuous monitoring of weight loss. The results showed that carbonization temperature has evident effects on CO2 gasification reactivity of the studied charcoals. The calcination treatment lowered the CO2 gasification reactivity of the studied charcoals. It might be due to structure reordering of the carbon matrix during the calcination that is accompanied by loss of active carbon sites.

Presenter: **Liang WANG, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Liang Wang is a research scientist at SINTEF Energy Research in Trondheim Norway. His research focuses on thermal conversion and utilization of biomass and wastes for renewable energy and green fuel production and substainable metal prodcution processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Wang, SINTEF Energy Research, Trondheim, NORWAY
N. Alsaker, SINTEF Energy Research, Trondheim, NORWAY
Ø. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
T. Buø, Elkem, Kristiansand, NORWAY
R. Birkeland, Elkem, Kristiansand, NORWAY
A. Valderhaug, Elkem, Kristiansand, NORWAY
B. Hovd, SINTEF Materials and Chemistry, Trondheim, NORWAY

Session reference: 3CV.2.17
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

CO2 Gasification Reactivity of Biocarbon Produced at Different Conditions

Short introductive summary:

In this work, biocarbons were produced from Norway spruce under different final temperature (550, 650 and 800 °C) and holding times (10 and 30 minutes). The CO2 gasification reactivity of the prepared biocarbons was investigated in a thermogravimetric analyzer at different gasification temperatures (850, 900 and 950 °C). The results show that the gasification reactivity of the spruce biocarbon produced at higher carbonization temperature are lower than those produced at lower temperatures. TIn addition, the CO2 gasification reactivity of biocarbon produced at longer holding time (i.e., 30 minutes) is also lower than those prepared at shorter carbonization time (i.e., 10 minutes). All prepared biocarbons had significantly higher reactivity as they were gasified at a higher temperature. The time needed for half conversion of the tested biocarbons at a gasification temperature of 950 °C was only one fourth of those at a gasification temperature of 850 °C. The random pore model described well the gasification behaviours of all the prepared biocarbons with high fit quality. The activation energy values obtained from the prepared biocarbons are in the range of 170 to 200 kJ/mol.

Presenter: **Liang WANG, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Liang Wang is a research scientist at SINTEF Energy Research in Trondheim Norway. His research focuses on thermal conversion and utilization of biomass and wastes for renewable energy and green fuel production and substainable metal prodcution processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Wang, SINTEF Energy Research, Trondheim, NORWAY
P. Maziarka, Norwegian University of Science and Technology, Trondheim, NORWAY
Ø. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
T. Løvås, Norwegian University of Science and Technology, Trondheim, NORWAY
M. Wadrzyk, AGH University of Science and Technology, Krakow, POLAND

Session reference: 3CV.2.18
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sugarcane Straw Upgrading by Water Washing and Roasting for its Use as a Solid Biofuel

Short introductive summary:

The effects of combined water washing and roasting pretreatments for reduction of ash, Cl, S and alkali oxides contents of sugarcane straw were investigated. Straw were ground between 2 – 6 mm and washed in 3 liters of water at 80 °C for 30 minutes. Washed samples were sun dried and roasted at 250 °C for 20 minutes. Untreated and washed-roasted straw were characterized by ultimate and proximate analysis, higher heating value and ash chemical composition. Results indicated that combined pretreatments signi?cantly improves the fuel characteristics. Ash, Cl, S and alkali oxides contents decreased by 18.7%, 98.6%, 57.1% and 50.2% respectively while higher heating value increased by 26.4%. Grinding properties of the residue were also improved.

Presenter: **Estela ASSUREIRA, Pontificia Universidad Católica del Perú, Engineering Dpt., Lima, PERU**

Presenter's biography:

I am a Mechanical Engineer and Master of Science from the Pontificia Universidad Católica del Perú (PUCP). At PUCP I am a principal professor at the Engineering Department teaching Fluid Mechanics and Turbomachinery courses. Since 1981, I am a Director of Coal and Biomass Research Group.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Assureira, Pontificia Universidad Católica del Perú, Lima, PERU
M. Assureira, Pontificia Universidad Católica del Perú, Lima, PERU

Session reference: 3CV.2.23

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Genepi Project: An Innovative Platform of Feedstock Pretreatment by Grinding and Torrefaction, Coupled with an Entrained-Flow Reactor (Efr) for Gasification

Short introductive summary:

The GENEPI project aims at developing an experimental platform for biomass pretreatment and gasification, with R&D equipment at pilot scale.To illustrate the potentiality offered by this platform, the results of two projects carried out with industrial partners and implying the preparation unit are presented.

Presenter: **Thierry CHATAING, CEA, Isère Dpt., Grenoble, FRANCE**

Presenter's biography:

Thierry Chataing is a physical engineer of Institut National Polytechnique de Grenoble (INPG), speciality Energétique et Nucléaire. He is in charge with the technological development platform at CEA Grenoble, and has 10 years of experience in thermal conversion processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Chataing, CEA, Grenoble, FRANCE
T. Melkior, CEA, Grenoble, FRANCE
G. Ratel, CEA, Grenoble, FRANCE
J.M. Commandre, CIRAD, Montpellier, FRANCE
S. Salvador, Mines Albi, Albi, FRANCE

Session reference:	3CV.2.24
Subtopic:	3.1 Production of thermally treated solid biofuels
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Small Scale Torrefaction of Local Biomass Residues. Technical and Economic Assessment

Short introductive summary:

The paper presents an innovative, integrated and automated pilot plant to produce torrefied biomass residues locally and use them in boilers and furnaces in various forms (powder, chips, and pellets)
The innovation lies in the design of the plant, compact and automated with remote supervision, in the use of poor quality hog fuel, locally sourced, to produce a high value fuel that respect the new ISO specifications for thermally treated biomass. The torrefaction gas represents about 20% of the mass and 8% of the energy of the raw biomass and is recovered in a Flox® burner, in order to provide heat to the process. Detailed physico-chemical analysis and combustion tests in domestic boilers have demonstrated the many advantages of the torrefied fuels.

Presenter: **Jean-Bernard MICHEL, Univ. of Applied Sciences and Arts Western Switzerland, Industrial Bioenergy Systems, Yverdon-les-Bains, SWITZERLAND**

Presenter's biography:

Professor and Head, of Industrial Bioenergy Systems unit, Independent consultant and trainer.
Born in 1953, 40 years of R&D experience in 5 public and private research units: IFRF, Battelle, CSEM, Hepia Geneva, HEiG-VD Yverdon. Teaching industrial ecology, renewable energy and fluid mechanics

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.-B. Michel, University of Applied Sciences and Arts Western Switzerland, Yverdon-les-Bains, SWITZERLAND
M. McCormick, University of Applied Sciences and Arts Western Switzerland, Yverdon-les-Bains, SWITZERLAND
C. Tansley, Granit Technology and Engineering SA, Orbe, SWITZERLAND
B. Correa, Granit Technology and Engineering, Orbe, SWITZERLAND
M. Schmid, Ökozentrum, Langenbruck, SWITZERLAND
M. Vögeli, Ökozentrum, Langenbruck, SWITZERLAND
J. Ropp, University of Applied Sciences and Arts Western Switzerland, Yverdon-les-Bains, SWITZERLAND

Session reference: 3CV.2.25
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Comparing Yield and Environmental Effects of Poplar and Willow Plantations on Agricultural Land in Sweden

Short introductive summary:

The present study characterizes the present situation of both cultivations in Sweden, aiming at assessing their relative importance by the extension planted, their current yield levels, and their effects on soil and groundwater quality. For that, a database has been compiled based on own measurements with existing data, trials and records from previous studies.
Based on that, in Sweden poplar currently covers 1 322 ha, for willow 9 830 ha, being distributed in similar locations in the country. The average plantation size is 2.59 and 3.87 ha, for poplar and willow respectively. Regarding their expected yields, those vary depending on the measurement methods: when estimating small plots and trials, their averages are 6.90 and 7.7 Mg ha-1 year-1 for poplar and willow, respectively. However, these are reduced to half these levels when assessing commercial level plantations. There are also differences in their environmental effects on groundwater, as poplar plantations presented higher values of NO3-N and lower values of PO4-P than willow, although the differences are small. These differences are consistent along seasons in case of NO3-N, and are only observed in autumn in th

Presenter: **Blas MOLA, University of Easter Finland, Joensuu, FINLAND**

Presenter's biography:

I work as Adj Prof at the University of Eastern Finland (UEF, Joensuu, Finland), and at the Swedish University of Agricultural Sciences (SLU, Uppsala, Sweden) in topics related to biomass production systems for energy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Dimitriou, Swedish University of Agricultural Sciences, Uppsala, SWEDEN
B. Mola-Yudego, UEF/SLU, Joensuu, FINLAND

Session reference:	1CO.9.1
Subtopic:	1.3 Biomass Crops and Energy Grasses
Topic:	1. BIOMASS RESOURCES

Bioethanol Yield and Quality Components in Cellulosic Biomass Crops Grown in the North Central USA

Short introductive summary:

This paper evaluates the biomass production, sugar profile, and bioethanol yield of seven cellulosic crops grown in side by side plots at two North Central USA locations over a three year period. Differences in gravimetric (g g-1) bioethanol yields were observed but biomass yield was the primary driver for liquid fuel production on a land-area basis.

Presenter: **Kurt THELEN, Michigan State University, Plant, Soil & Microbial Sciences Dpt., East Lanasing, USA**

Presenter's biography:

Dr. Thelen is a professor at Michigan State University, in the Plant, Soil and Microbial Sciences Department. His research program is focused on developing crop systems that increase food, feed, and energy production while safeguarding soil, air, water, and biodiversity.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Thelen, Michigan State University, East Lansing, USA
G. Sanford, University of Wisconsin, Madison, USA
P. Robertson, Michigan State University, East Lansing, USA
R. Jackson, University of Wisconsin, Madison, USA

Session reference: 1CO.9.2
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Evaluating Tropical Forages Grasses as Biomass Sources to Energy Production

Short introductive summary:

This research evaluated the productivity and chemical characteristics, such superior caloric values and carbohydrates contents of these biomass sources. These parameters were used to calculate energy per hectare per year (kcal), Theoretical energy potential/year (MW/hora), Theoretical ethanol per hectare per year (tons and liters). Brachiaria brizantha cultivars presented an average Dry matter yield of 24 t/ha/year, Energy per hectares year of 94126012 kcal, Theoretical energy potential per year of 109 MW/hours, Ethanol yield of 4.3 t/ha/year, and 5490 L/ha/year. Panicum maximum cultivars presented an average Dry matter yield of 15 t/ha/year, Total Energy of 59181300 kcal/ha/year, Theoretical energy potential per year of 69 MW/hours, Ethanol yield of 5 t/ha/year, and 5839 L/ha/year. Pennisetum purpureum cultivars presented an average Dry matter yield of 34 t/ha/year, Total Energy of 161231412 kcal/ha/year, Theoretical energy potential per year of 187 MW/hours, Ethanol yield of 12 t/ha/year, and 15297 L/ha/year.

Presenter: **Marcelo AYRES CARVALHO, Embrapa - Brazilian Agriculture Research Corporation, Cerrados Research Center, Planaltina, BRAZIL**

Presenter's biography:

Marcelo Ayres is a Senior Researcher at Embrapa Cerrados. He has a Ph.D. degree in Plant Breeding and Genetics from the University of Florida . Published 28 articles in professional journals and 96 papers in conference proceedings.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Ayres Carvalho, Embrapa, Brasilia, BRAZIL
F. Duarte Fernandes, Embrapa, Brasilia, BRAZIL
A. Kardec Braga Ramos, Embrapa, Brasilia, BRAZIL
G. Jose Braga, Embrapa, Brasilia, BRAZIL

Session reference: 1CO.9.3
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Evaluation of a Sugar Corn to Bioenergy and Bioproducts Value Chain

Short introductive summary:

New varieties of corn (Zea mays) which contain high concentrations of sucrose in their stalks, termed sugar corn, are under development at Agriculture and Agri-Food Canada. Sugar corn can be grown in temperate climates within 2000 crop heat units (CHU), potentially making it a viable energy crop throughout Canada. In this study we assessed the biomass and sucrose yield of sugar corn grown in two different locations in Ontario, Canada. Juice from processed sugar corn stalks was used for fermentative production of ethanol and for succinic acid production using Actinobacillus succinogenes. Pressed stalk residues were ensiled and assessed for biogas production potential or animal feed value. Here we present data on the impact of genotype, population density, and nitrogen application rate on biomass and sucrose yields in field trials. Sucrose conversion to succinic acid will also be reported.

Presenter: **Tiffany HINBEST, University of Guelph Ridgetown Campus, Dutton, CANADA**

Presenter's biography:

I am a Master's of Science student at the University of Guelph. My thesis involves studying a novel variety of corn with a high percent sucrose in its stalks. Before my Master's I studied at the University of Waterloo, where I became interested in how microorganisms are grown and utilized.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Hinbest, University of Guelph Ridgetown Campus, Ridgetown, CANADA
R. Nicol, University of Guelph Ridgetown Campus, Ridgetown, CANADA
D. Young, University of Guelph Ridgetown Campus, Ridgetown, CANADA
D. Hooker, University of Guelph Ridgetown Campus, Ridgetown, CANADA
L. McNea, University of Guelph Ridgetown Campus, Ridgetown, CANADA
M. Morrisson, Agriculture and Agri-Food Canada, Ottawa, CANADA
L. Reid, Agriculture and Agri-Food Canada, Ottawa, CANADA
A. Margaritis, University of Western Ontario, London, CANADA
B.H. Gilroyed, University of Guelph Ridgetown Campus, Ridgetown, CANADA

Session reference: 1CO.9.4
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Camelina & Crambe: Two Non-Food Oil Crops with New Perspectives for Europe

Short introductive summary:

The on-going EU-funded project ‘COSMOS - Camelina & crambe Oil crops as Sources for Medium-chain Oils for Specialty oleochemicals’ addresses two profitable, sustainable, multipurpose, non-food, domestic oil crops, camelina (Camelina sativa L.) and crambe (Crambe abyssinica Hochst ex. R.E. Fr.), for the production of several biobased products. Field trials are performed at different locations in Europe to assess the potential of the crops in terms of cultivation practices, seed yield, oil content and agronomic inputs.

Presenter: **Myrsini CHRISTOU, Center for Renewable Energy Sources, Biomass Dpt., Pikermi, GREECE**

Presenter's biography:

Agriculture engineer, MSc, leader of CRES Biomass department.Over 25 years of experience as coordinator and scientific responsible in a range of European and nationalRTD projectson technical evaluation of several biomass feedstocks in integrated biomass value chainsfor energy and biorefinery concepts.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Christou, CRES, Pikermi, GREECE
E. Alexopoulou, CRES, Pikermi, GREECE
F. Zanetti, University of Bologna, ITALY
A. Monti, University of Bologna, ITALY
D. Righini, University of Bologna, ITALY
M. Stolarski, UWM, Olsztyn, POLAND
M. Krzyzaniak, UWM, Olsztyn, POLAND
E.N. Van Loo, WUR, Wageningen, THE NETHERLANDS
C. Eynck, Linnaeus, Saskatoon, CANADA
J. Grushcow, Linnaeus, Saskatoon, CANADA

Session reference: 1CO.9.5
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Integrative Approaches for Bioenergy and the Bio-Economy: a Comparative Assessment in Kenya, Thailand and Sweden

Short introductive summary:

The integration of bioenergy into the bio-economy is explored using a conceptual model and comparative case study assessment in a developing, emerging and developed economy: Kenya, Indonesia, Sweden.

Presenter: **Ivar VIRGIN, Stockholm Environment Institute, Resources and Develpment Dpt., Stockholm, SWEDEN**

Presenter's biography:

Ivar Virgin, Senior Researcher at the Stockholm Environment Institute (SEI) is one of the main architects and initiators of the two largest bioscience innovation programs in Africa, the BIO-EARN and BioInnovate. He is the editor of the Routledge book Creating Sustainable Bioeconomies

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F.X. Johnson, Stockholm Environment Institute, Nairobi, KENYA
O. Olsson, Stockholm Environment Institute, Stockholm, SWEDEN
I. Virgin, Stockholm Environment Institute, Stockholm, SWEDEN
Y. Ran, Stockholm Environment Institute, Stockholm, SWEDEN
A. Nyambane, Stockholm Environment Institute, Nairobi, KENYA
P. Osano, Stockholm Environment Institute, Nairobi, KENYA
M. Fielding, Stockholm Environment Institute, Bangkok, THAILAND
M. Aung, Stockholm Environment Institute, Bangkok, THAILAND

Session reference: 4CO.10.1

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biomass Landscape in Malaysia / Asia

Short introductive summary:

Malaysia Biomass Industries Confederation (MBIC) is a legacy of Switch Asia Program under "Biomass-sp" in Malaysia which the EU have so generously funded and successfully groomed enterprises, whom now have joined forces to form this NGO to assist others wanting to develop sustainable Biomass conversion to high value products with knowledge gained during the 4 years of continual coaching and standards qualifications. The main objective is to create a platform to support Small and Medium Enterprises (SME's) to look into different industries that the what the local Biomass Feedstock are available and conversation technologies available to produce finish products of acceptable high standards plus market acceptance. MBIC's function is to facilitate the knowledge disbursement, pointing buyers to sellers and vis a vis. Malaysia is an agricultural country with a major commercial crop "OIL PALM". In this industry of producing Food Oil, large volume of biomass from the culturing and milling is made available for the Biomass sectors. Every efforts have being put in place by the Government and financial institutions to support the waste management industries to achieve Environmental and Sustainable down stream and upstream industries utilizing available feedstock thus generating income from other than the main product.

Presenter: **Kester CHIN, MBIC, Biotechnology, Banting, MALAYSIA**

Presenter's biography:

A "Waste to Wealth" Consultant in Palm Oil Mill Waste Management specializing in "Zero Waste and Zero Discharge" Technologies,
has more than 10 years experience in Environmental Sustainability Industries.
The Current Deputy President of Malaysia Biomass Industries Confederation (MBIC)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Session reference: 4CO.10.2

Subtopic: 4.5 Biomass strategies and policies

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Exploring the Rice Straw Bioenergy Landscape: Farmer Perspectives from India and the Philippines

Short introductive summary:

With over 730 million tonnes of rice straw produced every year, open-field rice straw burning continues to be an important environment and health challenge. Using rice straw as feedstock for bioenergy could offer a sustainable solution to straw burning, and potentially provide wider socio-economic benefits.

Using India and the Philippines as case studies, our work explores how this potential can be met by investigating the needs and preferences of farmers who would be major players in rice straw bioenergy deployment. We compared results from focus group discussions conducted during our scoping study to gain better insights on how a prospective bioenergy system could be shaped, especially considering the livelihood characteristics and energy demands of farmers and rice farming communities.

Presenter: **Angela Mae MINAS, University of Manchester, Tyndall Centre for Climate Change Research, Manchester, UNITED KINGDOM**

Presenter's biography:

Angela is a PhD Researcher at the Tyndall Centre for Climate Change Research at The University of Manchester. Her research focuses on the social sustainability aspect of bioenergy, particularly, farmer engagement in rice straw bioenergy development in Southeast Asia.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.M. Minas, University of Manchester, UNITED KINGDOM
M. Röder, University of Manchester, UNITED KINGDOM
A. Samaddar, International Rice Research Institute, Manila, PHILIPPINES
J. Luis, International Rice Research Institute, Manila, PHILIPPINES
E. Cabrera, International Rice Research Institute, Manila, PHILIPPINES
P. Thornley, University of Manchester, UNITED KINGDOM
C. Jamieson, International Rice Research Institute, Manila, PHILIPPINES

Session reference: 4CO.10.3
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Perspective for the Use of Biomass in the Iron and Steel Industry

Short introductive summary:

The introduction of renewables into high energy and emission intensive industries is a crucial step for moving towards a bio-based economy. Biomass presents a significant opportunity particularly in the iron and steel sector, as the iron ore reduction processes require solid carbon, which cannot be provided by any other renewable. There are various opportunities for bioenergy integration into the current technologies; however, pros and cons of each should be evaluated to ensure the limited biomass resources are strategically used to achieve the greatest gain regarding the environmental benefits, production costs, and technological constraints.
The current work presents a methodology that combines life cycle analysis, cost-benefit analysis and availability of biomass resources for those iron and steel making technologies, which considered biomass integration. The results provide an understanding of which of those technologies have the greatest potential for biomass usage and how the opportunities differ based on the geographic location. The proposed methodology can be adapted to other industries, which are yet to realise the full potential of bioenergy usage within their processes.

Presenter: **Hana MANDOVA, University of Leeds, School of Chemical and Process Engineering, Leeds, UNITED KINGDOM**

Presenter's biography:

Hana Mandová is a PhD researcher at the University of Leeds, part of the Bioenergy Centre for Doctoral Training. Her background is in Mathematics and focus of her PhD work is on optimising the use of biomass for heavy emission and energy-intensive industries, such as iron and steel.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Mandova, University of Leeds, UNITED KINGDOM
W. F. Gale, University of Leeds, UNITED KINGDOM
A. Williams, University of Leeds, UNITED KINGDOM
A.L. Heyes, University of Strathclyde, Glasgow, UNITED KINGDOM

Session reference:	4CO.10.4
Subtopic:	4.5 Biomass strategies and policies
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Household Level Food Security Impacts of a 20% Biofuel Mandate in Ghana

Short introductive summary:

As the effect on food security remains an important point of criticism on biofuel production in developing countries, various models have been developed to assess ex-ante the food security impacts of biofuel expansion. However, these models show impacts at a highly aggregate level, which disregards that vulnerability to food security differs between household types. The aim of this study is to assess the food security impacts of biofuel expansion in Ghana in 2030 on a household level. Ghana has a 20% biofuels mandate for 2030, while 5% of the population is currently under-nourished. Two approaches are combined to make this assessment: 1) the Bioenergy and Food Security Rapid Appraisal, a quick scan to calculate a biofuel potential in Ghana that does not interfere with food consumption or exports and 2) the macroeconomic MAGNET model that can calculate the impacts of the biofuel expansion for nine different types of Ghanaian households (rural and urban in four regions and the capital). The combination of the models allows assessing food security impacts from biofuel production in a more comprehensive manner than previous studies because it zooms in to the household level.

Presenter: **Marnix BRINKMAN, Utrecht University, Copernicus Institute of Sustainable Development, Utrecht, THE NETHERLANDS**

Presenter's biography:

Marnix Brinkman (1988) is a junior researcher at the Copernicus Institute of Sustainable Development at Utrecht University in the Netherlands. His main research interests lie with sustainable use of biomass, both from an environmental and a socio-economic perspective.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.L.J. Brinkman, Utrecht University, THE NETHERLANDS
J. Levin-Koopman, Wageningen Economic Research, THE NETHERLANDS
I. Maltsoglou, FAO, Rome, ITALY
L. Rincon, FAO, ITALY
E. Smeets, Wageningen Economic Research, THE NETHERLANDS
B. Wicke, Utrecht University, THE NETHERLANDS
A.P.C. Faaij, University of Groningen, THE NETHERLANDS
F. van der Hilst, Utrecht University, THE NETHERLANDS

Session reference: 4CO.10.5
Subtopic: 4.5 Biomass strategies and policies
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Exploitation of Inulin-type Fructans (ItF) from Chicory Roots for the Production of Platform Chemicals

Short introductive summary:

Around 76,042 tons of Inulin-type Fructans (ItF) can be provided annually in Europe by cultivating of Chicory (Cichorium intybus L.) roots with 15-20 % ItF fresh weight. Roots of a poor quality and roots after the Chicory salad production can be used for the production of the platform chemical 5-Hydroxymethylfurfural (5-HMF) with a high flexibility for chemical modification. After treatment of grated roots in water at 85 (±2 °C) for a maximum of 30 min extracted ItF with mainly low degree of polymerization (DP ≤ 8) were converted in diluted nitric acid (TR = 160 °C; tR = 3 min) with a molar yield up to 38 mol% 5-HMF in batch reactors at lab scale. D-(-)-Fructose could be converted with a molar yield of 41 mol% 5-HMF in batch reactors however up to 54 mol% 5-HMF in continuous operating proved by AVA-Biochem. Thus, conversion of ItF at 160 °C for reaction time up to 20 min in batch reactors and in continuous operating should result in promising molar yields of 5-HMF.

Presenter: **Dominik WUEST, University of Trento, Civil, Environmental and Mechanical Engineering Dpt., Trento, ITALY**

Presenter's biography:

10/2007-03/2013 Studies in Environmental Engineering at the University of Applied Sciences Weihenstephan-Triesdorf
04/2013-12/2015 Lab Engineer at the University of Hohenheim
01/2026-present Chief Engineer at the University of Hohenheim
10/2016-10/2019 PhD at the University of Trento

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Wüst, University of Hohenheim, Stuttgart, GERMANY
M. Götz, University of Hohenheim, Stuttgart, GERMANY
J. Pfenning, University of Hohenheim, Stuttgart, GERMANY
A. Kruse, University of Hohenheim, Stuttgart, GERMANY
L. Fiori, University of Trento, Trento, ITALY

Session reference: 3CO.11.1
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Depolymerization of Lignin: Product Characterization and Evaluation of its Antioxidant Potential

Short introductive summary:

Lignin is now considered as the main aromatic renewable resource because of its amorphous structure consisting of methoxylated phenylpropane units. Large quantities of lignin are produced worldwide in the pulp industry as a liquid by-product (black liquor). However, in spite of its enormous potential for obtaining high-value bio-based products and chemicals, to date lignin has been undervalued and only used as a dispersing or binding agent or directly combusted for obtaining process heat.

In this work, depolymerization of lignin has been studied aiming at fragmenting this biopolymer into phenolic units that could be used as antioxidant additives for biodiesel. Poor oxidation stability of biodiesel is an important drawback to be considered during extended storage periods, so the use of antioxidants is usually required to meet the standard requirements. Synthetic sterically hindered phenols such as tert-butyl hydroxyquinone are usually employed for this purpose because of the presence of highly labile hydrogen in the OH group that acts as a free radical scavenger. Therefore, obtaining renewable additives from lignin appears as an interesting challenge.

Presenter: **Alberto GONZALO CALLEJO, Universidad de Zaragoza, Instituto de Investigación en Ingeniería de Aragón, Zaragoza, SPAIN**

Presenter's biography:

Researcher

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.L. Sánchez, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
J. Salafranca, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
S. Moles, Universidad de Zaragoza, Zaragoza, SPAIN
J.F. Palomo, Universidad de Zaragoza, Zaragoza, SPAIN
C. Martínez, Universidad de Zaragoza, Zaragoza, SPAIN
N. Gil-Lalaguna, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
C. Dueso, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
A. Gonzalo, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN

Session reference: 3CO.11.2

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Physical And Structural Properties of Xylan-Based Biodegradable Films from Sorghum By-Products

Short introductive summary:

Xylan-based films have been developed targeting particularly food packaging applications, where they have found limited applications due to their high water permeability. However, this feature is advantageous for agricultural applications if the permeability can be controlled. Another disadvantage, which can potentially affect their potential agricultural applications is its low elasticity. Low elasticity leads to brittle films. Previous studies reported that films prepared from xylans extracted from cereals by-products, such as barley husks, oat spelts, wheat bran, rye grains, or corn cob and bran. However, the utilisation of sorghum by-products has not been studied intensively. Each cereal has its properties of xylans material. To the best of our knowledge, this is the first study on the production of biodegradable films of xylans extracted from sorghum by-products.

Presenter: **Prima LUNA, University of Reading, Food and Nutritional Sciences Dpt., Reading, UNITED KINGDOM**

Presenter's biography:

Prima Luna is a third year PhD student in Department Food and Nutritional Sciences at University of Reading. She is a researcher at the Ministry of Agriculture in Republic of Indonesia. Her field is postharvest technology. Her research area focus on crop plants postharvest.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P Luna, University of Reading, UNITED KINGDOM
A Chatzifragkou, University of Reading, UNITED KINGDOM
D Charalampopoulos, University of Reading, UNITED KINGDOM

Session reference: 3CO.11.3

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Consortia Based Production of Biochemicals

Short introductive summary:

Dr. Sheila I Jensen is currently a researcher at DTU Biosustain. She has a M.Sc. and PhD in Biology and has postdoc experience within applied biotechnology. Her recent and current research activities include designing optimized tools for bacterial engineering. Her main research activities have been to pioneer consortia based production of biochemicals to deal with heterogeneous sugar compositions.

Presenter: **Sheila Ingemann JENSEN, Technical University of Denmark, Novo Nordisk Foundation, Center for Biosustainability, Kgs. Lyngby, DENMARK**

Presenter's biography:

Sheila I Jensen obtained her M.Sc. and PhD in Biology from The University of Copenhagen. After her PhD, she shifted to biotechnology, where her main research activities have been to pioneer consortia based strategies for facilitating production of biochemicals from complex biomass resources.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.I. Jensen, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
S. Sukumara, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
E. Ôzdemir, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
K. Schneider, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
P. Calero, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
S. Li, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
C. Ronda, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK
A.T. Nielsen, Novo Nordisk Foundation, Center for Biosustainability, Technical University of Denmark, Lyngby, DENMARK

Session reference: 3CO.11.4
Subtopic: 3.7 Production and application of biobased chemicals
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Production of Antioxidant Additives for Biodiesel Using Residues from Wine Industry

Short introductive summary:

The poor oxidation stability of biodiesel is one of the main drawbacks for using this bio-carburant in diesel engines. Among other issues, low oxidation stability prevents biodiesel from being stored for long periods of time without significant changes in composition and properties. Therefore, the addition of antioxidants is usually required to satisfy the quality standards for biodiesel commercialization. Oxidation cannot be entirely prevented, but can be significantly retarded by using antioxidants, that are usually expensive and produced from non-renewable sources. Therefore, the production of additives from renewable materials is a key challenge in the field of production and commercialization of biodiesel. In this context, the waste derived from winemaking, which may represent up to 20% of the total weight of the grapes, appears as an interesting raw material because of its high content of polyphenols that are known to have high antioxidant potential. In this work, the antioxidant potential of different products derived from thermochemical treatment and solvent extraction process of grape residues has been evaluated through its addition to neat biodiesel.

Presenter: **Jose Luis SANCHEZ CEBRIÁN, Universidad de Zaragoza, Chemical & Environmental Engineering Dpt., Zaragoza, SPAIN**

Presenter's biography:

Researcher

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Botella, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
M. Ramos, Universidad de Zaragoza, Zaragoza, SPAIN
N. Gil-Lalaguna, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
A. Gonzalo, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
J.L. Sánchez, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN
J. Arauzo, Universidad de Zaragoza / Aragón Institute for Engineering Research (I3A), Zaragoza, SPAIN

Session reference: 3CO.11.5

Subtopic: 3.7 Production and application of biobased chemicals

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Use of Fast Pyrolysis Oil in Diesel Engines for CHP Applications

Short introductive summary:

The objective of the work described in this paper is to develop and demonstrate a cost-effective, biomass based combined heat and power (CHP) system by using fast pyrolysis bio oil (FPBO) in a diesel engine. Due to the properties of FPBO significant modifications are required to a standard engine to enable the fueling of FPBO. Test results of both the 1-cylinder and 4-cylinder prototype will be presented. Modified fuel pumps and injectors have been made in-house from a certain type of stainless steel, and implemented on both engines. Successful continuous test runs of over 100 hrs have been accomplished.

Presenter: **Bert VAN DE BELD, BTG Biomass Technology Group, Enschede, THE NETHERLANDS**

Presenter's biography:

Dr. Bert van de Beld joined BTG Biomass Technology Group BV in 1995 and became director of technology in 2002. He received his PhD at Twente University in the Netherlands on air purification by catalytic oxidation in an adiabatic packed bed reactor with periodic flow reversal. He was scientific/technical coordinator of the FP-7 EMPYRO project in which the semi-commercial pyrolysis plant is built and operated. Currently, he is involved in projects on pyrolysis oil quality control and the use of the pyrolysis liquid in modified diesel engines. Furthermore he is the representative of the Netherlands in IEA task 34 - thermochemical conversion of biomass into liquid fuels.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. van de Beld, BTG Biomass technology Group BV, Enschede, THE NETHERLANDS
E. Holle, BTG Biomass technology Group BV, Enschede, THE NETHERLANDS
J. Florijn, BTG Biomass technology Group BV, Enschede, THE NETHERLANDS

Session reference: ICO.12.1
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Enabling Solid Biomass Fired Small Scale Cogeneration Systems with the Twin Screw Wet Steam Expander Technology

Short introductive summary:

Distributed power generation in industrial, urban and commercial applications is a key topic for the strategic development and implementation of modern energy policies. Solid biomass fired small scale cogeneration plants can play an important role in Europe to improve environmental and economic impact of such policies. As a result of advances in the design and development of twin-screw wet steam expanders, they now appear as an efficient enabling technology for this small scale de-centralised cogeneration plants.The paper will describe the principles of steam screw expander operation and performance characterisation and discuss installations of the expander genset in various industrial and urban (district heating) applications where steam is generated with solid biomass fired saturated steam boilers.

Presenter: **Marco IEZZI, Heliex Power, Thermodynamics and Product Planning Dpt., East Kilbride, UNITED KINGDOM**

Presenter's biography:

Mechanical engineer graduated at University of L'Aquila (Italy), Marco got a PhD in Innovation Management at the same University in 2008. Moved to UK, since 2010 Marco is a director at Heliex Power, contributing in the development and commercialization of the twin screw steam expander technology.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Iezzi, Heliex Power, East Kilbride, UNITED KINGDOM
M.G. Read, City, University of London, London, UNITED KINGDOM

Session reference: ICO.12.2
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Potential Of A Machine Vision-Based Combustion Monitoring System In Optimizing Step-Grate Biomass Combustion

Short introductive summary:

The main objective of this work is to minimize emission levels and optimize thermal efficiency of a 3 MW nominal capacity, step-grate fired biomass boiler without on-line fuel analysis systems by applying novel combustion process control based on routinely measured operating parameters and real-time flame image processing and machine learning. Two important tasks of image based combustion monitoring systems are providing alerts and predictions regarding the state of the system. The system issues alerts based on the location of the reaction zone and predicts boiler performance based on image and operating data. Using image processing of the acquired flame images, the edge of the reaction zone inside the boiler can be monitored. The accuracy of the system was demonstrated. We showed that there is strong correlation between the location of the reaction zone and emission and operating parameters. Using image data and a trained deep neural network, the results indicate that the proposed learning scheme can reliably predict output water temperatures with errors +/- 1 %, up to roughly 30 minutes ahead of the current time. Without including image data, the errors were around +/- 5%.

Presenter: **Attila GARAMI, University of Miskolc, Combustion Technology and Thermal Energy Dpt., Miskolc, HUNGARY**

Presenter's biography:

Sept. 2015 - University of Miskolc, Miskolc
PhD student at the Institute of Energy and Quality Affairs

Feb. 2015 - July. 2015 Ministry of National Development, Budapest

Apr. 2013 – Jan. 2015 National Innovation Office, Budapest

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Garami, University of Miskolc, HUNGARY
P. Tóth, University of Miskolc, HUNGARY
P. Kókai, MIHO Ltd., Miskolc, HUNGARY

Session reference: ICO.12.3
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Affordable and Clean Energy: Addressing Project Development Challenges for the Production of Solid Biofuels from Woody Biomass for Heat & Power

Short introductive summary:

Solid Biofuels from woody Biomass are a competitive fuel option for biomass-fired power generation wherever secure & long-term supplies of low-cost, sustainably sourced feedstocks are available. However, despite a rise in installed generation capacity worldwide, the deployment of such bioenergy projects can be challenging because some projects may not meet certain required standards to obtain financial support. There is also a perception of high technology risk, cumbersome administrative procedures, insufficient transparency, as well as limited access to financing instruments. As a result, some projects stall during the development phase. The International Renewable Energy Agency (IRENA) has introduced the IRENA Project Navigator that provides a nine-step project lifecycle process designed to support the development of bankable renewable energy projects to produce solid biofuels from woody biomass for heat and power. The paper will cover the main issues encountered during a typical development phase and provide key recommendations to develop a bankable bioenergy project.

Presenter: **Simon BENMARRAZE, IRENA, Bonn, GERMANY**

Presenter's biography:

Mr. Simon Benmarraze is a Renewable Energy Analyst at the International Renewable Energy Agency (IRENA).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Benmarraze, International Renewable Energy Agency (IRENA), Bonn, GERMANY
C. Ruiz, International Renewable Energy Agency (IRENA), Bonn, GERMANY
R. Roesch, International Renewable Energy Agency (IRENA), Bonn, GERMANY

Session reference: ICO.12.4
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Evaluation of the Combustion Behaviour of Straw, Poplar and Maize in a Small-Scale Biomass Boiler

Short introductive summary:

In order to evaluate the combustion behaviour of new biomass feedstocks such as short rotation coppice (poplar), fuels from agriculture (straw) and biomass residues (maize), comprehensive test runs investigating both particulate matter (PM) and gaseous emissions were performed. A commercially available small-scale biomass boiler, especially designed to enable high fuel flexibility, was used for the evaluation. Based on wet chemical analyses of the fuels, so-called fuel indexes were calculated to deliver primary information on the combustion behaviour to be expected. The overall aim of the test runs was to determine appropriate operating conditions for these new biomass feedstocks, to optimise combustion parameters in order to minimise particulate matter and gaseous emissions as well as to minimise ash related problems (slagging, ash deposit formation and corrosion). The optimisation of operation parameters by primary measures (air staging in combination with an innovative control system including a unique non-invasive air mass flow measuring system) showed a big potential for a stable plant operation combined with reduced emissions.

Presenter: **Joachim KELZ, Bioenergy 2020+, Graz, AUSTRIA**

Presenter's biography:

2002-2006: Energy & Environmental Engineering Degree at the University of Applied Science Burgenland
2006-2010: Junior Researcher BIOENERGY 2020+
2011-2012: Project Manager KARNER Bäckereitechnik
2012-: Senior Researcher BIOENERGY 2020+

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Kelz, Bioenergy 2020, Graz, AUSTRIA
O. Krenn, Bioenergy 2020, Graz, AUSTRIA
C. Zemann, Bioenergy 2020, Graz, AUSTRIA
D. Muschick, Bioenergy 2020, Graz, AUSTRIA
G. Hofmeister, KWB, St. Margarethen/Raab, AUSTRIA
M. Gölles, Bioenergy 2020, Graz, AUSTRIA
St. Retschitzegger, Bioenergy 2020, Graz, AUSTRIA
A. Weissinger, Bioenergy 2020, Graz, AUSTRIA
C. Schmidl, Bioenergy 2020, Graz, AUSTRIA
W. Haslinger, Bioenergy 2020, Graz, AUSTRIA
C. Hochenauer, Institute of Thermal Engineering, Graz University of Technology, Graz, AUSTRIA

Session reference: ICO.12.5
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Development of a New Design Concept and Operational Experience of a Highly Efficient, Compact Size Micro-CHP Plant for Various Biomass Fuels

Short introductive summary:

The work builds up on a cooperative research project of Hargassner GmbH and the Institute of Thermal Engineering at Graz University of Technology. The research project deals with the development of a new design concept of a small-scale downdraft gasifier and performance analyzis of developed micro-CHP. Highlights of the micro-CHP (20 kWel) are: (1) very high efficiencies (total efficiency 90%), (2) compact dimensions (footprint of 2.5 m²) and (3) high fuel flexibility (wood-chips with bark and high fine particle content). The CHP-plant allows 24/7 operation except periodically required maintenance every 500 hours, determined by the engine oil exchange interval. In the conference contribution, the gasifier system as well as experimental results will be presented and operational experience issues will be shown.The authors think that this work perfectly fits in the scope of EUBCE 2017, SUBJECT 2.4 and would be happy if the work would be accepted for oral presentation. The research project has been supported by the Austrian Research Promotion Agency (FFG) under the project title “Biomass4Power&Heat”.

Presenter: **Markus BUCHMAYR, Graz University of Technology, Institute of Thermal Engineering, Graz, AUSTRIA**

Presenter's biography:

Master of Science in Eco-Energy-Engineering at University of Applied Sciences Upper Austria. Researcher and PhD student at Graz University of Technology, Institute of Thermal Engineering. Research fields: biomass combustion, combustion modeling and primary measures for emission reduction.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Buchmayr, Graz University of Technology, AUSTRIA
J. Gruber, Hargassner GmbH, Weng, AUSTRIA
M. Hargassner, Hargassner GmbH, Weng, AUSTRIA
C. Hochenauer, Graz University of Technology, AUSTRIA

Session reference: 2CV.3.3
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Use of Natural Gas Blends with Syngas from Biomass in Gas Micro Turbines. Thermal Performance and Emissions Tests

Short introductive summary:

The operation of power equipment such as a gas micro turbine using renewable fuels is an interesting alternative when it comes to sustainability, especially for energy from biomass.

Within the context, this article presents a methodology and the results of a thermal and emissions test of a micro turbine, operating with blends of natural gas with syngas product of the biomass gasification (rice hull).

Presenter: **Electo Eduardo SILVA LORA, Universidade Federal de Itajubá, Instituto de Engenharia Mecânica, ITAJUBA', BRAZIL**

Co-authors:

P.S. Correa, UNIFEI, Itajubá, BRAZIL
L.R. Pinto, UNIFEI, Itajubá, BRAZIL
E.E. Silva Lora, UNIFEI, Itajubá, BRAZIL
R. Vieira, UNIFEI, Itajubá, BRAZIL
A. Ratner, UIOWA, IOWA, USA

Session reference: 2CV.3.4
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Development of a Highly Efficient Micro-scale CHP System based on Fuel-flexible Gasification and a SOFC

Short introductive summary:

Biomass is a locally available energy source that should preferably be utilised in decentralised (small-scale) heat controlled CHP applications due to transport and logistic reasons. However, in this capacity range only few technologies are presently available and due to their restrictions regarding electric efficiency and fuel flexibility, their market coverage is still poor. Against this background, the Horizon 2020 project FlexiFuel-SOFC (GA No. 641229, 05/2015 – 04/2019) aims at the development of a new, highly efficient and fuel-flexible micro-scale biomass CHP technology consisting of a small-scale fixed-bed updraft gasifier, a compact gas cleaning system and a solid oxide fuel cell (SOFC). The technology is developed for a capacity range of 25 to 150 kW (fuel power) and thus shall be applicable for micro-scale CHP applications.

Presenter: **Thomas BRUNNER, Bios Bioenergiesysteme, Graz, AUSTRIA**

Presenter's biography:

Studied Chemical Engineering at Graz University of Technology
PhD thesis "Aerosols and coarse fly ashes in fixed-bed biomass combustion–formation, characterisation and emissions" at Eindhoven University of Technology.
Since 1995 project manager at BIOS BIOENERGIESYSTEME GmbH, Graz(AT).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Brunner, Bios Bioenergiesysteme, Graz, AUSTRIA
I. Obernberger, Bios Bioenergiesysteme, Graz, AUSTRIA
M. Kerschbaum, Windhager Zentralheizung Technik GmbH, Seekirchen, AUSTRIA
P.V. Aravind, Delft University of Technology, Delft, THE NETHERLANDS
R. Makkus, HyGear BV, Arnhem, THE NETHERLANDS
S. Megel, Fraunhofer Institut fuer Keramische Technologien und Systeme, Dresden, GERMANY
M. Hauth, AVL LIST GmbH, Graz, AUSTRIA
T. Goetz, Wuppertal Institut für Klima, Umwelt, Energie GmbH, Wuppertal, GERMANY
W. Zappa, Utrecht University, Utecht, THE NETHERLANDS

Session reference: 2CV.3.5
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Polygeneration Aiming the Generation of Hydrogen and Hythane Via Biomass Steam Gasification

Short introductive summary:

This work introduces a polygeneration process, which aims the generation of H2 and hythane (a mixture HYdrogen and meTHANE) based on dual fluidized bed biomass steam gasification. H2 should be generated as product for the chemical industry and hythane should be generated as possible natural gas substitute. Due to the similarity of the Wobbe index (WO), hythane could be used as fuel, for example, for cars, for gas boilers, or for industrial applications. In addition, a volumetric H2 content of up to 40 % would be possible in the Austrian natural gas grid. Consequently, hythane could substitute or supplement the fossil CH4 in the natural gas grid.

Presenter: **Michael KRAUSSLER, Bioenergy 2020+, Area Gasification Dpt., Graz, AUSTRIA**

Presenter's biography:

Michael Kraussler studied chemical engineering at Vienna University of Technology. After his graduation, he started a PhD at BIOENERGY2020+ and Vienna University of Technology in the field of gasification and product gas conditioning in August 2014.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Kraussler, Bioenergy2020+, Guessing, AUSTRIA
J. Priscak, Bioenergy2020+, Guessing, AUSTRIA
F. Benedikt, TU Wien, Vienna, AUSTRIA
H. Hofbauer, TU Wien, Vienna, AUSTRIA

Session reference: 2CV.3.6
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Multi-Phase Fluid Dynamic Of Syngas Flow Across A Throttle Body In A Gasifier-Engine System

Short introductive summary:

This work aim to investigate the unique unwanted phenomena that occur across the throttle blade in most gasifier-engine systems. Localized condensation is generated via sudden variations in temperature and pressure conditions creating dangerous droplets that can strongly reduce the time to fail of several engine components. A CFD and a psychrometric model are used to analyze the phenomena and set proper boundary conditions that prevent condensation and coalescence

Presenter: **Giulio ALLESINA, BEELab (Bio Energy Efficiency Laboratory), Enzo Ferrari Engineering Dpt., Modena, ITALY**

Presenter's biography:

Giulio Allesina holds a master’s degree in Mechanical Engineer and a PhD in "High Mechanics and Automotive Design & Technology" discussing a final thesis on "Experimental and analytical evaluation of stratified downdraft gasifiers." His research and teaching focuses on renewable sources.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Allesina, BEELab (Bio energy efficiency laboratory), Department of Engineering, University of Modena and Reggi, Modena, ITALY
S. Pedrazzi, BEELab (Bio energy efficiency laboratory), Department of Engineering, University of Modena and Reggi, Modena, ITALY
M. Puglia, BEELab (Bio energy efficiency laboratory), Department of Engineering, University of Modena and Reggi, Modena, ITALY
N. Morselli, BEELab (Bio energy efficiency laboratory), Department of Engineering, University of Modena and Reggi, Modena, ITALY
J. Mason, ALL Power Labs, Berkeley, USA
P. Tartarini, BEELab (Bio energy efficiency laboratory), Department of Engineering, University of Modena and Reggi, Modena, ITALY

Session reference: 2CV.3.8
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Analysis of Biomass Chars Thermal Decomposition: Experimental Tests and Modelling in Nitrogen and in Carbon Dioxide Atmosphere

Short introductive summary:

In a previous work, a preliminary study on the thermal degradation of char samples has been conducted. Decomposition at high temperature and under an inert atmosphere of nitrogen has been studied. The process has been modelled by means of a kinetic model coupled with a fluid dynamic model, reproducing the temperature distribution and the mass loss occurring inside the fixed bed reactor used for the thermal degradation tests. The aim of this work is to complete the study on char thermal decomposition, not only in nitrogen atmosphere, but also under a reactive atmosphere, more specifically, carbon dioxide. First of all, thermogravimetric tests have been performed on char samples collected from local gasification plants. The results have been used for calibrating the kinetic model describing the process of char degradation, both under inert and non-inert atmosphere. The same samples have then been subjected to thermal degradation tests at different constant temperatures between 600 °C and 1000 °C. The results of these tests, in terms of residual mass, have been compared with the residual mass predictions made by means of the model.

Presenter: **Eleonora CORDIOLI, Free University of Bolzano, Faculty of Science and Technology, Bolzano, ITALY**

Presenter's biography:

Eleonora Cordioli is a recent graduate in Energy Engineering from Free University of Bolzano (Italy). She is dedicated to the study of biomass gasification processes, and, in particular, to the utilization of char as a catalytic gas filtering medium for tar cracking.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Cordioli, Free University of Bolzano, ITALY
F. Patuzzi, Free University of Bolzano, ITALY
M. Baratieri, Free University of Bolzano, ITALY

Session reference: 2CV.3.9

Subtopic: 2.4 Gasification for power, CHP and polygeneration

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Valorization Pathways for Char from Small Scale Gasification Systems in South-Tyrol: The "Next Generation" Project

Short introductive summary:

The purpose of the present paper is to show the current results of the NEXT GENERATION project, i.e. Novel EXTension of biomass poly-GENERATION to small scale gasification systems in South-Tyrol, which aims to investigate the quantity, quality and environmental impact of the by-products of small-scale biomass-gasification-based CHP plant in South-Tyrol, and to assess possible route for their valorization. The project, started on July 2016, involves the Free University of Bozen-Bolzano as principal investigator and other Italian institutions, such as Eco-Research, IDM Südtirol – Alto Adige and RE-CORD.

Two main aspects will be considered. On the one side, the management of the residues, with the aim of characterizing their properties and assessing the main critical issues related to their disposal as well as their impact on the maintenance of the systems. On the other side, the valorization of the residues will be investigated as an alternative solution for reducing the management cost of the plants and increase the exploitation of the resources in the view of a poly-generation concept.

Presenter: **Francesco PATUZZI, Free University of Bolzano, Faculty of Science and Technology, Bolzano, ITALY**

Presenter's biography:

Francesco Patuzzi received his PhD in 2014 and is presently assistant professor at the Faculty of Science and Technology at the Free University of Bozen-Bolzano (Italy). His research activities are mainly related to the study of thermochemical conversion of ligno-cellulosic biomasses.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Basso, Free University of Bozen-Bolzano, Bolzano, ITALY
F. Patuzzi, Free University of Bozen-Bolzano, Bolzano, ITALY
A. Gasparella, Free University of Bozen-Bolzano, Bolzano, ITALY
W. Tirler, Ecoresearch srl, Bolzano, ITALY
S. Dal Savio, IDM Südtirol - Alto Adige, Bolzano, ITALY
A. Rizzo, RE-CORD Consortium, Firenze, ITALY
D. Chiaramonti, RE-CORD Consortium, Firenze, ITALY
M. Baratieri, Free University of Bozen-Bolzano, Bolzano, ITALY

Session reference: 2CV.3.10
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Sepiolite Performance as Bed Material towards Gas and Tar Compositions during C. Cardunculus L. Gasification

Short introductive summary:

A suitable choice of bed material can reduce the agglomeration tendency when the biomasses have high alkali content, as well as improve gas quality and reduce tar content in the product gas. In this sense, new bed materials should be tested to check their performance towards these aspects. A porous bed material such as sepiolite is studied as bed material in comparison with silica sand for biomass gasification in fluidized bed in terms of gas and tar composition. The capture of tar and molten ashes obtained, producing a cleaner product gas and increasing the defluidization time makes sepiolite an interesting bed material for biomass gasification in fluidized bed.

Presenter: **Daniel SERRANO GARCIA, Carlos III University of Madrid, Thermal and Fluid Engineering Dpt., Leganes, SPAIN**

Presenter's biography:

Daniel Serrano is a PhD in the Thermal and Fluid Department of the Carlos III University of Madrid. His research is mainly focused on experimental biomass gasification in fluidized beds: agglomeration and gas and tar composition.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Serrano Garcia, Universidad Carlos III de Madrid, Leganes, SPAIN
S. Sanchez Delgado, Universidad Carlos III de Madrid, Leganes, SPAIN
A. Horvat, University of Limerick, Limerick, IRELAND

Session reference: 2CV.3.13
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biomass Gasification Char as a Low-Cost Adsorbent for CO2 Capture

Short introductive summary:

Greenhous gases (GHG) concentration in the atmosphere is continuously increasing and the scientific community agrees that CO2 is the major contributor. Technologies such as Carbon Capture and Storage (CCS) have been developed to limit CO2 emissions. Adsorption on solid materials proved to be very promising for CO2 capture. Materials like activated carbon (AC) have already been tested and many studies claim their potential in this particular application. Char, a by-product of biomass gasification, is very similar to AC in terms of properties and mechanism of formation. However, char is usually treated as a waste by plant owners causing an overall economic and energetic loss. This study wants to valorize char from biomass gasification taking advantage of its similarities to AC and assess char suitability for CO2 adsorption. At first, chars from commercial gasifiers in South Tyrol, Italy, were collected and characterized. Secondly, the samples were tested through BET and TG analysis using CO2 in order to investigate micropore distribution, adsorption and desorption capacity, regeneration and adsorption kinetics.

Presenter: **Vittoria BENEDETTI, Free University of Bolzano, Faculty of Science and Technology, Bolzano-Bozen, ITALY**

Presenter's biography:

Vittoria Benedetti holds an MSc in Energy Engineering and currently is a PhD student in Sustainable Energy and Technologies at the Faculty of Science and Technology of the Free University of Bozen-Bolzano, Italy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Benedetti, Free University of Bolzano, ITALY
F. Patuzzi, Free University of Bolzano, ITALY
M. Baratieri, Free University of Bolzano, ITALY

Session reference: 2CV.3.14

Subtopic: 2.4 Gasification for power, CHP and polygeneration

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Experimental Results And Parametric Analysis Of Wood, Torrefied And Coffee Grounds Pellets Gasification Carried Out On A Pilot Plant Reactor

Short introductive summary:

The purpose of this experimental study consists in investigating the impact of different feedstocks when submitted to gasification process. Three densified biomasses in form of pellets have been considered: Austrian commercial pellet, torrefied spruce and coffee grounds. This investigation has been carried out on a dedicated pilot plant presenting a stratified configuration. The innovative aspect of this study consists in having setting up an experimental device able to monitor in continuous the mass loss of the biomass so that the evaluation of the main parameters of the process can be referred to a continuous process even if the charge of the material is referred to a batch configuration. The role of the air flow rate, adopted in this study as gasification agent, is enhanced as driving parameter to define the optimal performances of the reactor. At the same time the torrefied material emerges as particularly attractive to be gasified.

Presenter: **Daniele ANTOLINI, Free University of Bolzano, Faculty of Science and Technology, Bozen-Bolzano, ITALY**

Presenter's biography:

biography

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Antolini, University of Bolzano, ITALY
M. Grigiante, University of Trento, ITALY
M. Brighenti, University of Trento, ITALY

Session reference: 2CV.3.15

Subtopic: 2.4 Gasification for power, CHP and polygeneration

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Influence of the Stoichiometric Ratio on Tar and Hydrocarbon Composition during Fluidized Bed Gasification

Short introductive summary:

This paper analyzes the evolution of the tar and hydrocarbon mixture produced during the conversion of biomass pellets in a fluidized bed reactor when the stoichiometric ratio is raised from 0 (pyrolysis conditions) to 0.3.

Presenter: **Diego FUENTES-CANO, University of Seville, Chemical and Environmental Engineering Dpt., Seville, SPAIN**

Presenter's biography:

Diego Fuentes is a Research Professor at the Bioenergy Group in the Department of Chemical and Environmental Engineering of the Universidad de Seville. His researches have been published in Q1 journals of the Energy&Fuels JCR subject and presented in international meetings and conferences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Fuentes-Cano, University of Seville, Seville, SPAIN
A. Gómez-Barea, University of Seville, Seville, SPAIN
P. Haro, University of Seville, Seville, SPAIN
S. Nilsson, University of Seville, Seville, SPAIN

Session reference:	2CV.3.17
Subtopic:	2.4 Gasification for power, CHP and polygeneration
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Development Of A Multi-Stage Biomass Gasification Technology To Produce Energy Quality Gas

Short introductive summary:

The research is aimed at creating and research new technology of gas energy purposes in the speed of gasification of low-grade solid fuel. The proposed method is relatively recent conversion step has a number of advantages compared to other gasification technologies: 1. Ability to efficient processing of low-grade solid fuel (wood waste, sludge, lignins, municipal solid waste, etc.). 2. Stability of the gasification process. 3. The ability to use gas to power units CHP without further purification of the resin.

Despite the advantages and intensive research, conducted a number of foreign teams, the gasification step has not received widespread commercial use. A number of technical difficulties prevent the introduction of technology, including the following. 1. A large number of regime parameters complicates the optimization settings. 2. The low temperature level of the third stage of the process prevents operation of coal residue. 3. Optimization Requires second and third stage of the process to obtain virtually gas bessmolnogo

Presenter: **Alexander KOZLOV, Melentiev Energy Systems Institute, Thermodynamics Dpt., Irkutsk, RUSSIAN FEDERATION**

Presenter's biography:

2015 up to now Researcher:

Studying the kinetics of heterophase transformation of solid fuel, by means of thermal analysis. Designing the application methods of kinetic constants for the formation of macrokinetic constraints in thermodynamic modeling.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Kozlov, Melentiev Energy Systems Institute of Siberian Branch of the Russian Academy of Sciences, Irkutsk, RUSSIAN FEDERATION

D. Svishchev, Melentiev Energy Systems Institute of Siberian Branch of the Russian Academy of Sciences, Irkutsk, RUSSIAN FEDERATION

A. Keiko, Melentiev Energy Systems Institute of Siberian Branch of the Russian Academy of Sciences, Irkutsk, RUSSIAN FEDERATION

V. Shamansky, Melentiev Energy Systems Institute of Siberian Branch of the Russian Academy of Sciences, Irkutsk, RUSSIAN FEDERATION

Session reference: 2CV.3.18

Subtopic: 2.4 Gasification for power, CHP and polygeneration

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

EffectoOf Feedstock Heating Rate on Supercritical Water Gasification of Glucose and Guaiacol Mixture

Short introductive summary:

Supercritical water gasification is gasification of biomass in hot compressed water whose temperature and pressure are above critical values of water. Effect of heating rate is known to affect the gasification efficiency, which is not usual for conventional gasification. In this study, heating rate was changed by changing the length of preheater and mixture of glucose and guaiacol was gasified in supercritial water. Glucose is known to produce char by ionic reaction, and guaiacol is known to produce char by radical reaction. Compared to the gasification of glucose only, addition of small amount of guaiacol changed the effect of heating rate largely. This may be due to consumption of hydrogen by guaiacol.

Presenter: **Yukihiko MATSUMURA, Hiroshima University, Energy and Environmental Engineering Division, Higashi-Hiroshima, JAPAN**

Presenter's biography:

Mar. 1994 Ph.D. (Eng.) from Dept. of Chemical Energy Engineering, University of Tokyo
Apr. 1997 Assoc. Prof., Environmental Science Center, University
Apr. 2001 Assoc. Prof., Dept. of Mechanical Engineering, Hiroshima University
Apr. 2007 Prof., Dept. of Mechanical Engineering, Hiroshima University

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y. Matsumura, Hiroshima University, Higashi-Hiroshima, JAPAN
S. Inoue, Hiroshima University, Higashi-Hiroshima, JAPAN
O. Farobie, Hiroshima University, Higashi-Hiroshima, JAPAN
P. Changsuwan, Hiroshima University, Higashi-Hiroshima, JAPAN
T. Inoue, Fukken Co., Ltd., Hiroshima, JAPAN
Y. Kawai, Chuden Plant Co., Ltd., Hiroshima, JAPAN
T. Noguchi, Toyo Koatsu Co., Ltd., Hiroshima, JAPAN
H. Tanigawa, The Chugoku Electric Power Co., Inc.University, Higashi-Hiroshima, JAPAN

Session reference: 2CV.3.19
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Tar Removal from Syngas with Natural Zeolites from Tuffs: Wet Scrubbing and Catalytic Cracking

Short introductive summary:

Tuffs (natural zeolites) were tested for removing tar from a syngas flow produced by the gasification of woody biomass in a downdraft gasifier. Two different methodologies have been tested: addition of tuffs in a wet scrubber (30 °C) and catalytic cracking (600-800 °C).

Presenter: **Valerio PAOLINI, National Research Council, Institute of Atmospheric Pollution Research, Monterotondo, ITALY**

Presenter's biography:

Ph. D. in Chemistry (Sapienza University of Rome), my research is currently focused on the development of biomass conversion methodologies and the assessment of their environmental impact, in the Institute on Atmospheric Pollution Research (National Research Council of Italy; CNR IIA).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Paolini, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY
F. Petracchini, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY
C. Lo Piano, Sapienza University of Rome, Rome, ITALY
L. Longo, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (, Monterotondo, ITALY
A. Colantoni, Università della Tuscia, Viterbo, ITALY
M. Carnevale, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (, Monterotondo, ITALY
F. Gallucci, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (, Monterotondo, ITALY

Session reference:	2CV.3.21
Subtopic:	2.4 Gasification for power, CHP and polygeneration
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Modelling Of A Small Scale Energy Conversion System Based On An Open Top Gasifier Coupled With A Dual Fuel Diesel Engine

Short introductive summary:

The purpose of this work is to model a CHP system made up of an open-top downdraft gasifier and a 4kW single-cylinder diesel engine in operation at the Bioenergy & Biofuels Lab of the Free University of Bozen-Bolzano (Italy). In particular, the present study aims to couple a multi-stage and multi-phase thermodynamic model of the gasifier with a 0-D thermodynamic model and a heat release model describing dual fuel combustion inside the engine. A complete and validated model based on “Multi-Box” approach [1] has been applied to the open top gasifier. In the model, developed by means of the open source equilibrium solver Cantera in a Matlab environment, the open-top gasifier has been separated in boxes that represent the fundamental processes occurring into the reactor and that control the composition of the final products. Experimental output data, in terms of producer gas compositions and properties, have been used as input for the dual fuel engine model.
The most interesting characteristics of the proposed work are the use of the “Multi-Box” approach for an open top gasifier and the developing of a general strategy able to properly describe dual fuel combustion.

Presenter: **Carlo CALIGIURI, Free University of Bolzano, Bolzano, ITALY**

Presenter's biography:

Bachelor degree: Mechanical eng., Univ. of Calabria (2012)
Master degree: Energy eng., Univ. of Calabria (2015)
    Master thesis in laser induced florescence at VKI (Belgium)
    Erasmus, Univ. of Hannover
Internship at Fiat Powertrain
PhD start at Free Univ. of Bolzano

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Caligiuri, University of Bolzano, ITALY
D. Antolini, University of Bolzano, ITALY
F. Patuzzi, University of Bolzano, ITALY
M. Renzi, University of Bolzano, ITALY
M. Baratieri, University of Bolzano, ITALY

Session reference: 2CV.3.22
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

A Techno-Economic Analysis of Electricity Generation Via Fluidised Bed Gasification Process from Miscanthus

Short introductive summary:

This paper presents economic assessment of circulating fluidised bed gasification system for CHP applications from lignocellulosic biomass (Miscanthus). A comprehensive model of the biomass gasification from Miscanthus cultivation was developed employing the mass and energy balance analysis. The system consists of major process steps such as biomass cultivation, biomass processing; gasification; syngas cleaning and electricity generation. The research demonstrates the impact of key parameters (e.g. production scale, raw material pricing, clean-up efficiency and gasification yield) on the overall CHP process economics. In addition, the results of a sensitivity analysis comparing Miscanthus yields and heat recovery are discussed in order to provide further research developments for deployment.

Presenter: **Paul GILBERT, University of Manchester, Tyndall Centre for Climate Change Research, Manchester, UNITED KINGDOM**

Presenter's biography:

Paul Gilbert is a senior lecturer in Climate Change Mitigation and a Chartered Engineer with over 20 publications. His research focuses on LCA and techno-economics of bioenergy systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Chang, Tyndall Centre for Climate Change Research, School of Mechanical, Aerospace and Civil Engineering, Manchester, UNITED KINGDOM
P. Gilbert, Tyndall Centre for Climate Change Research, School of Mechanical, Aerospace and Civil Engineering, Manchester, UNITED KINGDOM

Session reference:	2CV.3.23
Subtopic:	2.4 Gasification for power, CHP and polygeneration
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Detailed Modeling of Biomass Gasification and Combustion under Aspen Plus: From the Forest to the Process

Short introductive summary:
In this poster, we will present an overview of the models we have developed under Aspen Plus® software in order to predict mass and energy balances of gasification and combustion routes.

At the bioenergy chain scale, we have developed a modeling method which handles forest growth, wood products uses and their recycling (e.g. energy wood after sawmills) and the wood-energy plant (gasification or combustion). By means of this model, detailed elemental (C, H, O, N, P, K, etc.) and energy balances of the whole bioenergy chain are modelled: from forest to power. These balances are required for life cycle assessment studies.

At the process scale, a complete model of the gasification plant has been modelled under Aspen Plus® with a particular focus on the fate of nutrients and minor compounds (NOx, PAH, tar, ash, etc.).

This approach is made possible by a rigorous model of the gasification process and notably of the gasification reactor.

Presenter: **Francis BILLAUD, CNRS-LRGP, Process Engineering Biomass Dpt., Nancy, FRANCE**

Presenter's biography:
biomass valorization

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Francois, CNRS, Nancy, FRANCE
C. Pelletier, CNRS, Nancy, FRANCE
F. Billaud, CNRS, Nancy, FRANCE
A. Dufour, CNRS, Nancy, FRANCE

Session reference: 2CV.3.25
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Algae Conversion to Hydrogen and Power by Integration of Drying, Gasification, and Chemical Looping Combustion

Short introductive summary:

A process simulation-based study was done to evaluate the integration of steam gasification and chemical looping combustion to produce hydrogen while generating power from algae (Fucus serratus). The process simulation was done using ASPEN Plus software package. The integrated system consists of drying, steam gasification, chemical looping combustion, and power generation. The simulation result shows that the integrated system had a relatively high total efficiency (about 72%) which consisted of hydrogen production and power generation efficiency of about 57% and 15% approximately.

Presenter: **Muhammad AZIZ, Tokyo Institute of Technology, Institute of Innovative Research, Meguro-ku, JAPAN**

Presenter's biography:

Dr. Aziz is currently an Associate Professor at Institute of Innovative Research, Tokyo Institute of Technology, Tokyo, Japan. His general research area is energy systems. His research interest includes power generation, renewable energy utilization, process modeling, smart grid, EV, etc.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I.N. Zaini, Institute of Innovative Research, Tokyo Institute of Technology, JAPAN
M. Aziz, Institute of Innovative Research, Tokyo Institute of Technology, JAPAN

Session reference: 2CV.3.26

Subtopic: 2.4 Gasification for power, CHP and polygeneration

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

60 h DSS Supercritical Water Gasification for Residue of Shochu (Japanese Distilled Liquor)

Short introductive summary:

Supercritical water gasification (SCWG) for wet-biomass holds promise as a technology to convert biological effluent into valuable fuel gas. The pre-drying or dehydration process is unnecessary for SCWG treatment for wet-biomass, because of using water as a solvent for SCWG reaction.
Shochu is Japanese traditional distilled liquor, and Shochu distillation residue is biological effluent and a kind of wet-biomass. Shochu residue's disposal cost is high, because of its property as too easy to rot, too heavy to transport, and too wet to burn. The SCWG process for shochu residue can provide the useful steam for distillation and fermentation in distillers' factories; moreover shochu residue has been treated to clear water. This development adopted as the national project by Japanese NEDO was planned for practical use of SCWG to convert waste water into renewable thermal energy for Shochu distillers.
Plug problem at heat exchanger pipe of SCWG facility with tarry material produced from Shochu residue is concerned for commercial plants. Therefore, daily start and stop (DSS) SCWG experiments with Shochu residue were conducted to consider the stable continuous SCWG operation with Radical Scavenger and Rapidly Temperature Rising. Presentation will include 60h DSS SCWG test result which was not reported so far in this sphere, and SCWG future business.

Presenter: **Yukihiko MATSUMURA, Hiroshima University, Energy and Environmental Engineering Division, Higashi-Hiroshima, JAPAN**

Presenter's biography:

Mar. 1994 Ph.D. (Eng.) from Dept. of Chemical Energy Engineering, University of Tokyo
Apr. 1997 Assoc. Prof., Environmental Science Center, University
Apr. 2001 Assoc. Prof., Dept. of Mechanical Engineering, Hiroshima University
Apr. 2007 Prof., Dept. of Mechanical Engineering, Hiroshima University

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y. Wada, The Chugoku Electric Power Co., Inc., Higashihirosima, JAPAN
H. Tanigawa, The Chugoku Electric Power Co., Inc., Higashihirosima, JAPAN
Y. Matsumura, Hiroshima University, Higashihirosima, JAPAN
T. Noguchi, Toyo Koatsu Co. Ltd., Hirosima, JAPAN
T. Inoue, Fukken Co., Ltd., Higashihirosima, JAPAN
Y. Kawai, The Chugoku Electric PowChuden Plant Co., Ltd, Hirosima, JAPAN

Session reference: 2CV.3.27
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Assessment of the Syngas Produced By Gasification of Vine Shoots in an Experimental Downdraft Reactor

Short introductive summary:

This study concerns the assessment of the syngas obtained from the gasification of vine shoots by means of an experimental downdraft reactor using air as an oxidising agent.
The first part of the study concerns the chemical and physical characterization of the biomass. The second part is focused on the assessment of the syngas, with particular attention to the contents of carbon monoxide, hydrogen and methane.
The aim of the study is to investigate the effects of different operating conditions of gasifier on the syngas composition and at the same time to analyze the characteristics of biochar that represents a valuable tool for improving the agronomic characteristics of the soil.

Presenter: **Leonardo LONGO, Consiglio per la Ricerca in Agricoltura e l'Analisi dell'Economia Agraria, Dip. Ingegneria agraria, Monterotondo, ITALY**

Presenter's biography:

Currently reseacher at CREA-ING (Monterotondo). The research activity concerns the pyro-gasification of biomass.
PhD in Engineering of Agricultural and Forestry Systems (University of Tuscia - Viterbo).
Master's Degree, cum laude, in Environmental Engineering (University of Tor Vergata – Rome).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Longo, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (CREA, Monterotondo, ITALY
F. Gallucci, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (CREA, Monterotondo, ITALY
L. Pari, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (CREA, Monterotondo, ITALY
M. Salerno, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (CREA, Monterotondo, ITALY
M. Carnevale, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria - Ingegneria agraria (CREA, Monterotondo, ITALY
V. Paolini, Consiglio Nazionale delle Ricerche - Istituto sull'Inquinamento Atmosferico (CNR-IIA), Monterotondo, ITALY
A. Colantoni, Università degli Studi della Tuscia - Dipartimento di Scienze Agrarie e Forestali (UNITUS-DAFNE), Viterbo, ITALY

Session reference:	2CV.3.30
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Gasification of Waste Biomasses: Measurement of Pollutants in Product Gas

Short introductive summary:

Within this work, the measurement techniques and their validation for the different fuels are presented and different approaches for a detailed analysis and evaluation of the produced syngas described.

Presenter: **Max SCHMID, University of Stuttgart, Institute of Combustion and Power Plant Technology, Stuttgart, GERMANY**

Presenter's biography:

Max Schmid holds a master's degree in process engineering and is a Ph.D. student at the Institute of Combustion and Power Plant Technology (IFK) at the University of Stuttgart. He is working on gasification of biomass and hot gas cleaning.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Schweitzer, University of Stuttgart, GERMANY
M. Schmid, University of Stuttgart, GERMANY
A. Gredinger, University of Stuttgart, GERMANY
R. Spoerl, University of Stuttgart, GERMANY

Session reference:	2CV.3.31
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biomass Gasification in Downdraft Dual Stage Reactor by Experimental Analysis and Simulation with CFD Tools

Short introductive summary:

This work presents a methodology for the study of the behavior of a double stage downdraft gasifier fed with biomass wastes and mixtures of reagents. Initially it was made a physical and chemical characterization of fuel derived from wastes and other biomass from wastes to characterize them in the gasification process. Subsequently were carried out experimental tests of biomass gasification in a double stage downdraft gasifier installed in the laboratory of the Center of Excellence in Thermoelectric and Distributed Generation - NEST at the Federal University of Itajubá, MG. Following analyzed the gasification products which were used air, steam + air + steam and oxygen as reactants in the process in order to use this information for simulations by Computational Fluid Dynamics and subsequent validation. Following the aerator was set model comprising a porous medium, and set the boundary conditions and settings of the various parameters that represent the gasification phenomenon in a double stage downdraft gasifier. For the simulations were chosen the tools ANSYS-ICEM®, ANSYS-FLUENT® and ANSYS CFD-POST®

Presenter: **Electo Eduardo SILVA LORA, Universidade Federal de Itajubá, Instituto de Engenharia Mecânica, ITAJUBA', BRAZIL**

Co-authors:

D.M. Yepes Maya, UNIFEI, Itajubá, BRAZIL
A.L. Espinosa Sarmiento, UNIFEI/CEFET-RJ, Angra dos Reis, BRAZIL
C.A. Aguirre Rodriguez, UNIFEI, Bogotà, COLOMBIA
E.E. Silva Lora, UNIFEI, Itajubá, BRAZIL
R. Vieira Andrade, UNIFEI, Itajubá, BRAZIL
A. Ratner, Iowa State University, Ames, USA
L.J. Mendes Neto, UNIFEI, Itajubà, BRAZIL
L.R. de Mello e Pinto, UNIFEI, Itajubà, BRAZIL

Session reference:	2CV.3.33
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Technical Evaluation of Residual Biomasses In Colombia for Gasification In Fluidized Bed

Short introductive summary:

Aiming to evaluate the suitability of residual biomasses available in Colombia for their transformation in fluidized bed gasifiers, the biomasses with higher energy potential were selected to be characterized, these are: oil palm shells, fiber and empty bunches; sugarcane leaves and bagasse; rice husk; coffee husk; and manure residues from poultry. Physical (particle size distribution, particle shape factor, particle density and bulk density), thermochemical (proximate and ultimate analysis as well as heating value) and fluiddynamical properties (minimum fluidization velocity, bed voidage) were measured. The data collected allow the selection of the most suitable residual biomasses for gasification in fluidized bed in Colombia. The methodology presented can be used for other biomasses of interest. Properties here reported, are valuable for the design of operations of thermochemical conversion of the biomasses under study in Colombia, and serve as a reference for similar works in different regions.

Presenter: **Sonia L. RINCON PRAT, National University of Colombia, Mechanical and Mechatronics Engineering Dpt., Bogotá, COLOMBIA**

Presenter's biography:

Mechanical Engineer of the National University of Colombia (Unal) with a doctorate from the University of Kassel.She works as Professor in the Mechanical Engineering Department of the Unal and is the head of the Research Group on Biomass and Optimization of Thermal Processesof this University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D.C. Guío-Pérez, Universidad Nacional de Colombia, Bogotá, COLOMBIA
S.L. Rincón Prat, Universidad Nacional de Colombia, Bogotá, COLOMBIA
L.E. Cáceres Martínez, Universidad Nacional de Colombia, Bogotá, COLOMBIA
P. Hartwig, Universidad Nacional de Colombia, Bogotá, COLOMBIA

Session reference:	2CV.3.34
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

CFD Simulation Of A Small-Scale Up-Draft Co-Gasification Of Wood Pellet And Charcoal With Experimental Verification

Short introductive summary:

I am a lecturer/researcher in the department of mechanical engineering, Kasetsart University. Currently, my scope of research is waste and biomass conversion technology.

Presenter: **Chootrakul SIRIPAIBOON, Kasetsart University, Mechanical Engineering Dpt., bangkok, THAILAND**

Presenter's biography:

I am a student in Kasetsart University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Siripaiboon, Kasetsart University, Bangkok, THAILAND
P. Sarabhorn, Kasetsart University, Bangkok, THAILAND
W. Siwakosit, Kasetsart University, Bangkok, THAILAND
C. Plengsa-ard, Kasetsart University, Bangkok, THAILAND
C. Areeprasert, Kasetsart University, Bangkok, THAILAND

Session reference:	2CV.3.35
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Vapor-Phase Reactions of Cellulose Gasification

Short introductive summary:

Gasification is a promising way to convert biomass into synthetic petroleum via Fischer-Tropsch synthesis. However, tar-free clean gasification systems are required for establishment of the reliable gasification systems. A better understanding the chemistry involved in biomass gasification would provide insights for this purpose. This paper reports the gas-phase reactions and their roles during cellulose gasification, mainly based on the experimental and theoretical investigations of the gas-phase reactivity of levoglucosan as an important intermediate of cellulose gasification. Levoglucosan was selectively fragmented into gaseous products including CO and H2 via smaller amounts of C1 and C2 carbonyl intermediates, without forming any furans, benzenes, and coke. Thus, gas-phase reactions are clean for tar and coke by-production, but these are produced only after cooling to the molten phase.

Presenter: **Haruo KAWAMOTO, Kyoto University, Graduate School of Energy Science, Kyoto, JAPAN**

Presenter's biography:

My research background is organic and synthetic chemistry, and now I am working on the molecular mechanisms of the chemical reactions which occur during the pyrolysis of lignocellulosic biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Kawamoto, Kyoto University, JAPAN
A. Fukutome, Kyoto University, JAPAN
S. Saka, Kyoto University, JAPAN

Session reference: 2CV.3.37

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The FLEDGED project: DME Production from Biomass Gasification with Flexible Sorption-enhanced Processes

Short introductive summary:

The main aim of FLEDGED project is to develop a highly intensified and flexible process for DME production from biomass and validate it in industrially relevant environments (i.e. TRL 5). This project will combine a flexible sorption enhanced gasification (SEG) process and a sorption enhanced DME synthesis (SEDMES) process to produce DME from biomass with an efficient and low cost process. DME is recognised by key stakeholders as one of the most promising future biofuels, due to the easy adaptability of car engines and reduced life-cycle environmental impact [1,2]. The main outcome of the FLEDGED project will be a highly competitive concept for both small-medium scale plants serving regional markets and for large scale plants.

Presenter: **Matteo Carmelo ROMANO, Polytechnic of Milan, Group of Energy Conversion Systems, Milano, ITALY**

Presenter's biography:

Assistant professor of Energy Systems at Politecnico di Milano.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.C. Romano, Polytechnic of Milan, ITALY
I. Martínez, Polytechnic of Milan, ITALY
C. Alonso, Ecohispanica, Madrid, SPAIN
J. Boon, ECN, Petten, THE NETHERLANDS
E. Coda, Amec Foster Wheeler, Varkaus, FINLAND
A. Dauriat, Quantis, Lausanne, SWITZERLAND
G. Grasa, ICB-CSIC, Zaragoza, SPAIN
T. Hyppänen, Lappeenranta University of Technology, FINLAND
T. Jayabalan, Institut National de l'Environnement Industriel et des Risques, Verneuil-en-Halatte, FRANCE
J. Mooijer, Frames Renewable Energy Solutions, Alphen aan den Rijn, THE NETHERLANDS
R. Murillo, ICB-CSIC, Zaragoza, SPAIN
J. Palonen, Amec Foster Wheeler, Varkaus, FINLAND
J. Ritvanen, Lappeenranta University of Technology, FINLAND
S. Rojas, ICP-CSIC, Madrid, SPAIN
R. Spörl, University of Stuttgart, GERMANY
J. Vente, Energy research Centre of the Netherlands, Petten, THE NETHERLANDS

Session reference:	2CV.3.40
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Pilot Plant Air-Steam Gasification of Nut Shells for Syngas Production

Short introductive summary:

ALMON SHELLS AND HAZELNUT SHELLS WERE GASIFIED AT PILOT SCALE (20KG/H) WITH AIR/O2/STEAM FLOWS TO INVESTIGATE THE EFFECT OT THE EQUIVALENCE RATIOS (COMBUSTION AND WATER OXYDATION) ON THE PRODUCTION OF HYDROGEN, GAS PURITY, ENERGY CONVERSION EFFICIENCY (GAS AND LIQUIDS). 15 TESTS AT PILOT SCALE WERE CARRIED OUT AND REPORTED.

Presenter: **Nadia CERONE, ENEA Research Centre, Technical Unit for Trisaia Technologies, Rotondella, ITALY**

Presenter's biography:

Senior researcher at ENEA in development of technologies and processes of energy exploitation of biomass for electricity and biofuels. Expert of pyrolysis and gasification plants; hydrogen separation,LCA and project management.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Cerone, ENEA Research Centre, Rotondella, ITALY
F. Zimbardi, ENEA Research Centre, Rotondella, ITALY
L. Contuzzi, ENEA Research Centre, Rotondella, ITALY
M.S. Celiktas, Ege University Solar Energy Institute, Izmir, TURKEY
V. Valerio, ENEA Research Centre, Rotondella, ITALY

Session reference: 2CV.3.41

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Multi-Step Reaction Kinetic Model for Secondary Vapor-Phase Cracking of Lignin-Derived Tar

Short introductive summary:

Thermochemical processes such as fast pyrolysis and gasification provide economically viable routes for the conversion of lignocellulosic biomass into these globally important commodities. Due to the high heating rates used in fast pyrolysis and gasification, tar compounds and their subsequent secondary vapor-phase cracking are of significance. The focus of our research has been a systematic investigation of the vapor-phase tar cracking processes of guaiacyl-type compounds found in lignin tar. Based on the fundamental reaction pathways derived from the results of our previous studies, we are developing a general multi-step reaction kinetic model that could be used to model the secondary vapor-phase cracking of tar compounds derived from lignin.

Presenter: **Elmer LEDESMA, University of St. Thomas, Chemistry and Physics Dpt., Houston, USA**

Presenter's biography:

Dr. Elmer B. Ledesma is an associate professor at the University of St. Thomas in Houston, TX, USA. His expertise and areas of research and publication are in fuel science and engineering, with a focus on the pyrolysis, gasification, and combustion of fossil fuels and biomass. He conducted his PhD studies at the Commonwealth Scientific Industrial Research Organisation, Division of Coal and Energy Technology and at the University of Sydney in the field of coal pyrolysis and combustion. Dr. Ledesma is a member of the Combustion Institute, the American Chemical Society, the American Institute of Chemical Engineers, and the International Union of Pure and Applied Chemistry.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Ledesma, University of St. Thomas, Houston, TX, USA

Session reference: 2CV.3.45

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Characterisation of the Char Obtained from Biomass Gasification in a Spouted Bed Reactor

Short introductive summary:

A sample of char obtained from biomass gasification in a pilot spouted bed reactor is characterised. Its specific surface area, porosity, composition and heating value are assessed. Given these features, its most suitable application is discussed.

Presenter: **Filippo MARCHELLI, Free University of Bolzano, Faculty of Sciences and Technology, Bolzano, ITALY**

Presenter's biography:

I am a chemical engineer from Genova, currently studying for my PhD in Sustainable Energies and Technologies at the Free University of Bozen. My research interests include biomass valorisation and process simulation. I was born on 4th March, 1992.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Marchelli, Free University of Bozen-Bolzano, ITALY
C. Moliner, University of Genova, ITALY
M. Curti, Polytechnic of Turin, ITALY
G. Rovero, Polytechnic of Turin, ITALY
M. Baratieri, Free University of Bozen-Bolzano, ITALY
B. Bosio, University of Genova, ITALY
E. Arato, University of Genova, ITALY

Session reference: 2CV.3.47

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biomass Particle Gasification: Towards a Reliable Comprehensive Model for Biomass Particle Gasification

Short introductive summary:

Biomass gasification is still a promising technology after over 30 years' research and development and has success only in a few niche markets due to various reasons, among which the lack of reliable modelling is an important factor. This project is aimed to develop a reliable engineering model for biomass particle gasification which can be used in practical design, scaling up and optimization of biomass gasifiers. In this paper, a comprehensive mathematical model for biomass particle gasification is developed within a generic particle framework, assuming the feed is a woody biomass pellet. The particle is discretized into a number of cells, on each of which the governing equations for mass, momentum, species and energy are numerically solved by using the finite volume method. All the key processes, e.g., moisture evaporation, pyrolysis, heterogeneous and homogeneous reactions, heat and mass transfer, and changes in thermo-physical properties and so on, are properly taken into account to update the densities of various solid/liquid components in each cell as well as to provide source terms to the relevant gas-phase governing equations.

Presenter: **Xiyan LI, Aalborg University, Energy Technology Dpt., Aalborg, DENMARK**

Presenter's biography:

Xiyan li, born on May 29th, 1989, China. Ph.D student from Aalborg university. Master and bachelor graduated from Northeast Electric Power University. Working on CFD modelling of biomass gasification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

X. Li, Aalborg University, DENMARK
C. Yin, Aalborg University, DENMARK

Session reference: 2CV.3.49

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Combined Steam and CO2-Gasification In Fluidised Bed Steam Gasifiers and Influence on Subsequent Hot Gas Cleaning

Short introductive summary:

State of the art fluidised bed gasifiers use either steam or a mixture of steam and oxygen as gasification agents. Both options have drawbacks, since the production of superheated steam is energy extensive and the utilization of oxygen leads to less favoured gas compositions for a later methanation of the produced syngas.

During the last years several more advanced process routes were established in literature. The utilization of waste streams (e.g. from biogas plants) and the coupling of a gasifier with solid oxide fuel cells were discussed. In both cases CO2-rich gases can be used as gasification agent. Therefore, the need for high temperature steam generation is reduced and the carbon content in the produced syngas is increased. Furthermore, the H2/CO-ratio can be positively influenced.

Presenter: **Felix FISCHER, Technische Universität München, Institute for Energy Systems, Garching, GERMANY**

Presenter's biography:

Felix Fischer is a research fellow and PhD student at TU Munich’s Institute for Energy Systems. He graduated in Energy and Process Engineering and is now working on the fields of biomass gasification and chemical energy storages.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Fischer, Institute for Energy Systems, Munich, GERMANY
S. Fendt, Institute for Energy Systems, Munich, GERMANY
H. Spliethoff, Institute for Energy Systems, Munich, GERMANY

Session reference: 2CV.3.50
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

A Kinetic Study of Steam Gasification of Residual Biomass from Sicilian Agro-Industries

Short introductive summary:

The aim of this work is in fact to carry out a kinetic study of steam gasification of different chars obtained by residual biomass coming from the major agro-industrial activities that are typical of Sicily (Italy). In particular, in this research work the residual chars where obtained from citrus wastes, grape marc, olive residues and Arundo Donax (named as reed in this paper). The latter has been chosen because it grows naturally in the Mediterranean Basin, and it could be considered as a good source of feedstock for the integration with agricultural residues in thermochemical processes.

In this study the composition of the inorganic ash forming elements and the char reactivity was compared. Following recent studies, the idea was to compare the reactivity to the K and Ca contents of the chars. It was observed that the Si had an inhibiting effect on the char gasification reactivity, which has been observed in previous studies . This is expected as the Si can form inert silicates. Therefore, it was tested whether the reactivity was proportional to the new defined parameter, named as inorganic composition ratio, ICR = (K+Ca)/Si.

Presenter: **Mauro PRESTIPINO, University of Messina, Engineering Dpt., Messina, ITALY**

Presenter's biography:

Researcher in the field of residual biomass gasification. Part of the research activity is focused on the kinetic study of biomass decomposition in H2O atmosphere. M.Sc in Materials Engineering, University of Messina; PhD Student at University of Messina, Department of Engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Prestipino, University of Messina, Messina, ITALY
A. Galvagno, University of Messina, Messina, ITALY
O. Karlstrom, Abo Akademi, Turku, FINLAND
A. Brink, Abo Akademi, Turku, FINLAND
N. Cerone, ENEA, Matera, ITALY
F. Zimbardi, ENEA, Matera, ITALY

Session reference: 2CV.3.54

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Non-Thermal Plasma-Catalytic Processing for Tar Reduction to Deliver High Quality Syngas from Real Biomass Gasification

Short introductive summary:

Climate change and its dangerous effects on the environment has become one of the most important social and political issues in recent years. To tackle climate change, renewable energies are promoted in order to reduce our society's dependence of fossil-fuels. In using renewable energies, thermal processes such as pyrolysis and gasification are an attractive way to produce energy and high-valued chemical products from biomass. The main product of the biomass gasification is syngas. Syngas can be combusted for power and heat generation or can be used in the production of fuels and chemicals as a cleaner, alternative raw material to fossil fuels. The main drawback however for large-scale industrial implementation of this technology is the presence of tars in the syngas produced from biomass gasification. Tars (a mixture of hydrocarbons, resins and alcohols) can accumulate within the engines resulting in damaged machinery, as well as reduced efficiency of the desirable processes from syngas. The main objective of this research project is to produce a high quality syngas from biomass gasification. This will be achieved by developing a plasma-catalytic process to reduce tars.

Presenter: **Ella BLANQUET, University of Leeds, School of Chemical & Process Engineering, Leeds, UNITED KINGDOM**

Presenter's biography:

After obtaining a BSc and MSc in Chemical Engineering from a French engineering School and three years of R&D experience in Japan, I joined the CDT of Bioenergy in Leeds in October 2015 and I am now a full time PhD student in the School of Chemical & Process Engineering in the University of Leeds.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Blanquet, University of Leeds, UNITED KINGDOM
M.A. Nahil, University of Leeds, UNITED KINGDOM
P.T. Williams, University of Leeds, UNITED KINGDOM

Session reference: 2CV.3.55
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Sorption Enhanced Gasification (SEG) of Biomass with CO2 Capture for the Production of Synthetic Natural Gas (SNG)

Short introductive summary:

A detailed process assessment of a Synthetic Natural Gas (SNG) production plant based on a flexible sorption enhanced gasification (SEG) of biomass is carried out in this work. This SEG process consists of an indirect gasification process where a CaO-based material is circulated between the gasifier and combustor reactors. The CaO reacts with the CO2 formed inside the gasifier, enhancing the reactions towards hydrogen production. The flexibility of this SEG process relies on the possibility of adjusting the composition and flow rate of the solids fed to the gasifier for obtaining a syngas composition adequate to be fed directly to a downstream synthetic fuel production process. This allows simplifying the syngas conditioning section, removing water gas shift reactor and CO2 separation unit, therefore reducing the expected fuel production costs.
In this work, it is explored the possibility of adjusting syngas composition with a molar (H2-CO2)/(CO+CO2) ratio of 3 that is suitable for SNG production in the proposed methanation process. Mass and energy balances of the SEG process have been solved under different operation strategies. Experimental data obtained at the 200 kWt

Presenter: **Matteo Carmelo ROMANO, Polytechnic of Milan, Group of Energy Conversion Systems, Milano, ITALY**

Presenter's biography:

Assistant professor of Energy Systems at Politecnico di Milano.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Martinez, Politecnico di Milano, ITALY
G. Guandalini, Politecnico di Milano, ITALY
M. Schmid, University of Stuttgart, GERMANY
D. Schweitzer, University of Stuttgart, GERMANY
M. Beirow, University of Stuttgart, GERMANY
R. Spoerl, University of Stuttgart, GERMANY
M.C. Romano, Politecnico di Milano, ITALY

Session reference: 2CV.3.56
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Comparison Between Equilibrium and Kinetic Models with Aspen Plus for a Full Scale Biomass Downdraft Gasifier

Short introductive summary:

The paper shows a comparison between an equilibrium model and a kinetic one, that are applied to a full-scale woody biomass gasification plant with fixed-bed downdraft gasifier using Aspen Plus.

Presenter: **Stefano FRIGO, University of Pisa, Energy, Systems, Territory and Costruction Engineering Dpt., Pisa, ITALY**

Presenter's biography:

Stefano Frigo took a Bachelor in Mechanical Engineering in 1991 and a Ph.D. in Energetic at the University of Genoa in 1994. From 1998 he works at the University of Pisa carrying on research activities concerning internal combustion engines and biomass utilization in cogeneration power plants.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Frigo, University of Pisa - DESTEC, Pisa, ITALY
R. Gabbrielli, University of Pisa - DICI, Pisa, ITALY
M. Seggiani, University of Pisa - DICI, Pisa, ITALY

Session reference: 2CV.3.61
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Crystal-Plane Effect of Ceria on the Activity of Au/CeO2 for Preferential CO Oxidation

Short introductive summary:

Hydrogen accounts for the main source for on-board hydrogen in fuel cell applications. However, the anode of fuel cells can be poisoned by carbon monoxide (CO) in hydrogen stream. Ceria (CeO2) has been regarded as an interesting support for many reactions including preferential CO oxidation due to its unique properties. The morphology of ceria is one of the important factors that significantly affects the properties such as reactive exposed-crystal plane for reaction, surface area and oxygen storage capacity (OSC) including metal dispersion of catalyst. Gold-based catalyst has been considered as a potential catalyst for many reactions, including preferential CO oxidation.

Recently, it was reported that the catalytic activity of Au catalysts strongly depended on the shape of ceria. In the present work, hydrothermal method will be used to synthesize ceria. The effect of hydrothermal temperature ranging from 100 to 140 °C under 6 M of NaOH concentration on the morphology of the prepared ceria will be investigated.

Presenter: **Mike CARLTONBIRD, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, THAILAND**

Presenter's biography:

Mike Carltonbird
Master's degree student in a major of Petroleum Technology
The Petroleum and Petrochemical College, Chulalongkorn University
Thailand

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Carltonbird, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, THAILAND
A. Luengnaruemitchai, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, THAILAND

Session reference: 2CV.3.62
Subtopic: 2.4 Gasification for power, CHP and polygeneration
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Adsorption and Desorption of Methane and Carbon Dioxide on Coconut Shell Activated Carbon: Effect of Desorption Time and Carbon Dioxide Adsorption

Short introductive summary:

Natural gas can be stored as an adsorbed phase in porous materials and is referred to as ANG. The use of adsorbent materials in a storage vessel for storing natural gas, at relatively low pressure (3.5-4 MPa) and at room temperature, is a possibility for making natural gas vehicles competitive with other types of vehicle. For adsorbent materials, activated carbon is the most commonly used and effective modified adsorbent support because of its high specific surface area and pore volume among these materials. In this work, investigation on one cycle adsorption of pure methane and carbon dioxide by using coconut shell activated carbon (CSAC) was carried out to study the effect of desorption time and carbon dioxide adsorption. We found that the desorption time does not play an important role on the carbon dioxide desorption by using pure methane at room temperature and carbon dioxide has stronger adsorption than methane on coconut shell activated carbon.

Presenter: **Suwadee UTTARAPHAT, Chulalongkorn University, The Petroleum and Petrochemical College, Bangkok, THAILAND**

Presenter's biography:

Suwadee Uttaraphat

Master's degree student in a major of Petroleum Technology at The Petroleum and Petrochemical College, Chulalongkorn University.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Uttaraphat, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, THAILAND
P. Rangsunvigit, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, THAILAND
B. Kittiyanan, The Petroleum and Petrochemical College, Chulalongkorn University, Bangkok, THAILAND
S. Kulprathipanja, UOP, A Honeywell Company, Des Plaines, Illinois, USA

Session reference: 2CV.3.63

Subtopic: 2.5 Gasification for synthesis gas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Gasification Reactivity of Model Refuse Derived Fuel (RDF) Char and its Components in CO2 and Steam

Short introductive summary:

CO2 and steam gasification of model Refuse Derived Fuel (RDF)

RDF is a refined form of everyday generated Municipal Solid Waste (MSW) obtained after separating out fractions like glass and metals. RDF comprises predominantly of organic fractions like food waste, paper waste, plastic waste and wood which can be converted to syngas via gasification. A model composition is established to mimic the actual RDF produced. Since a large part of the model RDF is biomass-like compounds, the fundamental studies performed can be extended to any feed with similar structure (cellulose, hemicellulose, lignin) and inorganics. Both CO2 and steam are good gasification agents which are largely influenced by the inorganic content present in the RDF char. The effect of quality and quantity of the inorganics present in the RDF char on the gasification reactivity is analyzed and presented in this study. The results are dominantly a reflection of the effect of the inorganics on carbon gasification and thus can be generalized.

Presenter: **Sireesha ALURI, Georgia Institute of Technology, School of Chemical and Biomolecular Engineering, Atlanta, USA**

Presenter's biography:

Sireesha Aluri

Chemical Engineering PhD student working at Georgia Institute of Technology. Research is focused on conversion of municipal solid waste to energy.
More specifically, pyrolysis and gasification of model Refuse Derived Fuel (RDF)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Aluri, Georgia Institute of Technology, Atlanta, USA
P.K. Agrawal, Georgia Institute of Technology, Atlanta, USA
J.D. Muzzy, Georgia Institute of Technology, Atlanta, USA
C. Sievers, Georgia Institute of Technology, Atlanta, USA
D.W. Flick, The Dow Chemical Company, Freeport, USA
B.A. Stears, The Dow Chemical Company, Freeport, USA
J.P. Henley, The Dow Chemical Company, Midland, USA

Session reference:	2CV.3.64
Subtopic:	2.5 Gasification for synthesis gas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Investigation of Ammonia Removal in the Simulated Gas of Biomass Gasification by H2-Reduced Titanomagnetite

Short introductive summary:

Biomass gasification is a promising technology to convert biomass into gas product which can be further processed to be clean liquid fuel. However, the contaminants in the producer gas, like tars, N-containing compounds and S-containing compounds, are the Achilles heel of biomass gasification technology.
In this research, catalytic hot gas cleaning reactor was used to remove NH3 from the simulated gas of a 100kW dual fluidized bed gasifier. Fe-based sand, namely titanomagnetite, was employed as catalyst in the experiments. Impinging method and Ion Selective Electrode were used to analyze the NH3 concentration in the gas. Suitable catalyst form has been chosen in this work. Different side reactions in the simulated gas atmosphere were found at different temperatures and the effect of the reactions on NH3 removal was discussed.

Presenter: **Yanjie WANG, University of Canterbury, Chemical and Process Engineering Dpt., Christchurch, NEW ZEALAND**

Presenter's biography:

I am a full-time PhD student in University of Canterbury at this moment. I am researching about gas cleaning of the producer gas from a dual fluidised bed steam gasifier. Oil scrubber and catalytic hot gas cleaning reactor are being used to remove tars, NH3 and H2S in the producer gas.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y. Wang, University of Canterbury, Christchurch, NEW ZEALAND
S. Pang, University of Canterbury, Christchurch, NEW ZEALAND
S. Pang, University of Canterbury, Christchurch, NEW ZEALAND

Session reference: 2CV.3.65
Subtopic: 2.5 Gasification for synthesis gas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Pre-processing of Biomass by Rolling - A Combined Experimental and Numerical Analysis

Short introductive summary:

A number of different methods to pre-process biomass exist, including chemical as well as mechanical processing. Among mechanical pre-processes methods ball milling, knife milling, hammer milling, rolling / compression milling, chopping, shredding, pelletizing and extrusion are applied. The mechanical methods are considered to be less costly and/or faster that other techniques and among these rolling can be expected to be less energy consuming as compared to other mechanical pre-treatment processes. The present paper describes a combined experimental and numerical study of pre-processing of straw by rolling.
The experiments are conducted on a custom built, pilot rolling mill with a double screw feeder intended for crushing of straw as a pre-processing of biomass. A 2D Finite Element Model is set up in LS-DYNA analyzing the flow, stress and volumetric strain distribution in order to determine the feasible process window for pre-processing of wheat straw by roll pressing varying the feed, the roll gap, the roll speed and friction between rolls and straw. The model is compared to experiments.

Presenter: **Klaus Schütt HANSEN, IPU, Kgs. Lyngby, DENMARK**

Presenter's biography:

Mechanical Engineer from DTU from 2008, holds a industrial PhD in laser welding with beam patterns. Has a broad interest in electronics and mechanics. Has served as project management from both industrial and EU projects.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K.S. Hansen, IPU, Kgs. Lyngby, DENMARK
P. Christiansen, Dept. of Mech. Eng., Technical University of DenmarkIPU, Kgs. Lyngby, DENMARK
T. Koch, TK Energy, Koege, DENMARK
C. Porte, TK Energy, Koege, DENMARK
A.A. Rasmussen, IPU, Kgs. Lyngby, DENMARK
N. Bay, Dept. of Mech. Eng., Technical University of Denmark, Kgs. Lyngby, DENMARK

Session reference: 2CO.13.1
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Study of the Production of Pelletized Biofuels from Mediterranean Scrub Biomass

Short introductive summary:

This work has been carried out within the framework of the LIFE+ ENERBIOSCRUB project. This project objective is the mobilization of new biomass resources while reducing the risk of forest fires by obtaining sustainable solid biofuels with high flammability risk from shrub lands in the South of Europe.
After the demonstration of the technical and economic feasibility of the supply of shrub biomass with mechanized harvesting methods, a second step is to study the pre-treatment energetic balance of biomass obtained from shrubs clearings, to evaluate the quality of the produced solid biofuels, and to calculate the life cycle assessment of these biofuels.
This work includes the specific energy demand necessary for comminution and pelletizing four typical Mediterranean shrubs (brooms, brooms and heathers, rockroses and gorses), the quality of the solid biofuels obtained, and a complete (from harvest to biofuel factory gate) life cycle assessment of all of them.

Presenter: **Raquel BADOS SEVILLANO, CIEMAT-CEDER, Energía Dpt., Lubia, SPAIN**

Presenter's biography:

Raquel Bados Sevillano (Degree in Forestry Engineering) works since 2005 in the Renewable Energy Department of CIEMAT-CEDER placed in Soria (SPAIN). Her work is related with solid biofuels pretreatment for use in combustion boilers. She has participated in more than 10 research projects related to solid biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Bados, CEDER-CIEMAT, Soria, SPAIN
L.S. Esteban, CEDER-CIEMAT, Soria, SPAIN
P. Perez, CEDER-CIEMAT, Soria, SPAIN
I. Mediavilla, CEDER-CIEMAT, Soria, SPAIN
M.J. Fernandez, CEDER-CIEMAT, Soria, SPAIN
R. Barro, CEDER-CIEMAT, Soria, SPAIN
R. Corredor, CEDER-CIEMAT, Soria, SPAIN
L. Maqueda, CEDER-CIEMAT, Ssoria, SPAIN
J.E. Carrasco, CEDER-CIEMAT, Soria, SPAIN

Session reference: 2CO.13.2
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Warren-Spring Based Model for the Shear Yield Locus of Biomass Powders

Short introductive summary:

The objectives of this work is to describe accurately the cohesion of biomass powders from simple measures (density, avalanche angle) and to propose a new method for the description of the curved yield loci of cohesive powders. The cohesion of 32 biomass (mostly wood) and inorganic powders has been analysed by shear test and measure of the avalanche angle and density. The shear test is performed in a powder rheometer at 3kPa preconsolidation. This test gives the yield locus: the shear stress necessary to yield a powder bed as a function of the applied normal stress. Some parameters can be derived from this test such as cohesion (Y-intercept) and traction (Y-intercept). The avalanche angle is measured in a rotating drum. A linear relation is found between the avalanche angle and the ratio of cohesion over the aerated density. Another relation is found between cohesion, traction and aerated density. Finally, a model is proposed for the prediction of the cohesion and the yield locus of biomass powders consolidated at 3kPa, using only two parameters easy to measure: the avalanche angle and the aerated density. This model describes correctly the cohesion and the yield locus.

Presenter: **Clement VANNESTE-IBARCQ, CEA, Liten - Laboratoire de Préparation des Bioressources, Grenoble Cedex 09, FRANCE**

Presenter's biography:

I am a Ph-student in the The French Alternative Energies and Atomic Energy Commission (CEA). I study the flowability of biomass powders (mainly wood) in the context of biomass gasification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Vanneste-Ibarcq, CEA-Liten, Laboratoire de Préparation des Bioressource, Grenoble, FRANCE
T. Melkior, CEA-Liten, Laboratoire de Préparation des Bioressource, Grenoble, FRANCE
A. de Ryck, Centre RAPSODEE, UMR CNRS 2392, Ecole des Mines d’Albi, Albi, FRANCE

Session reference: 2CO.13.3
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Possibilities to Reduce Biomass Supply Costs Through a Terminal

Short introductive summary:

Finland and Sweden are the world leaders in large scale wood biomass utilization for heat and power generation. A vast network of large installations and the great centralized demand around high capacity CHP generation units have created challenging requirements for the reliability and volumes of wood fuel supply all year round. Terminal supply of fuel has been the common solution and the fuel supply through terminal network currently accounts for 55% 7.8 TWh (28 PJ) of forest fuels delivered to heat and power plants in Sweden and 45% 6.4 TWh (23 PJ) in Finland. The decreased electricity price has made biomass supply to electricity generation cost a crucial factor for economically sustainable energy supply business. Recent time studies and energy consumption measurements at Finnish biomass terminals present several principles that facilitate significant cost reductions in biomass supply chains through terminals.

Presenter: **Matti VIRKKUNEN, VTT Technical Research Centre of Finland, Biofuels and Bioenergy Dpt., Jyväskylä, FINLAND**

Presenter's biography:

Virkkunen has over ten years of experience in roundwood and wood biomass procurement technology and economy research at VTT Technical Research Centre of Finland. Virkkunen has experience of project research and management both from national and international projects.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Virkkunen, VTT, Jyväskylä, FINLAND
J. Raitila, VTT, Jyväskylä, FINLAND

Session reference: 2CO.13.4
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Developmentof a Model to Predict the Grate Burning Profile of Biomass Derived Char

Short introductive summary:

Presenting a concept of modelling the combustion profile for biomass derived char based on simplistic inputs obtained from char proximate analysis.

Presenter: **Scott RUSSELL, University of Nottingham, Centre for Doctoral Training in Efficient Fossil Energy Technologies, Nottingham, UNITED KINGDOM**

Presenter's biography:

-Undergraduate degree in Environmental Engineering from Massey University, New Zealand
-Process Engineer in research and development team at LanzaTech, a renewable fuels and chemicals company for 3 years
-In final year of EngD looking into biomass pyrolysis and techno-economic analysis

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Russell, University of Nottingham, UNITED KINGDOM
J.L. Turrion, CPL Industries Ltd., Immingham, UNITED KINGDOM
P. Langston, University of Nottingham, UNITED KINGDOM
C.E. Snape, University of Nottingham, UNITED KINGDOM

Session reference: 2CO.13.5
Subtopic: 2.1 Production and Supply of Solid Biofuels
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Life Cycle Assessment of Climate Impact of Bioenergy from a Landscape

Short introductive summary:

Using regionally produced biomass for energy can decrease the dependency on imported fossil fuels. This can be beneficial both from an energy security and climate change mitigation perspective. Assessing such a strategy requires a landscape perspective approach, since spatial variations like transport distances, age distribution and biomass productivity in a region are important. GIS mapping was therefore used to assess the spatial aspects in a specific Swedish region, with the aim of producing heat and power from two types of woody biomasses; forest residues and short rotation coppice willow. Time-dependent life cycle assessment (LCA) methodology was used to capture temporal fluxes of greenhouse gases (GHGs) from the entire bioenergy system, including biogenic carbon fluxes due to direct land use changes. The preliminary result showed that bioenergy from short and long rotation forestry has climate change mitigating effects compared to fossil fuels, and that the temperature response differs between the two types of wood fuels, both due to differences in land use type (agricultural and forest land), biogenic carbon balances and procurement chains.

Presenter: **Torun HAMMAR, Swedish University of Agricultural Sciences, Energy and Technology Dpt., Uppsala, SWEDEN**

Presenter's biography:

PhD student working with temporal climate effects of bioenergy systems in Sweden using life cycle assessment (LCA) methodology. Have a background in sociotechnical system engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Hammar, Swedish University of Agricultural Sciences, Uppsala, SWEDEN
C. Sundberg, Swedish University of Agricultural Sciences, KTH Royal Institute of Technology, Uppsala, SWEDEN
J. Stendahl, Swedish University of Agricultural Sciences, Uppsala, SWEDEN
A. Larsolle, Swedish University of Agricultural Sciences, Uppsala, SWEDEN
P-A. Hansson, Swedish University of Agricultural Sciences, Uppsala, SWEDEN

Session reference: 4CO.14.1
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Assessing Energy Crop ILUC Potential on a Regional Scale

Short introductive summary:

Cellulosic energy crops are a widely-considered option to reduce the impact of biofuel production on food markets and indirect land use change (ILUC) emissions. Energy crops could still cause ILUC, however, if grown on land that otherwise would have been used for food, feed, or fiber crops. This study aims to assess the potential for energy crop ILUC on a regional scale using regionally-specific data. In particular, we conduct an investigation into the potential for energy crops to displace food crops in four countries in Europe based on the relative profitability of these crops.

Presenter: **Kristine BITNERE, International Council on Clean Transportation, Fuels Researcher Dpt., Berlin, GERMANY**

Presenter's biography:

Kristine Bitnere is a researcher on transportation fuels related issues such as renewable energy, fuel quality and carbon intensity.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.V. Petrenko, Independent consultant, San Francisco, USA
S.Y. Searle, International Council on Clean Transportation, Washington, USA
K. Bitnere, International Council on Clean Transportation, Berlin, GERMANY

Session reference: 4CO.14.2

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Implications of Direct Land Use-Change on the Greenhouse Gas Balance of Bioenergy Crops

Short introductive summary:

Biomass could deliver 11% of Europe’s electricity demand by 2050 playing a key role in mitigating climate change. However, there is uncertainty surrounding the potential of 2nd generation (2G) bioenergy crops to deliver net carbon savings, in part due to poor quantification of the effects of direct land-use change and land management. This is a significant issue limiting its deployment on a mass-scale. Over the last 10 years, an extensive body of field, laboratory and modelling research has been conducted to reduce the uncertainty over the greenhouse gas (GHG) balance of 2G crops. In 2015, we convened a workshop of international researchers, policymakers and industry representatives to discuss complementary research on bioenergy and land-use change. We compared data on changes in nitrous oxide (N2O) emissions and soil carbon stocks as a consequence of land-use change to bioenergy and explored the following questions: (1) how important are N2O emissions from 2G crops in a life-cycle context; and (2) what are the best predictors of soil carbon stock change following land-use change to 2G crops? Conclusions and uncertainties highlighted from this work are presented.

Presenter: **Jeanette WHITAKER, Centre for Ecology and Hydrology, Plant-Soil Interactions Dpt., Lancaster, UNITED KINGDOM**

Presenter's biography:

Research focused on the impacts of land-use change to bioenergy crops on GHG emissions and carbon cycling in terrestrial ecosystems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Whitaker, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
N.P. McNamara, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
R.L. Rowe, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
R. Ceulemans, University of Antwerp, BELGIUM
C.E.P. Cerri, University of Sao Paulo, BRAZIL
C.J. Bernacchi, University of Illinois, Illinois, USA

Session reference: 4CO.14.3
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Climate Change Impacts and Related Emission Uncertainties from Waste Wood Based Energy Systems in the Uk

Short introductive summary:

This research investigated the generation of energy from treated waste wood, which is currently going to landfill in the UK. Through life cycle assessment, the climate change impacts and related emission uncertainties of different waste wood grades and energy applications were evaluated. Results showed that depending on the type of waste wood, application and scale, emissions reduction of up to 76% compared to fossil fuels is possible. This reduction potential, however, could vary significantly based on the variation of feedstock type and application. In some cases, it may exceed the emission of the fossil fuel references particularly for waste wood containing urea-based resins. Nevertheless, low-grade waste wood can provide a valuable bioenergy feedstock and support emissions reduction from waste management, but pre-treatment of some types of waste wood would be required to maximise these emissions savings.

Presenter: **Mirjam ROEDER, University of Manchester, Manchester, UNITED KINGDOM**

Presenter's biography:

Mirjam Röder is a Research Fellow at the Tyndall Centre for Climate Change Research at The University of Manchester. Her research interests focus on bioenergy and climate change impacts and related enviromental and sustainability aspects, global challenges and development of bioenergy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Roeder, Univeristy of Manchester, Manchester, UNITED KINGDOM
P. Thornley, Univeristy of Manchester, Manchester, UNITED KINGDOM

Session reference: 4CO.14.4
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Comparative Life Cycle Assessment of Biomass Utilization for Electricity Generation in the European Union and the United States

Short introductive summary:

Biomass utilization to decrease electricity sector greenhouse gas emissions is a widely adopted practice in the EU due to favorable bioenergy policies. Such use in the US is currently limited due to a lack of carbon reduction policies. Thus, the aim of this study is to provide a detailed analysis of greenhouse gas emissions associated with biomass utilization in order to inform US bioenergy policies and implementation. A number of factors need to be considered in overall carbon accounting for biomass utilization including feedstock type, harvesting practice, transportation, and conversion method. The complexity of this issue can be captured using Life Cycle Assessment (LCA) techniques. This study utilizes LCA of four different scenarios in the EU and the US given varying policy environments in order to quantify carbon emissions and economics associated with biomass utilization: 1) EU with a local biomass resource, 2) EU with imported biomass, 3) US with local biomass and current lack of biomass policy, and 4) US with local biomass and EU biomass policies. Results include life cycle greenhouse gas emissions, life cycle energy efficiency, and economics of the four scenarios.

Presenter: **Emily BEAGLE, University of Wyoming, Mechanical Engineering Dpt., Laramie, USA**

Presenter's biography:

I am a second year PhD student at the University of Wyoming in Mechanical Engineering. My research focus is on the utilization of biomass for energy applications with research on conversion techniques, techno-economic considerations, policy impacts and life cycle assessment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Beagle, University of Wyoming, Laramie, USA
E. Belmont, University of Wyoming, Laramie, USA

Session reference: 4CO.14.5
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Techno-economic and Environmental Analysis of Global Biomass Supply Chains for Germany - Exemplified by a Case Study for Ethanol and Pyrolysis Slurry from Brazil

Short introductive summary:

In the context of the globalization of commodity markets, the orientation of the economy towards "bioeconomy" and the German Energiewende, biomass is gaining importance for Germany as food, raw material and energy source. The versatile possibilities of using biomass will generate an additional demand on the world market. Beside the general availability, it depends on a number of other factors, if biomass potentials are tapped and if an import is economically and environmentally sensible.

Against this background, a comprehensive analysis and assessment of selected biomass supply paths, their associated costs and environmental impacts is conducted. This includes the detailed technical description and analysis of different freight transport means (ship, barge, rail, truck) as a function of the selected types of biomass, countries of origin and transport distances as well as the investigation of different environmental influences, in particular the Greenhouse gas emissions.

Presenter: **Tobias DOMNIK, Karlsruhe Institute of Technology, Institute for Technology Assessment and System Analysis, Karlsruhe, GERMANY**

Presenter's biography:

Studies of Industrial Engineering at Karlsruhe Institute of Technology (KIT), graduation in 2015. Semester abroad at Ecole des Mines de Nancy in France. Since 2015 Doctoral student at ITAS, KIT.

Fields of work: Global biomass logistics, Overseas freight transport

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Domnik, Karlsruhe Institute of Technology, GERMANY
E. Wendeberg, Karlsruhe Institute of Technology, GERMANY
D. Poncette, Karlsruhe Institute of Technology, GERMANY
S. Kälber, Karlsruhe Institute of Technology, GERMANY
L. Leible, Karlsruhe Institute of Technology, GERMANY
C. Aipperspach, Hamburg University of Technology, GERMANY
C. Jahn, Hamburg University of Technology, GERMANY
L. Kretschmann, Hamburg University of Technology, GERMANY

Session reference: 3CO.15.1

Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Improving Sustainability of Maize to Ethanol Processing by Plant Breeding and Process Optimization

Short introductive summary:

Efficient management of plant resources is essential for a sustainable biobased economy. The biomass conversion efficiency and sustainability performance depend greatly on the choice of feedstock and the applied processing technology. The aim of this research was to enhance the biomass use of maize stover for bioethanol production, by combining plant breeding of the maize feedstock with various pretreatment severities and applying an exploratory assessment of the environmental and economic impacts. We found that systematic genetic gains of cell wall digestibility can lead to significant advances in the total glucose productivity and also in the sustainability performance. The best maize characteristics tested led to a total glucose productivity of 3.7 ton per hectare using mild processing conditions. This matches the highest realizable yields under severe processing conditions. In the best scenarios the environmental and economic impacts of operating conditions were reduced by 15% compared to the benchmark.

Keywords: maize ethanol production, plant breeding, optimization, LCA

Presenter: **Petronella Margaretha SLEGERS, Wageningen University, Biobased Chemistry and Technology Dpt., Wageningen, THE NETHERLANDS**

Presenter's biography:

Ellen is a post-doc working on sustainable biorefineries. The challenges lie in the complex interactions within these biorefineries and limited data availability. This makes it challenging to perform reliable LCA studies at early stage of biobased process design.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P.M Slegers, Wageningen University and Research, THE NETHERLANDS
A.F. Torres, Wageningen University and Research, THE NETHERLANDS
A.J.B. van boxtel, Wageningen University and Research, THE NETHERLANDS
L.M. Trindade, Wageningen University and Research, THE NETHERLANDS

Session reference: 3CO.15.2
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Recovery of Butanol from Abe Fermentation Broth by Gas Stripping: Process Simulation and Techno-Economic Evaluation

Short introductive summary:

Because of the growing demand for renewable fuels, the production of butanol through acetone-butanol-ethanol (ABE) fermentation of lignocellulosic biomasses is attracting more and more research interest. The major limit for an industrial-scale production of bio-butanol is the high separation cost, due to the presence of other fermentation products and to its low final concentration in the broth. This study regards the synthesis of the optimal process configuration for the in-situ recovery of butanol from a batch fermentation unit, in which the product is recovered from the fermentation broth by means of nitrogen gas stripping and subsequently fractionated by a distillation train. Detailed simulations using Aspen Hysys® have been performed, demonstrating that it is possible to obtain a high selectivity to butanol that leads to a phase separation in the condensate, reducing the cost of the downstream separation. The model of the downstream process has been coupled with the batch reactor model, showing the beneficial effect of in-situ product removal on sugar consumption and process productivity.

Presenter: **Gabriele LODI, Polytechnic of Milan, Chemistry, Materials and Chemical Engineering Dpt. G. Natta, Milano, ITALY**

Presenter's biography:

Gabriele Lodi graduated in Chemical Engineering at Politecnico di Milano in 2013. In 2013 he started his PhD in Industrial Chemistry and Chemical Engineering. His research activity deals with the study of process solutions for upstream and downstream separations in 2nd generation biorefineries.

Co-authors:

G. Lodi, Polytechnic of Milan, ITALY
G. De Guido, Polytechnic of Milan, ITALY
L. A. Pellegrini, Polytechnic of Milan, ITALY

Session reference: 3CO.15.3
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Fungi as Biomass Pretreatment Agents for Biofuel Applications

Short introductive summary:

The conversion of lignocellulosic biomass to liquid biofuels has the opportunity to help meet the growing demand for energy in the world. However, conversion processes are often expensive and produce environmental contaminants due to the harsh chemicals, temperature, and pressure required to condition the biomass. Therefore, environmentally friendly and inexpensive pretreatment methods are desirable in order to make these processes more efficient and affordable. This research explored the efficacy of a low-cost, biological pretreatment strategy for lignocellulosic biomass. Specifically, we examined the white-rot fungus, Trametes versicolor, as a biological pretreatment agent for hardwood (oak/ash blend) and Miscanthus. The biomass was pretreated with Trametes versicolor (wild-type or the cellobiose-dehydrogenase mutant strain) for 12 weeks, and then the physicochemical properties were assessed and compared to untreated biomass.

Presenter: **Hector FLORES, Universidad Nacional de Agricultura, Natural Resources and Environment Managment Dpt., Catacamas, HONDURAS**

Presenter's biography:

I am from a small town in Honduras C.A. This is a beautiful town called Guaimaca, it is full of natural resources, specilly mountains full of pine tress. As a little kid I experienced nature because my father is a coffee farmer. I decided to learn about environment since I was really young. My

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. D. Flores, Eastern Illinois University / Universidad Nacional de Agricultura, Catacamas, HONDURAS

Session reference: 3CO.15.4

Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Understanding Effect of Sugar Composition on Cell Growth: Fermentation of Glucose and Xylose by Clostridium acetobutylicum ATCC 824

Short introductive summary:

This paper focuses on butanol production from fermentation of lignocellulosic sugars by C.acetobutylicum ATCC 824. Our objective is to investigate opportunities for improved cell yield by studying growth at different compositions of C5 and C6 sugars. We performed the batch growth experiment at anaerobic and static conditions at 6 different mixtures of glucose and xylose with 0%, 20%, 40%, 60%, 80% and 100% of glucose composition, and same total sugar concentration. We measured optical density and pH to follow cell growth, and analyzed the samples in HPLC to obtain sugar utilization profiles. All cultures grew successfully. We observed diauxic growth in cultures, which contained both sugars; glucose was utilized first, and then xylose. Specific cell growth rates are 0.14, 0.397, 0.39, 0.453, 0.415 and 0.55 h-1 for cultures grown on 0%, 20%, 40%, 60%, 80% and 100% of glucose, respectively. The growth on xylose is slower that on glucose which is in good agreement with sugar utilization profiles. Successful utilization of sugars suggests that lignocellulosic feedstocks can be a promising option for high yield fermentation.

Presenter: **Cansu BIRGEN, Norwegian University of Science and Technology, Chemical Engineering Dpt., Trondheim, NORWAY**

Presenter's biography:

Cansu Birgen is a PhD candidate in Chemical Engineering in Norwegian University of Science and Technology. Her research aims at realization of a new, scalable high productivity biotechnological production process for butyl butyrate.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Birgen, Norwegian University of Science and Technology, Trondheim, NORWAY
H. A. Preisig, Norwegian University of Science and Technology, Trondheim, NORWAY
A. Wentzel, SINTEF Materials and Chemistry, Trondheim, NORWAY
S. Markussen, SINTEF Materials and Chemistry, Trondheim, NORWAY
B. Wittgens, SINTEF Materials and Chemistry, Trondheim, NORWAY
U. Sarkar, Jadavpur University, Kolkata, INDIA
S. Saha, Jadavpur University, Kolkata, INDIA
S. Baksi, Jadavpur University, Kolkata, INDIA

Session reference: 3CO.15.5
Subtopic: 3.5 Bioethanol and sugars from lignocellulosic biomass
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Chances and Challenges of Biomass from Landscape Conservation and Maintenance Work in Conversion Routes on Different Scale

Short introductive summary:

The European project greenGain aims to promote the mobilisation of sustainable biomass obtained from landscape conservation and maintenance work(LCMW) for bioenergy generation.In a bottom-up approach,information on the biomass potentials has been collected and analysed. The utilisation of LCMWbiomass for bioenergy production incorporates a variety of chances and challenges. Among them are the low density of the biomass feedstock, heterogeneity, seasonal occurrence and many more which limitits exploitation on different geographical scales.For the regions with small LCMW biomass potentials with suitable feedstock properties, the utilisation in local conversion plants is favourable.Potential conversion routes from biomass harvesting to the energetic consumption were investigated.A model was selected to determine the biomass based fuel value chain and cost optimisation at regional level. Utilisation of LCMW biomass for biofuel production can be economically attractive via the production of an intermediate energy carrier in regions with high biomass potentials.

Presenter: **Mini BAJAJ, SYNCOM Forschungs- und Entwicklungsberatung, Ganderkesee, GERMANY**

Presenter's biography:

Mini Bajaj, PhD did Masters of Technology in Environmental Science and Engineering from Guru Jambheshwar University at Hisar, India and received her doctorate in Environmental Engineering from University of Karlsruhe. She was employed as a scientist at KIT and joined SYNCOM in 2016.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Lenz, SYNCOM, Ganderkesee, GERMANY
S. Kuehner, SYNCOM, Ganderkesee, GERMANY
M. Bajaj, SYNCOM, Ganderkesee, GERMANY
K. Ludewig, SYNCOM, Ganderkesee, GERMANY
W. Baumgarten, FNR, Gülzow, GERMANY
M. Gomez, CIRCE, Zaragoza, SPAIN
D. Garcia, CIRCE, Zaragoza, SPAIN
A. Claluena, LWK Niedersachsen, Hannover, GERMANY
F. de Filippi, Sogesca, Rubano, ITALY
J. Dolezal, CZBiom, Praha, CZECH REPUBLIC
J. Lorenzo, Local action group Bajo Aragon-Matarrana, GanderkeseeTorrevelilla Teruel, SPAIN
L. Montagnoli, Comunità Montana Associazione dei Comuni, Magione, ITALY

Session reference:	ICO.16.1
Subtopic:	6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic:	6. INDUSTRY SESSIONS

Preliminary Evaluation of the Performances of a Purpose Designed Machine for Grass Harvesting and Pre-processing in Orchards, Vineyards and Uncultivated Areas.

Short introductive summary:

One specific combined machine, aimed at increasing the energetic exploitation of the herbaceous biomass from grass-planted vineyards, orchards and river banks, has been designed and manufactured by BERTI Macchine Agricole (Caldiero, Verona, Italy). Compared to the technical solutions already available in the market, it allows to harvest, pre-process and remove the grass (whose average biogas potential is
356 ± 100 Nm3 t Volatile Solids-1) in one passage, pushing forward the sustainability and the profitability of the supply chain. Machine testing in vineyards showed it has adequate manoeuvrability and operative performances: the operative working rate of 0.94 h·ha-1 and the 3.33 m3 effective capacity of the loader make it capable to mow, harvest and shred up to 283 m of fruit trees/vines rows at a time allowing the supplying of up to 6.7 Mg of grass to the biogas plant.

Presenter: **Massimo BRAMBILLA, Consiglio per la Ricerca in Agricoltura e l'analisi dell'economia Agraria, Unità di Ricerca per l'Ingegneria Agraria, Treviglio, ITALY**

Presenter's biography:

Graduated in Agricultural Science in 1996, in 2002 achieved the Ph.D. in Agricultural Chemistry. Since 2012 he is been working as full time researcher at CREA-Consiglio per la ricerca in agricoltura e l'analisi del'economia agraria.
ORCID ID: http://orcid.org/0000-0002-0998-0522

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Brambilla, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per, Treviglio, ITALY
D. Boscaro, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali (TESAF), Padova, ITALY
A. Pezzuolo, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali (TESAF), Padova, ITALY
L. Sartori, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali (TESAF), Padova, ITALY
C. Bisaglia, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per, Treviglio, ITALY
F. Trabacchin, BERTI Macchine Agricole S.p.A., Caldiero, ITALY
F. Berti, BERTI Macchine Agricole S.p.A., Caldiero, ITALY

Session reference:	ICO.16.2
Subtopic:	6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic:	6. INDUSTRY SESSIONS

New Opportunities for Optimized Infeed of Straw for Combustion and Bioethanol Production

Short introductive summary:

The farmers in Denmark and EU face huge challenges in marketing grain straw, and one main factor is the economy using straw for straw based combined heat and power (CHP) plants. This could be straw based power and heating plants, 2G or 3G bioethanol plants etc. Some very important challenges are handling of large quantities of straw bales and reducing the cost per produced energy unit, logistic barn management, handling of bales, quality control of feedstock and industrial preparation of feedstock for various applications.

A Danish cluster named Processbio, represented by a handful of companies, has taken these challenges serious and cooperate in delivering full scale front-end material handling and processing systems of all sorts of biomass in bale- and bulk format. One of the partners is Stratek, who has developed an innova-tive cost- and energy-efficient industrial biomass shredder.

Technological Institute, AgroTech has carried out a test program on two plants that have installed the Biomass Shredder in EU. Also, the economically benefits in industrial preparation of feedstock for various applications, where the Biomass Shredder has been analyzed.

Presenter: **Bodil Engberg PALLESEN, Danish Technological Institute, AgroTech Dpt., Aarhus N, DENMARK**

Presenter's biography:

BDP works as a Senior Consultant at Technological Institute, AgroTech. Areas: Plant fibres, Biomaterials, Biomass for bioenergy, Value chain of biomass, Bio-Economy, Business Development and Innovation, Project management

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B.E. Pallesen, Technological Institute, Aarhus, DENMARK

Session reference: ICO.16.3

Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)

Topic: 6. INDUSTRY SESSIONS

Has Lignin's Time Finally Come? Opening Up New Bio-Based Application Opportunities

Short introductive summary:

At EUBCE 2016, we spoke about new business model based on biomass and how biorefinery technologies continue to improve. The Stora Enso biomaterials division continues to approach the innovation challenge through its four innovation clusters which transform non-food-competing, non-GMO, second-generation biomass .

Set to come online in the next few months, a demonstration plant in Raceland, Louisiana, USA will be testing newly-acquired technology by extracting xylose from sugar cane bagasse. Later, the facility will be able to extract C5 and C6 sugars as well as lignin.

Presenter: **Roxana BARBIERU, Stora Enso Biomaterials, Head of Market & Application Development, Brussels, BELGIUM**

Presenter's biography:

Roxana Barbieru heads Stora Enso Biomaterials Market & Application Development team. She joined the company in 2015 from the chemical industry where she worked as Business consultant, Head of R&D for DyStar, and Head of business unit Speciality Chemicals for Weijie Group and Chemtechnologica.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Seppalainen, Stora Enso Biomaterials, Helsinki, FINLAND

Session reference: ICO.16.4

Subtopic: 6.4 Biochemical Conversion

Topic: 6. INDUSTRY SESSIONS

iLUC is about Biomass Displacement - Where There is No Displacement There is No iLUC

Short introductive summary:

Both world and European output of starch crops have grown by 20%-30% in the past ten years, at a rate five time higher than population growth, and this trend is set to continue. Starch is the crude oil of the bioeconomy. Where is the growth coming from and how should the ILUC and food-fuel debates look on this growth?
iLUC refers to the concept of displacement, i.e. that growth in biomass demand in one sector can displace demand in others, causing the system to arrive at a new equilibrium by finding other sources. It applies to all economic activities. In the case of biofuels it is commonly assumed – often with little reference to science or evidence - that there is high risk of displacement leading to undesirable land use change such as deforestation. At EUBCE 2017 I propose to elaborate on the displacement concepts introduced above, and to translate ILUC principles into the language of displacement.

Presenter: **James COGAN, Industry & Policy Analyst, Dublin, IRELAND**

Presenter's biography:

James Cogan BE MBA

James Cogan gained an engineering degree at University College Dublin and an MBA at Trinity College Dublin. His 25 year career in industry has spanned aeronautics, telecommunications, energy efficiency and fuels, industrial design and research and innovation policy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Cogan, Ethanol Europe Renewables, Dublin, IRELAND

Session reference: ICO.16.5

Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)

Topic: 6. INDUSTRY SESSIONS

Biogas Treatment Using Alternative Adsorbents: Pilot Test Results with Municipal Solid Waste Incineration Bottom Ash

Short introductive summary:

A pilot has been developed and installed in a landfill site for testing an alternative biogas cleaning process using bottom ash (BA) from municipal solid waste incineration. BA appears to efficiently eliminate H2S in biogas and could be reused as a pre-desulfurization treatment, consequently decreasing the current high operational costs of fine adsorbents like activated carbon. Reactional mechanisms are being studied so to optimize the process and to consider BA end-of-life.

Presenter: **Marta FONTSERE OBIS, INSA Lyon, DEEP Laboratory, Villeurbanne, FRANCE**

Presenter's biography:

I am a chemical engineer from Spain, now living in France where I am doing a PhD (3rd year) at INSA de Lyon. I work on the development of an alternative cleaning treatment of landfill biogas using waste from incineration. During free time I like to dance, skating and play guitar.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Fontseré Obis, INSA Lyon, Villeurbanne, FRANCE
P. Germain, INSA Lyon, Villeurbanne, FRANCE
H. Benbelkacem, INSA Lyon, Villeurbanne, FRANCE

Session reference: 2CV.4.1
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effect of mechanical, chemical and biological pre-treatments in the anaerobic digestion of wood

Short introductive summary:

Anaerobic digestion of wood for biogas production

Presenter: **Ioannis ZARKADAS, Aristotle University of Thessaloniki, Chemical Engineering Dpt., Thessaloniki, GREECE**

Presenter's biography:

Qualified and experienced in waste management and chemical analysis for both solid and liquid wastes. Experienced in the scientific and technical matters of anaerobic digestion and composting of heterogeneous substrates including manures and the organic fraction of the municipal solid waste.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Sarigiannis, Aristotle University of Thessaloniki, GREECE
F. Kaldis, Aristotle University of Thessaloniki, GREECE
M. Lioti, Aristotle University of Thessaloniki, GREECE
P. Katopodis, University of Ioannina, GREECE
I. Zarkadas, Aristotle University of Thessaloniki, GREECE

Session reference:	2CV.4.5
Subtopic:	2.6 Anaerobic digestion for biogas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

A Sustainable Bioenergy Generation Process Combining Digestate For Algae Cultivation And Further Anaerobic Digestion For Methane Production

Short introductive summary:

Intensive livestock breeding produced much waste resulting in the flourish of biogas plants all over the world. Digestate, as a main by-product, was rich in recalcitrant organic compounds. Proper management and resource utilization of digestate has become a challenging problem of biogas industry in China.The present investigation was targeted on a sustainable bioenergy generation process:digestate for algae cultivation and subsequent anaerobic digestion for methane production.The results have proven that the novel process can effectively make use of digestate and enhance biomethane production simultaneously.

Presenter: **Na DUAN, China Agricultural University, College of Water Resources and Civil Engineering, Beijing, P.R. CHINA**

Presenter's biography:

Dr.Duan received her Ph.D. from China Agriculture University, Beijing, China in 2011. My research focus in environmental biotechnology areas including anaerobic digestion technology for production biogas from biomass, wastewater treatment, inhibition regulation and system assessment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.R. Li, China Agricultural University, Beijing, P.R. CHINA
N. Duan, China Agricultural University, Beijing, P.R. CHINA

Session reference: 2CV.4.6
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Comparative Study Concerning Anaerobic Fermentation of Cereal Degraded Materials

Short introductive summary:

The present work underlines the possibility of using two types of degraded cereal materials, with and without waste waters, in order to establish the influence of these additions.
The paper focuses on the parallel experiments conducted in order to determine the main process parameters for two different batches containing degraded cereal material, one containing residual water from treatment plant and the other one containing normal tap water. The scope is to depict the main parameters' values during the process and establish the general influence of waste water over degraded cereal materials.

Presenter: **Ioana IONEL, Universitatea Politehnica Timisoara, Mechanical Engineering Dpt., Timisoara, ROMANIA**

Presenter's biography:

Professor Ioana IONEL is graduated as mechanical engineer (1977) and achieved her PhD degree by 1987. She became researcher and basic member of the teaching staff at the P University of Timisoara. Starting 1991 she wan several postdoctoral positions, the most relevant being the Alexander von Humboldt fellowship. She authored several books in Romanian, English and German and an impressive number of articles and conferences. She is Phd mother and coordinates an accredited laboratory. Key activities: research and teaching in fields such as: Thermodynamics, Clean Combustion, Air quality, Renewable energy resources, Modern transport systems, etc.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.E. Cioabla, Universitatea Politehnica Timisoara, ROMANIA
I. Ionel, Universitatea Politehnica Timisoara, ROMANIA
A.G. Dumitrel, Universitatea Politehnica Timisoara, ROMANIA
M.D. Vasilescu, Universitatea Politehnica Timisoara, ROMANIA

Session reference: 2CV.4.7
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biogas Yield of the Residues from the Cardoon Seeds Milling: Results of the Preliminary Laboratory Experimentations

Short introductive summary:

The research work aims at defining the biogas yield of a biomass byproduct as the cardoon seeds milling residues. No data are provided by current scientific literature due to the zootechnical field of application of the residue. Great amounts of cardoon seeds milling residues can justify the biogas production by anaerobic digestion.

Presenter: **Andrea NICOLINI, University of Perugia, CIRIAF, Perugia, ITALY**

Presenter's biography:

Associate Professor in "Industrial Applied Physics" at the University of Perugia. Director of CRB (Biomass Research Centre) of University of Perugia. Lecturer of "Applied physics for food factories" and "Energy resources and alternative energies". Author of more than 140 scientific papers.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Cavalaglio, CIRIAF-CRB, Perugia, ITALY
A. Petrozzi, CIRIAF-CRB, Perugia, ITALY
V. Coccia, CIRIAF-CRB, Perugia, ITALY
A. Nicolini, CIRIAF-CRB, Perugia, ITALY
F. Cotana, CIRIAF-CRB, Perugia, ITALY
E. Pompili, CIRIAF-CRB, Perugia, ITALY

Session reference: 2CV.4.12
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Software Development for Bioelectrochemical System Modelling

Short introductive summary:

As the search for sustainable alternatives to fossil fuels has intensified, bioelectrochemical systems (BESs) have been generating significant research interest. BESs can provide several synergetic benefits, including recovery of metals, production of biofuels and chemicals (including reuse of CO2), wastewater treatment, and possibly energy recovery. Thus far, there is no modelling software for conducting simulation and sustainability assessment of BESs. Global Sustainability and Engineering analysis of Resource recovery Technologies (GSERTTM) is a first of its kind software for assessing the life cycle sustainability of various configurations of BESs. Based on input data, e.g. substrate COD and the material of construction of electrodes, GSERTTM can predict optimal operations, life cycle cost, economic performance and environmental and social life cycle impacts of BESs. The powerful modular nature of the software makes it applicable to biorefinery systems.

Presenter: **Mobolaji SHEMFE, University of Surrey, Centre for Environment and Sustainability, Guildford, UNITED KINGDOM**

Presenter's biography:

I joined the Centre for Environmental Strategy as Research Fellow in June 2016. Before joining CES, I obtained my PhD from Cranfield University in 2016, having previously obtained an MSc in Petroleum Refining Systems Engineering in 2010 at the University of Surrey.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Shemfe, University of Surrey, Guildford, UNITED KINGDOM
J. Sadhukhan, University of Surrey, Guildford, UNITED KINGDOM

Session reference: 2CV.4.13
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Investigation and Optimization of the Mixing in a Biogas Digester with a Laboratory Experiment and an Artificial Model Substrate

Short introductive summary:

Mixing the substrate within a digester requires high energy input. It often contributes most to the electricity consumption of the biogas processing. In an investigation at the Institute of new Energy Systems the goal is a deeper understanding of the mixing process and the determination of rules for design and dimensioning of mixing systems.

Presenter: **Leonhard WIEDEMANN, Technische Hochschule Ingolstadt, Institute of New Energy Systems, Ingolstadt, GERMANY**

Presenter's biography:

Working here at Institute of new Energy Systems of Technische Hochschule Ingolstadt since 4 years as research fellow in the field of Bioenergy

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Wiedemann, Technische Hochschule Ingolstadt, Ingolstadt, GERMANY
M. Sonnleitner, Technische Hochschule Ingolstadt, Ingolstadt, GERMANY
T. Janus, De Monfort University, Leicester, UNITED KINGDOM
F. Conti, University of Padova, ITALY
M. Goldbrunner, Technische Hochschule Ingolstadt, Ingolstadt, GERMANY

Session reference: 2CV.4.14
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Anaerobic Co-digestion of Donkey Manure (DM) with Vegetable Waste (VW) for Optimum Biogas Production

Short introductive summary:

South Africa is the most industrialized country in Africa and is highly dependent on conventional fuels, non renewable sources such as coal, oil and natural gas. This makes the country to be one the largest greenhouse gases emission in the world. Biogas from anaerobic digestion can be a solution to the current energy needs of South Africa without the emission of greenhouse gases. An option for improving the biogas yield is co-digestion which is the thrust of this research.

Presenter: **Patrick MUKUMBA, University of Fort Hare, Physics Department, Alice, SOUTH AFRICA**

Presenter's biography:

I am a renewable energy specialist, focusing mainly on biogas technology and wind energy. Currently, I am a renewable energy researcher at university of Fort Hare, South Africa.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Mukumba, University of Fort Hare, Alice, SOUTH AFRICA
G. Makaka, University of Fort Hare, Alice, SOUTH AFRICA
S. Mamphweli, University of Fort Hare, Alice, SOUTH AFRICA
A. Mutungwazi, University of Fort Hare, Alice, SOUTH AFRICA

Session reference: 2CV.4.15
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Evaluation of Low-Cost Enhanced Biodigesters for Public Use in Rural Societies in Colombia

Short introductive summary:

Biogas production offers huge perspectives for smallholders in isolated rural areas provided they have sufficient biomass and access to robust, ready-to-use technologies. Biodigesters generate biogas and organic fertilizers from manure and/or crop residues. To improve biogas technology accessibility in Colombia, a modular biodigester system has been developed based on affordable local materials, together with an open-source manual for construction and operation, with a focus on reduction of operational costs, thereby improving farmer self-reliance and reducing dependence on fossil fuels and artificial fertilizers. We present early examples of biodigester prototypes and define efforts for further optimization, including modifications to allow mixing, while considering feed strategies maximizing biogas production rates, while biodigester effluents are analysed for (micro) nutrient content and coliform bacteria species. Furthermore, studies are undertaken to quantify economic and social benefits from prototype implementation in rural Colombia (La Mesa de los Santos, Santander), while evaluating environmental aspects.

Presenter: **Eric Charles PETERSON, Universidad Icesi, Biochemical Engineering Dpt., Cali, COLOMBIA**

Presenter's biography:

Dr. Eric Peterson

Dr. Peterson is an interdiciplinary engineering biologist, with a focus on value-added chemicals, bioreactor design, and sustainability. He is currently living in Cali, Colombia, where he is advancing projects at Icesi on affordable domestic biodigesters.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E.C. Peterson, Universidad Icesi, Cali, COLOMBIA
J.W.A. Langeveld, Biomass Research, Wageningen, THE NETHERLANDS
P.M.F. Quist-Wessel, Agriquest, Heteren, THE NETHERLANDS

Session reference: 2CV.4.16
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Anaerobic Digestion of Food Waste

Short introductive summary:

In 2010 Brazil endorsed a new National Policy of Solid Wastes, which has a very ambitious target to close up all the dumping areas and to manage adequately all the municipal solid waste, landfilling only the refuse until 2019. More than 50% of the Brazilian municipal solid waste is organic, which can produce biogas through anaerobic digestion process. Anaerobic digestion of some samples of organic restaurant wastes were performed in batch laboratory 500 ml reactors for determination of optimized operating conditions. The tests were conducted in triplicate with three different compositions between substract and inoculum. The methane production was monitored until its stabilization.

Presenter: **Gilberto MARTINS, Universidade Federal do ABC, CECS Dpt., Santo André, BRAZIL**

Presenter's biography:

I am presently an Associate professor at Federal University of ABC, researching the biogas production from organic fraction of municipal solic waste. I am a mechanical Engineer with PhD in thermodynamics and transport phenomena.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B.P. de Oliveira, Universidade Federal do ABC, Santo André, BRAZIL
G. Martins, Universidade Federal do ABC, Santo André, BRAZIL
L.H. dos Santos Oliveira, Universidade Federal do ABC, Santo André, BRAZIL

Session reference: 2CV.4.17
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Anaerobic Digestion of Energy Beets

Short introductive summary:

From year 2009 more than 50 biogas plants started working in Latvia. There is need to investigate the suitability of various biomasses for energy production. Maize is the dominating crop for biogas production in Latvia, but recent decisions its cultivation for biogas production limit. The cultivation of more varied crops with good economics and low environmental impact is thus desirable. One of the highest biogas yield in Germany conditions is giving energy beets. This paper shows results from anaerobic digestion of energy beets Gerty. The digestion process was investigated for biogas production in sixteen 0,7l digesters, operated in batch mode at temperature 38±1.0°C. The average methane yield per unit of dry organic matter added (DOM) from coarse chopped Gerty was 0,564 L•gDOM-1 and the average methane (CH4) content was 49,91%. Results show that energy beets can be successfully cultivated for energy production under agro ecological conditions in Latvia.
Key words: energy beets, anaerobic digestion, biogas, methane, energy crops.

Presenter: **Vilis DUBROVSKIS, Latvia University of Agriculture, Institute of Energetics, Jelgava, LATVIA**

Presenter's biography:

Dr.sc.ing degree in biotechnology and mechanical engineering. Many years working in directors positions, but from 2006 as leading researcher of Institute of Energetics Latvia University of Agriculture. My particular research interest includes anaerobic digestion and energy producing from biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Dubrovskis, Latvia University of Agriculture, Jelgava, LATVIA
I. Plume, Latvia University of Agriculture, Jelgava, LATVIA
J. Vinters, ZS Ligo, Lielplatone, LATVIA

Session reference: 2CV.4.18
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Duckweed as Innovative Feedstock for Biogas Production - A Comparison of Two Fermenter Concepts

Short introductive summary:

The goal of this study was to investigate the influence of the fermenter concepts on the biogas production from duckweed. The duckweed was collected from a farmed pond and from a park pond near Leipzig, Germany. The samples mainly consisted of Spirodela polyrhiza or of Lemna minuta and were mechanically pre-treated. A fixed bed reactor (FBR) and a continuous stirred tank reactor (CSTR) in laboratory scale, both continuously running, were tested with regards to technical feasibility and biogas production. The duckweed was co-fermented with cattle slurry. The biofilm of the FBR had probably a stabilizing influence during a phase of reduced reactor volume, while the CSTR showed a decline in the biogas production. Over the last 25 day of the trial each reactor produced 273 mlSTP/gVS biogas. The methane content in the FBR was 63.8 % and 63.1 % in the CSTR. Theoretical methane potentials were calculated based on nutritional value analysis and compared to dis-/continuous digestion tests.

Presenter: **Torsten REINELT, DBFZ-German Biomass Research Centre, Biochemical Conversion Dpt., Leipzig, GERMANY**

Presenter's biography:

Career:
- 2006-09 - 2011-02:
o University of applied sciences Mittweida, Germany
o Degreed engineer of environmental technology
- 2011-05 - today:
o Technical staff member of the Biochemical Conversion Department
o Function: Investigations to methane emissions from biogas plants

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Schumacher, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
J. Liebetrau, DBFZ-German Biomass Research Centre, Leipzig, GERMANY

Session reference: 2CV.4.19
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Comparison of Inoculum Sources on Start-Up of Anaerobic Digestion Treating Protein- and Lipid-Rich Substrate

Short introductive summary:

Inoculum source is a key operational parameter in anaerobic digestion (AD) process. Proteins and/or lipids-rich organic wastes are energy-dense but produces ammonia and long-chain fatty acids during AD. These substances can inhibit methanogenic activity (Chen et al. 2008). Moreover, lipolytic acidogens and lipid-tolerant methanogens were reported to exhibit slowly-growing nature compared to other acidogens and methanogens (Lee et al. 2015). Thus, these points raise the importance of selecting proper inoculum source for AD of such protein- and lipid-rich waste. In this study, microbial composition of the four different inoculum sources (i.e., cattle manure (CM), swine manure (SM), secondary sludge (SS) and anaerobic digester effluent (ADE)) were investigated and their inoculation effects were assessed in batch AD tests fed with gelatin and/or oleic acid of various combination of concentrations and mixture. SS had the highest diversity in microbes among the sources; moreover, SS was the most attractive inoculum source in AD of high concentration of lipid.

Presenter: **Seokhwan HWANG, Pohang University of Science and Technology, Pohang, REPUBLIC OF KOREA**

Presenter's biography:

I am a professor working on anaerobic digestion of biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J Lee, POSTECH, Pohang, REPUBLIC OF KOREA
SG Shin, POSTECH, Pohang, REPUBLIC OF KOREA
J Shin, POSTECH, Pohang, REPUBLIC OF KOREA
S Hwang, POSTECH, Pohang, REPUBLIC OF KOREA

Session reference: 2CV.4.25
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Grass from Landscaping Measures in Biogas Production - A Systems Analytical Approach

Short introductive summary:

The study presented here aimed at investigating whether grass from landscaping measures is suited as a fermentation substrate for biogas production when considering its major technical and economic characteristics. The work was based on selected process chains starting with the supply of landscaping grass up to the production of biogas in biogas plants, typical for Germany.

Our contribution deals with a very special issue in the field of biogas production, so we would like to submit it for visual presentation (as poster).

Presenter: **Tobias DOMNIK, Karlsruhe Institute of Technology, Institute for Technology Assessment and System Analysis, Karlsruhe, GERMANY**

Presenter's biography:

Studies of Industrial Engineering at Karlsruhe Institute of Technology (KIT), graduation in 2015. Semester abroad at Ecole des Mines de Nancy in France. Since 2015 Doctoral student at ITAS, KIT.

Fields of work: Global biomass logistics, Overseas freight transport

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Kälber, Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY
L. Leible, Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY
G. Kappler, Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY
T. Domnik, Karlsruhe Institute of Technology (KIT), Karlsruhe, GERMANY

Session reference: 2CV.4.28
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Conversion of Food Waste into Energy: Impact of Thermal Pre-Treatment on Hydrogen and Methane Production

Short introductive summary:

In the framework of the waste circular economy, anaerobic digestion (AD) is a promising treatment option, due to both renewable energy and fertilizer production. Nevertheless, in mesophilic conditions a part of the organic carbon fed is not degraded, reducing the possibility to fully exploit the waste energy potential, and opening the research to advanced processes that can increase AD efficiency. In this study, AD of food waste was investigated in thermophilic conditions. Scope of this work was to evaluate the efficiency of a mild thermal pre-treatment on the solubilisation of complex organics and the digestion enhancement potential in terms of H2 and CH4 conversion rates. Thermal pre-treatment promoted complex organics solubilisation (soluble COD up to +40) in particular with reference to starch and hemi-cellulose fraction. The high amount of released sugars was rapidly transformed into H2 in the first hours of AD, with high yields (up to 2.6 mol H2/mol glucose) and significant gain with respect to untreated waste. Methane conversion was slightly affected by the substrate pre-treatment (0.330 vs 0.300 Nm3/kg VSfed), but the positive impact was shown by the increase in anaerobic

Presenter: **Camilla Maria BRAGUGLIA, CNR - Istituto di Ricerca sulle Acque, Monterotondo, ITALY**

Presenter's biography:

Researcher at the Water Research Institute of CNR(since 2001). Camilla has a degree in Chemistry and a Ph.D. in Industrial Chemical Processes from Università “La Sapienza”, Rome (1997). Scientific interest: Sludge and biomass anaerobic digestion technologies

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Gallipoli, IRSA-CNR, Monterotondo (Roma), ITALY
C.M. Braguglia, IRSA-CNR, Monterotondo (Roma), ITALY
M. Di Carlo, IRSA-CNR, Monterotondo (Roma), ITALY
A. Gianico, IRSA-CNR, Monterotondo (Roma), ITALY
D. Montecchio, IRSA-CNR, Monterotondo (Roma), ITALY
P. Pagliaccia, IRSA-CNR, Monterotondo (Roma), ITALY
C. Pastore, IRSA-CNR, Bari, ITALY
F. Gironi, University of Rome, ITALY

Session reference: 2CV.4.29
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effect of Hydraulic Retention Time on Performance and Microbial Community Structure in Anaerobic Digestion of Waste Activated Sludge

Short introductive summary:

We conducted a long-term operation of anaerobic digesters treating waste activated sludge. Six hydraulic retention times (HRTs) were applied, from 25 to 11.5 d, which resulted in continual decrease of the performance. Bacterial and methanogenic populations were analyzed using real-time PCR and high-throughput sequencing to elucidate their populations under the transient HRT conditions.

Presenter: **Seung Gu SHIN, Pohang University of Science and Technology, School of Environmental Science and Engineering, Pohang, REPUBLIC OF KOREA**

Presenter's biography:

I am a scientist working on environmental engineering, specialized in biomass utilization using anaerobic digestion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.G. Shin, Pohang University of Science and Technology, Pohang, REPUBLIC OF KOREA
J. Shin, Pohang University of Science and Technology, Pohang, REPUBLIC OF KOREA
B.-C. Park, Hyundai Steel Company, Dangjin, REPUBLIC OF KOREA
S. Hwang, Pohang University of Science and Technology, Pohang, REPUBLIC OF KOREA

Session reference:	2CV.4.30
Subtopic:	2.6 Anaerobic digestion for biogas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Multi-stage Semi-dry Anaerobic Digestion of OFMSW and Cattle Manure Improved by Natural Zeolites

Short introductive summary:

A novel full scale multi-stage reactor has been built to optimize the high solid Anaerobic Digestion (AD) treatment of OFSWM and cattle manure, based on two units: a sequential set of batch reactors for hydrolitic phase and a methanogenic plug flow reactor. Leachate is denitrified using natural zeolites and recirculated. No ammonia accumulation was observed, while methane production increased of up to 55%.

Presenter: **Valerio PAOLINI, National Research Council, Institute of Atmospheric Pollution Research, Monterotondo, ITALY**

Presenter's biography:

Ph. D. in Chemistry (Sapienza University of Rome), my research is currently focused on the development of biomass conversion methodologies and the assessment of their environmental impact, in the Institute on Atmospheric Pollution Research (National Research Council of Italy; CNR IIA).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Petracchini, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY
F. Liotta, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY
V. Paolini, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY
M. Perilli, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY
D. Cerioni, Social Energy srl, Guidonia, ITALY
F. Gallucci, Consiglio per la Ricerca in Agricoltura e l’Analisi dell’Economia Agraria, Unità di Ricerca per l’In, Monterotondo, ITALY
M. Carnevale, Consiglio per la Ricerca in Agricoltura e l’Analisi dell’Economia Agraria, Unità di Ricerca per l’In, Monterotondo, ITALY
A. Bencini, National Research Council of Italy - Institute of Atmospheric Pollution Research, Monterotondo, ITALY

Session reference: 2CV.4.33
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Enhancement of Biogas production from two lignocellulosic wastes by a biological co-treatment and its scale up experiment

Short introductive summary:

An innovative approach to enhancing biogas production by Anaerobic Digestion (AD) of lignocellulosic biomasses was tested in two experimental trials, where the second experiment was a scale up (10x) of the best results obtained in the first one. Wheat Straw (WS) and Mushroom-Bed Straw (MBS) were used as substrates and the methanogenic microbial community was bioaugmented with: 1) a mix of highly hydrolytic Anaerobic Ruminal Fungi (ARF), Neocallimastix sp. and Orpinomyces sp.; 2) a pool of fermentative H2-producing bacteria, selected in ENEA laboratories (F210), in order to improve hydrolysis and acidogenesis AD steps. The experiments were carried out in batch mode and mesophilic conditions (37°C); substrate concentration of 6,5gVS/L was tested. Moreover, the first experimental trial was set up comparing a one-stage vs a two-stage process configuration; in the scale-up experiment only the two-stage process configuration was tested. The highest methane productions were recorded when the microbial community was bioaugmented both with ARF and F210, with a methane yield increase of 115% and 104% respectively for WS and MBS in the first experiment and of 82% and 223% in the scale-up experiment. During the experiments, the main microbial community changes were investigated by Fluorescent In Situ Hybridization technique (FISH) considering the start-up phase, the time of maximum methane production and the end the process. A mathematical model to predict methane production was calibrated on first experiment while data from the scale-up experiment were used to validate it.

Presenter: **Giulia MASSINI, ENEA Research Centre, Biomass and Bioenergy, S.Maria di Galeria, ROMA, ITALY**

Presenter's biography:

Researcher: ENEA - Department of Energetic Technologies; Laboratory: Biomass and Biotechnology for Energy
Topics:
Biogas and Biohydrogen production from agro-food wastes
Biological pre-treatment and co-treatment to improve hydrolysis
Studies on microbial ecology and functional ecology

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Dottorini, La Sapienza University - ENEA, Rome, ITALY
G. Massini, ENEA, Rome, ITALY
V. Mazzurco Miritana, La Tuscia University - ENEA, Rome, ITALY
A. Signorini, ENEA, Rome, ITALY
G. Lembo, La Tuscia University - ENEA, Rome, ITALY
A. Gaetani, La Sapienza University - ENEA, Rome, ITALY
F. Liotta, Federico II University, Naples, ITALY
G. D'Alessandro, Federico II University, Naples, ITALY
L. Pontoni, Federico II University, Naples, ITALY
M. Fabbricino, Federico II University, Naples, ITALY

Session reference: 2CV.4.34
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Evaluation and Modelling the Energy Efficiency of Commercial Scale Biogas Plants

Short introductive summary:

Our abstract is about the evaluation and modelling of the efficiency of commercial scale biogas plants.
The presented method will show the efficiency of biogas plants by the comparison of input and output energy content. This is done by time series analysis and based on the calorific value of the samples.
Our abstract is about the evaluation and modelling of the efficiency of commercial scale biogas plants.
The presented method will show the efficiency of biogas plants by the comparison of input and output energy content. This is done by time series analysis and based on the calorific value of the samples.

Presenter: **René CASARETTO, Hochschule Flensburg, Green Engineering Dpt., Flensburg, GERMANY**

Presenter's biography:

2009 - 2013 Bachelor Studium FH Flensburg
2013 - 2014 Master Studium FH Flensburg
2014 - 2016 Projektingenieur
2016 - heute, PhD-Student

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Casaretto, Hochschule Flensburg, Flensburg, GERMANY
J. Born, Hochschule Flensburg, Flensburg, GERMANY
R. Casaretto, Biogas-Akademie-Campus-GmbH, Flintbek, GERMANY

Session reference: 2CV.4.35
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Biogas Technology as a Part of Wastewater Treatment in the Future

Short introductive summary:

Laboratory tests and pilot-scale tests have been utilised to study comprehensive wastewater treatment using a membrane bioreactor, and sludge treatment using biogas technology based on dry fermentation. The aim is to use modelling to optimise and test the operation of a biogas plant as a part of the wastewater treatment process. This article describes the effect of pharmaceutical residues on biogas production using the sludge formed in a membrane bioreactor, and the results of the modelling of biogas plant operation in the processing of wastewater sludge. The purpose is to make the results of the development work available for wide use both in Finland as well as abroad.

Presenter: **Vuokko MALK, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND**

Presenter's biography:

Project Manager in the South-Eastern Finland University of Applied Sciences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Malk, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
M. Lehesvaara, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Poutiainen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND

Session reference: 2CV.4.36
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Anaerobic Digestion System for bio-CH4 and bio-H2 Production Utilizing Fish Waste in Norway: A Comparison between a Single Stage and Two Stage Reactor Process

Short introductive summary:

The current study investigates the feasibility of using fish waste as substrate for anaerobic digestion (AD) that can be optimized for bio-H2 and bio-CH4 production and further for methane upgradation to biofuel. Process software tool SuperPro v 9.5 (Intelligen, Inc.) will be used to simulate the anaerobic digestion process for reactor configuration comprising single and multiple stage fermenters. The reactor type will be determined based on theoretical calculation employing 'attainable region theory' while plant mass and energy balance will be performed in SuperPro platform. Generally, AD in multistage reactors allow increased hydrogen production, improved waste treatment opportunities and better controlling of the processing steps. However, the multistage process is sensitive to the type and concentration of input substrates and expensive depending on techniques. This project thus aims to compare the performance of both single and multistage reactor configurations on product yield, methane upgradation and economics at varying fish waste input so that a holistic overview of a future AD system in Norway can be identified.

Presenter: **Shiplu SARKER, Norwegian University of Science and Technology, Energy and Process Engineering, Trondheim, NORWAY**

Presenter's biography:

I am a Post Doc researcher from the Norwegian University of Science and Technology (NTNU) involved in a project called 'Hydrogen in Biogas (HyBig): Optimization of hydrogen production and implementation of sensor technologies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Shiplu Sarker, Norwegian University of Science and Technology, Trondheim, NORWAY
Jacob Lamb, Norwegian University of Science and Technology, Trondheim, NORWAY
Kristian Lien, Norwegian University of Science and Technology, Trondheim, NORWAY
Dag Hjelme, Norwegian University of Science and Technology, Trondheim, NORWAY

Session reference:	2CV.4.37
Subtopic:	2.6 Anaerobic digestion for biogas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Isolation of Protease-Producing Bacillus Sp. from Wastewater Sludge for Solubilization of Primary Sludge

Short introductive summary:

The activated sludge process is the most important for biological wastewater treatment plants. The primary sludge produced by the activated sludge wastewater treatment process could be converted to biogas energy in an anaerobic digestion process, but the primary sludge contains non-degradable organic matter such as proteins, lipids, and cellulose. In order to produce biogas efficiently, non-degradable organic matter solubilization methods of the primary sludge should be improved. Protease promotes the degradation of protein in the primary sludge. We isolated an extracellular protease producing strain, Bacillus sp. PA-21, from the sludge of wastewater treatment plants in Korea. On the basis of 16S rDNA sequencing, morphological, and biochemical studies, a new isolate was identified as a Bacillus amyloliquefaciens. In this study, we investigated factors affecting extracellular protease production and optimization of culture conditions in a 5-L bioreactor.

Presenter: **Junghyun JU, Korea Research Institute of Bioscience and Biotechnology, Jeongup jeonbuk, REPUBLIC OF KOREA**

Presenter's biography:

I am a student in Korea.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.H. Ju, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
D.J. Ko, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
J.W. Seo, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
C.H. Kim, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
B.R. Oh, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA

Session reference: 2CV.4.38
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Screening of Lipase-producing Burkholderia sp. from Wastewater Sludge for Solubilization of Primary Sludge

Short introductive summary:

The activated sludge process is the most widely used for biological wastewater treatment plants. The excess sludge could be converted to biogas energy in the anaerobic digestion process, but it contains non-degradable organic materials such as protein, lipid, and cellulose. Non-degradable organic materials solubilization study of the primary sludge should be promoted for effective production of biogas. Lipase promotes the degradation of lipids in the primary sludge. From the course of screening useful enzyme-producing microorganisms from the sludge of wastewater treatment plants in Korea, we isolated lipase-producing strains and their lipase activities were tested. 16S rDNA sequence analysis showed that the strains were gram negative bacteria of Aeromonas sp., Acidovorax sp., and Burkholderia sp.. Among them, an excellent lipase production strain, Burkholderia sp. LA-96, identified by 16S rDNA analysis and a biochemical method, was further studied for its lipase producing characteristics. The purpose of this study is for optimization culture conditions and production of lipase for solubilization of primary sludge from the biological wastewater treatment process.

Presenter: **Sun-Yeon HEO, Korea Research Institute of Bioscience and Biotechnology, Jeongup Jeonbuk, REPUBLIC OF KOREA**

Presenter's biography:

I am a post master in KRIBB

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.Y. Heo, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
D..J Ko, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
J.W. Seo, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
C.H. Kim, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA
B.R. Oh, Korea Research Institute of Bioscience and Biotechnology, Jeongeup, REPUBLIC OF KOREA

Session reference: 2CV.4.42

Subtopic: 2.6 Anaerobic digestion for biogas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

The Use of the Hydrodynamic Cavitation for Disintegration of Lignocellulosic Biomass

Short introductive summary:

The study investigated a conditioning of lignocellulosic substrate with hydrodynamic cavitation. The aim was to determine the influence of energy doses used for the conditioning on the quality of the obtained biogas. The relationship between the dose of energy used for the conditioning of the substrate and the efficiency of methane fermentation was determined with respirometric measurements. The study led to the development of guidelines for the construction of equipment used for the conditioning of substrate for biogas production on a technical scale.

Presenter: **Magdalena ZIELINSKA, University of Warmia and Mazury, Environmental Biotechnology Dpt., Olsztyn, POLAND**

Presenter's biography:

Magdalena Zielinska

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Zielinski, University of Warmia and Mazury, Olsztyn, POLAND
M. Debowski, University of Warmia and Mazury, Olsztyn, POLAND
M. Zielinska, University of Warmia and Mazury, Olsztyn, POLAND
A. Cydzik-Kwiatkowska, University of Warmia and Mazury, Olsztyn, POLAND
A. Glowacka-Gil, University of Warmia and Mazury, Olsztyn, POLAND
P. Rusanowska, University of Warmia and Mazury, Olsztyn, POLAND

Session reference: 2CV.4.44

Subtopic: 2.6 Anaerobic digestion for biogas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effect of Hydrodynamic Disintegration of the Lignocellulosic Substrate on the Effectiveness of the Agricultural Biogas Plant

Short introductive summary:

The study on the effects of the hydrodynamic disintegration of lignocellulosic substrate on the effectiveness of the operation of agricultural biogas plant was carried out. In this study, a disintegrator of own design was installed in the technological line of a model agricultural biogas plant.
Substrates for biogas plant, i.e. cattle slurry and wheat straw, were pumped from the preliminary tank by a rotary pump integrated with a chopper-disperser for hydrodynamic disintegration. The disintegrator consisted of a multi-rotor rotating inside the chamber with a capacity of 25 L, driven by an electric motor with a power of 4 kW and a rotational speed of 2800 rpm. By the special design of the rotor, inside the disintegrator the cavitation occurred, which led to the disintegration of the substrate. Within a day, 16 cycles of disintegrator filling (1 minute), operation (10 minutes) and decantation (1 minute) were carried out. The disintegrated organic substrates were fed to the digester, in which the anaerobic decomposition took place under mesophilic conditions (36°C).

Presenter: **Agnieszka CYDZIK-KWIATKOWSKA, University of Warmia and Mazury in Olsztyn, Environmental Biotechnology Dpt., Olsztyn, POLAND**

Presenter's biography:

Agnieszka Cydzik-Kwiatkowska

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Debowski, Uniwersity of Warmia and Mazury, Olsztyn, POLAND
M. Zielinski, Uniwersity of Warmia and Mazury, Olsztyn, POLAND
A. Cydzik-Kwiatkowska, Uniwersity of Warmia and Mazury, Olsztyn, POLAND
M. Zielinska, Uniwersity of Warmia and Mazury, Olsztyn, POLAND
A. Glowacka-Gil, Uniwersity of Warmia and Mazury, Olsztyn, POLAND
P. Rusanowska, Uniwersity of Warmia and Mazury, Olsztyn, POLAND

Session reference:	2CV.4.45
Subtopic:	2.6 Anaerobic digestion for biogas production
Topic:	2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Methane Generation Rates Through Anaerobic Cofermentation of Sewage Sludge With Residual Waters from Food Industries

Short introductive summary:

Growing population associated with expanding industry in urban areas has as consequences a rapid regional growth of waste. The paper focuses on a possibility to turn sewage sludge into energy, by anaerobic digestion, using as co substrate a waste from the food industry.

Presenter: **Ioana IONEL, Universitatea Politehnica Timisoara, Mechanical Engineering Dpt., Timisoara, ROMANIA**

Presenter's biography:

Professor Ioana IONEL is graduated as mechanical engineer (1977) and achieved her PhD degree by 1987. She became researcher and basic member of the teaching staff at the P University of Timisoara. Starting 1991 she wan several postdoctoral positions, the most relevant being the Alexander von Humboldt fellowship. She authored several books in Romanian, English and German and an impressive number of articles and conferences. She is Phd mother and coordinates an accredited laboratory. Key activities: research and teaching in fields such as: Thermodynamics, Clean Combustion, Air quality, Renewable energy resources, Modern transport systems, etc.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.R. Wächter, Universitatea Politehnica Timisoara, ROMANIA
I. Ionel, Universitatea Politehnica Timisoara, ROMANIA
T.V. Vintila, Universitatea Politehnica Timisoara, ROMANIA
M.R. Wächter, District Heating Timisoara COLTERM S.A Timisoara, ROMANIA

Session reference: 2CV.4.46
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Wheat Straw as a Material in Co-Digestion with other Nitrogen-Rich Substrate

Short introductive summary:

This work covers the co-digestion of wheat straw with a Nitrogen rich substrate, food waste. Here continuous co-digestion experiments including food waste (Nitrogen rich) and wheat straw pellets and briquettes have been carried out. Results show the potential of wheat straw for biogas production and also in balancing the C/N in co-digestion with food waste.

Presenter: **Swarnima AGNIHOTRI, University of Borås, The Swedish Centre for Resource Recovery, Borås, SWEDEN**

Presenter's biography:

A Phd in Pulp and Paper Technology with a biotechnological background. I have worked with the second generation bioethanol production in past and currently working on Codigestion utilizing urban waste along with wheat straw to produce Biogas.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Agnihotri, HB-Högskolan i Borås, Borås, SWEDEN
I.S. Horváth, HB-Högskolan i Borås, Borås, SWEDEN
M. Castillo, HB-Högskolan i Borås, Uppsala, SWEDEN

Session reference: 2DO.1.1
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Climate and Economic Performances of Anaerobic Digestion of Second Cheese Whey. A Case Study

Short introductive summary:

In this work four different ways of Second Cheese Whey (SCW) disposal are analysed in terms of global warming potential and economic performances.
The four systems analysed are: sewage system disposal, conventional anaerobic digestion off-site, a single-stage anaerobic digester on-site, and a two-stage anaerobic digester on site. These four options represent the actual opportunities for many dairy factories.
A detailed inventory of input–output flows of the systems, including all the related economic costs and GHG emissions is compiled to allow for both the economic analysis and the global warming potential calculation. The data are collected from a real cheesemaking factory in the surrounding of Rome which is planning the construction of an anaerobic digestion plant, but is currently providing the SCW to an AD plant off-site.
The aim is to provide the dairy industry with a robust economic analysis on the opportunity of building an innovative system for SCW valorisation, and policy makers with reliable data on GHG emissions from such systems.

Presenter: **Giuseppe LEMBO, ENEA Research Centre, Biomass and Biotechnology for Energy, Rome, ITALY**

Presenter's biography:

Giuseppe Lembo is a research fellow for University of Tuscia of Viterbo, Department of Ecological and Biological Science. He works at ENEA, Italian Research Centre, biomass and biotechnology for energy. He works in the field of wastewater and biomass valorization for bioenergy. His present research activity is focused on biological pre-treatment of ligno-cellulosic biomass to improve anaerobic digestion processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Lembo, ENEA, Rome, ITALY
A. Agostini, ENEA, Rome, ITALY
A. Signorini, ENEA, Rome, ITALY

Session reference: 2DO.1.2
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Mono-Fermentation of Chicken Manure: Competing with Ammonia Inhibition and a High Content of Inorganic Solids

Short introductive summary:

Anaerobic digestion of chicken manure is an alternative to minimize waste and recover bioenergy. Although chicken manure is a substrate with a high biogas yield, anaerobic digestion faces several problems. The clue to reduce ammonia inhibition is anaerobic digestion under psychrophilic conditions. With decreasing temperatures the equilibrium between ammonia and ammonium shifts towards ammonium, which means a reduction of ammonia inhibition. This study investigates the biogas production from chicken manure under different process temperatures, varying from psychrophilic to mesophilic conditions. Under high ammonia concentrations psychrophilic and lower mesophilic reactors showed a stable biogas production.
A further approach dealt with the generation of a stable hydrolysis of chicken manure, which could be a solution for separation of inorganic solids in preparation of the methanogenesis stage. Without an additional supplementation of phosphoric acid it was not possible to create a stable hydrolysis stage so far. The study of acidification via a fast increase of the organic loading rate under recirculation of digestate is the matter of our current investigations.

Presenter: **Franziska SCHAEFER, DBFZ-German Biomass Research Centre, Biochemical Conversion Dpt., Leipzig, GERMANY**

Presenter's biography:

since 2012: scientist at DBFZ,Department of Biochemical Conversion
20012: PhD in Biochemistry, University of Leipzig
2009 – 2012: PhD Studies,Helmholtz Centre for Environmental Research – UFZ
2008: Diploma in Biology, Universität Leipzig
2002 – 2008: Studies of Biology, University of Leipzig

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Schaefer, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
L. Mueller, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
R. Reiter, AEV Energy GmbH, Dresden, GERMANY
A. Himmelstoss, AEV Energy GmbH, Dresden, GERMANY
J. Proeter, DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, Leipzig, GERMANY

Session reference: 2DO.1.3
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Enhancing Biogas Production from Shrimp Processing Waste through Enrichment of the Microbial Community

Short introductive summary:

Energetic valorization of shrimp processing waste is a growing interest issue considering that the global fish consumption has doubled in the last three decades in countries with a rapid population growth, income and urbanization. The aim of this study was to test biogas production by Anaerobic Digestion (AD) process from an innovative substrate, chitinous waste from shrimps. Hydrolysis and acidogenesis steps, the bottleneck of the whole AD process, were enhanced respectively by Anaerobic Ruminal Fungi (ARF) and a fermenting bacteria pool (F210), already tested in other studies. Three different community configurations and increasing substrate concentrations (6.5, 9.7 and 13.0 gVS/L) were tested in batch mode(37°C), under continuous agitation. The main microbial ecology changes into the reactors were investigated by FISH technique. The results showed that chitinous waste resulting from fishery industry are efficiently used by methane-producing microbial communities and that it is possible to increase biogas production by enriching them with hydrolytic and fermenting components. Very interesting outcomes were obtained by the characterization of microbial communities.

Presenter: **Giulia MASSINI, ENEA Research Centre, Biomass and Bioenergy, S.Maria di Galeria, ROMA, ITALY**

Presenter's biography:

Researcher: ENEA - Department of Energetic Technologies; Laboratory: Biomass and Biotechnology for Energy
Topics:
Biogas and Biohydrogen production from agro-food wastes
Biological pre-treatment and co-treatment to improve hydrolysis
Studies on microbial ecology and functional ecology

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Gaetani, La Sapienza University - ENEA, Rome, ITALY
V. Mazzurco Miritana, La Tuscia University - ENEA, Rome, ITALY
G. Dottorini, La Sapienza University - ENEA, Rome, ITALY
A. Signorini, ENEA, Rome, ITALY
G. Lembo, La Tuscia University - ENEA, Rome, ITALY
V. Pignatelli, ENEA, Rome, ITALY
G. Massini, ENEA, Rome, ITALY

Session reference: 2DO.1.4
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Where is the Environmental Break-Even Point of Marginal Land Use for Biomass Production?

Short introductive summary:

A Life Cycle Assessment will be conducted to assess the environmetal performance of the cultivation and utilization of miscanthus on marginal land.
The results of this assessment enable the specification of conditions, under which the cultivation and utilization on marginal land is useful from an environmental perspective.

Presenter: **Moritz WAGNER, University of Hohenheim, Institute of Crop Science (340b), Stuttgart, GERMANY**

Presenter's biography:

Doctoral Student/Researcher Scientist at the Institue of Crop Science, Department of Biobased Products and Energy Crops at the University of Hohenheim

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Wagner, University of Hohenheim (340b), Stuttgart, GERMANY
I. Lewandowski, University of Hohenheim (340b), Stuttgart, GERMANY

Session reference:	4DO.2.1
Subtopic:	4.3 Environmental impacts of bioenergy
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Understanding Soil Carbon Storage Across Heterogeneous Landscapes: Carbon Offsets and Sustainability of Tropical Biomass Production Systems

Short introductive summary:

This research was completed at the University of Hawaii at Manoa investigating carbon storage of bioenergy crops undergoing transition to conservation management. Soil properties and carbon storage across a landscape was also investigated. Funding support supplied through several US government agencies.

Presenter: **Susan E. CROW, University of Hawaii at Manoa, Natural Resources and Environmental Management Dpt., Honolulu, USA**

Presenter's biography:

Researching the maximization of conversion efficiency, climate change mitigation potential, and economic and environmental feasibility through conservation management practices and feedstock selection.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.M. Wells, University of Hawaii at Manoa, Honolulu, USA
S.E. Crow, University of Hawaii at Manoa, Honolulu, USA
J. Deenik, University of Hawaii at Manoa, Honolulu, USA
K. Carlson, University of Hawaii at Manoa, Honolulu, USA
A. Hashimoto, University of Hawaii at Manoa, Honolulu, USA
C. Sierra, Max Plank Institute for Biogeochemistry, Jena, GERMANY

Session reference: 4DO.2.2
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Conversion and Reversions: Impacts on Soil Carbon Stocks of Land Use Change to and from Perennial Bioenergy Crops in the UK

Short introductive summary:

Sources of biomass are diverse, but in temperate regions of the world including Europe there is considerable scope and interest in the use of the perennial bioenergy crops Short Rotation Coppice willow and Miscanthus x giganteus. The production of these bioenergy crops, however, requires major changes in land use and management, leading to questions over the impact of these crops on soil C stocks and ultimately their true climate change mitigation potential (Guo and Gifford, 2002, Rowe et al., 2016). Here we explore this issue using data from two UK studies, the ELUM project (www.elum.ac.uk) focused on the impacts on soil C stocks of the conversion of land to perennial bioenergy crops and the second MAGLUE (www.maglue.ac.uk) assessing the impacts of bioenergy crop removal and reversion of land back to conventional agriculture.Uniquely here by combining these two studies, and in particular though novel data on impacts of bioenergy crop reversion, we will discuss the potential full life cycle impacts of these perennial bioenergy crops on soil C stocks.

Presenter: **Rebecca ROWE, Centre for Ecology and Hydrology, Shore Dpt., Lancaster, UNITED KINGDOM**

Presenter's biography:

I work on the challenges associated with sustainable land-use and especially how we will meet future demands for food, fibre and fuel whilst protect the natural environment, with my work to date focused land use change to bioenergy cropping.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.L. Rowe, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
A.K. Keith, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
D.M.O. Elias, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
J. Whitaker, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM
N.P. McNamara, Centre for Ecology & Hydrology, Lancaster, UNITED KINGDOM

Session reference: 4DO.2.3
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Quantifying the Potential Contribution to Climate Change Mitigation from Temporary Carbon Storage in Hydrochars

Short introductive summary:

Little is known about the potential contribution to climate change mitigation of hydrochars - new biomaterials derived from organic waste – when used as soil amendments in agriculture. Hydrochars have fundamentally similar properties to more common biochars, although they degrade faster in soils which might obviate some climate benefits. In addition, current indicators of climate change like global warming potentials (GWP) commonly used in greenhouse gas (GHG) accountings, are not fully suitable to hydrochars. Here, we address these challenges and present results of a life cycle assessment (LCA) combined with recent climate metrics (i.e. dynamic global warming potentials and climate tipping potentials) carried out to quantify potential contribution to climate change mitigation of hydrocarbons varying in stability in agricultural soils.

Presenter: **Mikolaj OWSIANIAK, Technical University of Denmark, Management Engineering Dpt., Kgs. Lyngby, DENMARK**

Presenter's biography:

Chemical engineer specialized in development and application of life cycle impact assessment method in LCA of products, with focus on biomass-based materials like charcoals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Owsianiak, Technical University of Denmark, Kongens Lyngby, DENMARK
M. Renz, Universitat Politècnica de València, SPAIN

Session reference: 4DO.2.4
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

A Spatially Explicit Overview of the Impacts of Wood Pellet Related Pine Plantation Expansion on Species Richness in the Southeastern U.S.

Short introductive summary:

Over the past decades industrial wood pellet production has increased almost tenfold, and is predicted to grow further, potentially resulting into an expansion of pine plantation cover in the southeastern U.S.. This potentially impacts the biodiversity of this species rich region. The aim of this study is to provide a spatially explicit overview of the differences in amphibian, reptile and mammal richness between pine plantations and forested and cultivated land within the southeastern U.S..

Presenter: **Hanneke VAN T VEEN, Universiteit Utrecht, Environmental Biology Dpt., Utrecht, THE NETHERLANDS**

Presenter's biography:

I am a Master's student Environmental Biology at Utrecht University. At present I have almost completed a nine month Master's project on the impacts of a conversion of natural and cultivated land into pine plantations on the vertebrate diversity of the southeastern USA.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. van t Veen, Copernicus Institute of Sustainable Development, Utrecht, THE NETHERLANDS
A. Duden, Copernicus Institute of Sustainable Development, Utrecht, THE NETHERLANDS
P. Verweij, Copernicus Institute of Sustainable Development, Utrecht, THE NETHERLANDS

Session reference: 4DO.2.5
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Torrefaction Analysis of Woody Biomasses from Fast-Growing Plantations of Costa Rica

Short introductive summary:

Torrefaction is a thermal pretreatment commonly applied to biomasses developed at 200-300 °C in the absence of oxygen. This allows to obtain improved biomasses´ properties for energy purposes. In the present work, a study of five fast-growing species (Cupressus lusitanica, Dipterix panamensis, Gmelina arborea, Tectona grandis and Vochysia ferruginea) was performed using simultaneous thermogravimetic and calorimetric analyses under pyrolysis and different torrefaction conditions (i.e. light, mild and severe). Parameters obtained from such class of analyses (e.g. mass losses, decomposition temperatures and devolatilisation rates) were correlated with characteristics of the biomasses such as composition (i.e. cellulose, lignin, ash components and extractives in different solvents) and energy parameters (i.e. volatile content, net calorific value and C/N ratio). This allowed the determination of the influence of biomasses´ characteristics in the thermal processes developed, as well as the selection of better torrefaction conditions. Those conditions were used to develop torrefaction processes at larger scales and the resulting materials were properly characterized.

Presenter: **Allen PUENTE-URBINA, Costa Rica Institute of Technology, Cartago, COSTA RICA**

Presenter's biography:

Chemist. Currently working for the Costa Rica Institute of Technology in the determination of useful parameters to decide the suitability of a biomass to be used as raw material for thermochemical processes as well as the optimization of this kind of processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Moya, Escuela de Ingeniería Forestal, Instituto Tecnológico de Costa Rica., Cartago, COSTA RICA
A. Rodríguez-Zúñiga, Escuela de Ingeniería Forestal, Instituto Tecnológico de Costa Rica., Cartago, COSTA RICA
J. Gaitán-Álvarez, Escuela de Ingeniería Forestal, Instituto Tecnológico de Costa Rica., Cartago, COSTA RICA
A. Puente-Urbina, Centro de Investigación y de Servicios Químicos y Microbiológicos (CEQIATEC), Escuela de Química, In, Cartago, COSTA RICA

Session reference: 3DO.3.1
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Catalytic Effect of Potassium Carbonate on Condensable Species Released During Wood Torrefaction

Short introductive summary:

In order to investigate the effect of potassium addition on the composition of torrefaction condensates, two demineralized wood species were impregnated with three different concentrations of K2CO3 and then torrefied at 275°C until obtaining an anhydrous weight loss (AWL) of 25%. Torrefaction was carried out in both a thermogravimetric analysis (TGA) instrument and a laboratory fixed-bed reactor. Condensates from the fixed bed reactor were collected and analyzed by Gas Chromatography-Mass Spectroscopy (GC-MS). TGA showed that when potassium content increased in the biomass, shorter torrefaction times were required for obtaining the targeted AWL. GC-MS revealed for both wood species that potassium promotes the formation of low molecular compounds such as acetic acid and acetol, as well as some lignin derivatives (guaiacol, syringol, 4-vinylguaiacol). Yields of levoglucosan, LAC (1-hydroxy-(1R)-3,6-dioxabicyclo[3.2.1]octan-2-one) and DGP (1,4:3,6-dianhydro-a-d-glucopyranose) decreased drastically in the presence of potassium.

Keywords: torrefaction, potassium, thermogravimetric analysis, guaiacol, syringol

Presenter: **Jean-Michel COMMANDRE, CIRAD, Montpellier, FRANCE**

Presenter's biography:

Ph.D. in process engineering, researcher at CIRAD in BioWooEB unit (Biomass, Wood, Energy and Bioproducts). He is an expert on torrefaction and combustion of biomass. He has lead a national research project on biomass torrefaction before gasification under pressure (TORBIGAP project)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Alves de Macedo, CIRAD, Montpellier, FRANCE
J.M. Commandré, CIRAD, Montpellier, FRANCE
P. Rousset, CIRAD, Montpellier, FRANCE
J. Valette, CIRAD, Montpellier, FRANCE
M. Pétrissans, Université de Lorraine, Nancy, FRANCE

Session reference: 3DO.3.2
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Pressure Influence on Biocarbon Yield and Quality

Short introductive summary:

Biocarbon, or charcoal, is receiving increased attention as an increasingly important reductant in metallurgical industries, and has as well many others uses, e.g. as high quality fuel or as activated carbon.
Traditional charcoal production processes are very inefficient, giving charcoal with low char and fixed carbon yields. A number of parameters influence these yields, including fuel properties and carbonization process conditions. The importance of temperature is rather well known, as well as sufficient residence time at a certain temperature. However, the influence of pressure is more debated, and many parameters may influence the carbonization process simultaneously, making it hard to establish the real influence of pressure. In the scientific literature the pressure influence has been found to be from negative to very positive.
In this work, based on thermodynamics, kinetics evaluations and experiments in a variety of atmospheric and pressurised carbonization systems, the influence of pressure is presented and evaluated, as a function of temperature and choice of carrier gas, as well as fuel properties.

Presenter: **Øyvind SKREIBERG, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Dr. Øyvind Skreiberg (49) is Chief Scientist within stationary bioenergy at SINTEF in Trondheim, Norway, having 25 years of broad bioenergy experience, contributed to about 350 scientific publications, presentations and reports andrepresentedNorwaysince 1998 in IEA Task 32 Biomass combustion and cofiring.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Ø. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
L. Wang, SINTEF Energy Research, Trondheim, NORWAY
M. Grønli, NTNU, Trondheim, NORWAY

Session reference: 3DO.3.3
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Valorization of Solid Residues from Anaerobic Digestion Through Thermal and Hydrothermal Carbonization Processes

Short introductive summary:

Digestate from AD can be obtained in both liquid as well as dried forms. Dried digestate came from a mechanical separation followed by a drying process; this product still contain a 15wt% of moisture but it can be directly used for slow pyrolysis.
In this study, two digestate carbonization processes have been tested in lab and pilot-scale at different process conditions: conventional thermo-chemical carbonization (slow pyrolysis) and hydrothermal carbonization (HTC). The non-separated liquid has a solid content ranging from 20% to 8%; but the cost for drying often does not justify this further treatment.
The digestate was obtained by a 1 MWel plant located in Italy, where corn, manure and other food processing by-products were anaerobically digested. HTC represents an innovative technology, capable of directly exploiting the digestate high water content. The yield and the characteristics of the product significantly differ from the biochar from slow pyrolysis. For both processes, the experimental results indicate that biochar from digestate contains much more ashes than char from wood, and this is a first explanation of the higher yields. From the 450°C TGA experiment, the soli

Presenter: **Edoardo MILIOTTI, University of Florence, Prato, ITALY**

Presenter's biography:

Phd student at industrial engineering department of University of Florence; working at RE-CORD consortium.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Miliotti, RE-CORD, Firenze, ITALY
D. Casini, RE-CORD, Firenze, ITALY
M. Prussi, RE-CORD, Firenze, ITALY
D. Chiaramonti, RE-CORD, Firenze, ITALY
L. Bettucci, RE-CORD, Firenze, ITALY

Session reference: 3DO.3.4
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Microwave Pre-Processing of Biomass Pellets for Cleaner Heat Energy Production

Short introductive summary:

Microwave pre-processing of different types of biomass pellets (spruce, rape straw, pine bark) and their mixtures was carried out with the aim to activate gasification of biomass samples and combustion of volatiles (CO, H2) for cleaner heat energy production, thus determining the innovative approach to control the biomass gasification/combustion characteristics.

Presenter: **Inesa BARMINA, University of Latvia, Institute of Physics, Salaspil, LATVIA**

Presenter's biography:

Dr.sc.ing., a leading researcher of University of Latvia, Institute of Physics since 2004. The main research area: experimental studies of co-firing the renewable with fossil fuel, electric/magnetic field control of combustion process, swirling flame combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Barmina, Institute of Physics, University of Latvia, Salaspils, LATVIA
R. Valdmanis, Institute of Physics, University of Latvia, Salaspils, LATVIA
M. Zake, Institute of Physics, University of Latvia, Salaspils, LATVIA

Session reference:	3DO.3.5
Subtopic:	3.1 Production of thermally treated solid biofuels
Topic:	3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Sustainable Biomass Production on Marginal Lands (SEEMLA)

Short introductive summary:

The main objective of the H2020 funded EU project SEEMLA (acronym for Sustainable Exploitation of Biomass for Bioenergy from Marginal Lands in Europe) is the establishment of suitable innovative land-use strategies for a sustainable production of plant-based energy on marginal lands while improving general ecosystem services. The use of marginal lands (MagL) could contribute to the mitigation of the fast growing competition between traditional food production and production of renewable bio-resources on arable lands.
SEEMLA focuses on the promotion of re-conversion of MagLs for the production of bioenergy through the direct involvement of farmers and forester, the strengthening of local small-scale supply chains, and the promotion of plantations of bioenergy plants on MagLs. Life cycle assessment is performed in order to analyse possible impacts on the environment. SEEMLA is expected to contribute to an increasing demand of biomass for bioenergy production in order to meet the 2020 targets and beyond.

Presenter: **Wibke BAUMGARTEN, FNR - Agency for Renewable Resources, EU/International Affairs, Gülzow-Prüzen, GERMANY**

Presenter's biography:

since 01/2016 Project coordinator of the EU H2020 funded Project SEEMLA www.seemla.eu

since 11/2014 Lecturer (PD) in Soil Science, Rostock University, Germany

2013 Habilitation & Venia Legendi in Soil Science, CAU Kiel, Germany

2006 PhD in Soil Science, CAU Kiel, Germany

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

W. Baumgarten, FNR, Gülzow-Prüzen, GERMANY
W. Gerwin, BTU, Cottbus, GERMANY
F. Repmann, BTU, Cottbus, GERMANY
N. Rettenmaier, IFEU, Heidelberg, GERMANY
F. Kiourtsis, DAMT, Thessaloniki, GREECE
D. Keramitzis, DAMT, Thessaloniki, GREECE
S. Galatsidas, DUTH, Komotini, GREECE
N. Gounaris, DUTH, Komotini, GREECE
O. Hanzhenko, IBC&SB NAAS, Kiev, UKRAINE
V. Ivanina, IBC&SB NAAS, Kiev, UKRAINE
K. Bogatov, SALIX, Kiev, UKRAINE
I. Gnap, SALIX, Kiev, UKRAINE
F. Barbera, Legambiente, Rome, ITALY
D. Mattioli, Legambiente, Rome, ITALY

Session reference: 1DV.1.1
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Assessment of Shrub Biomass Availability And Environmental Impacts of its Harvesting for Energy Purposes: A Methodological Approach in the Mediterranean

Short introductive summary:

The sustainable management of shrub formations is a challenging aspect of forest management and one which will allow us to reduce the risk of fires in fire-prone areas as well as to generate biomass resources which could be used for energy purposes and help create employment in rural areas. However, the current methodologies for estimating shrub biomass, either through direct or indirect approaches, have been developed without taking into consideration the legal, technical, physiographic and environmental restrictions often found in Mediterranean environments. Moreover, the mechanized harvesting of shrub biomass involves the need to carry out enviromental impact assessments to identify both the positive and negative impacts on the environment in the short-term, which is especially important in the Mediterranean given its specific climatic conditions. This study provides a new methodological approach which considers real scenarios and is based on a GIS for estimating shrub biomass availabilily in the Mediterranean. Furthermore, it also provides an appropriate methodology for monitoring the environmental impacts of shrub harvesting on species and soil features.

Presenter: **Borja Daniel GONZALEZ-GONZALEZ, INIA, Madrid, SPAIN**

Presenter's biography:

Borja Daniel González González received the 5-years degree in Forestry Engineering (2007), the M.Sc. degree in Forestry and Agricultural research (2009) from the University of Santiago de Compostela, and the Ph.D. degree by the same University in September 2012.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B.D. Gonzalez-Gonzalez, INIA, Madrid, SPAIN
H. Sixto, INIA, Madrid, SPAIN
A. Va¡zquez, INIA, Madrid, SPAIN
F. Montes, INIA, Madrid, SPAIN
M Sanchez-Gonzalez, INIA, Madrid, SPAIN
I. Canellas, INIA, Madrid, SPAIN

Session reference: 1DV.1.2
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Short Rotation Woody Crops: Experiences from the EU Project SRCplus

Short introductive summary:

The three years SRCplus project terminates in February 2107. The focus of the presentation will be on the final results and gained experiences in the SRCplus target regions on how to promote SRC. This includes experiences on the training courses, seminars, stakeholder involvement and policies.

Presenter: **Dominik RUTZ, WIP, Biomass Unit, München, GERMANY**

Presenter's biography:

Dominik Rutz is a Senior Project Manager at WIP Renewable Energies (www.wip-munich.de) since 2005. He graduated in Environmental Science (Dipl.-Ing.) and Consumer Science (M.Sc.). His main field of experience includes the technical and non-technical analysis of bioenergy and its supporting policies in developing countries and emerging economies worldwide. He is coordinator of several EU funded projects.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Rutz, WIP Renewable Energies, Munich, GERMANY
R. Mergner, WIP, Munich, GERMANY
J.M. Ugalde, WIP, Munich, GERMANY
R. Janssen, WIP Renewable Energies, Munich, GERMANY
S. Hinterreiter, Biomassehof Achental, Grassau, GERMANY
I. Eleftheriadis, Centre for Renewable Energy Sources and Saving, Athens, GREECE
A. Zandeckis, Ekodoma, Riga, LATVIA
Z. Fistrek, Energy Institute Hrvoje Pozar, Zagreb, CROATIA
B. Kulisic, Energy Institute Hrvoje Pozar, Zagreb, CROATIA
T. Perutka, Energy Agency of the Zlín region, Zlin, CZECH REPUBLIC
D. Lazdina, Latvian State Forest Research Institute Silava, Salaspils, LATVIA
N. Toskovski, Secondary School Car Samoil - Resen, Resen, REPUBLIC OF MACEDONIA
G. Toskovska, Secondary School Car Samoil - Resen, Resen, REPUBLIC OF MACEDONIA
I. Dimitriou, Swedish University of Agricultural Sciences, Uppsala, SWEDEN
A. Leplus, Association d'Initiatives Locales pour l'Energie et l'Environnement, Rennes, FRANCE
J. Bernard, Association d'Initiatives Locales pour l'Energie et l'Environnement, Rennes, FRANCE

Session reference: 1DV.1.3
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Characterization Of Brazilian Sugarcane Bagasse And Sugarcane Straw Based on European Methodologies to Evaluate The Potential for Energy Conversion

Short introductive summary:

The characteristics of biomass through specified methodologies is important to calculate the cost of production, the pre-processing viability such as energy conversion process. Current European methodologies is becoming requirement between producers of biomass for the export market. In this work, the residual Lignocellulosic Biomass (LCB) will be characterized from biorefinery sugarcane by European standards and assess the energy potential of biomass as well their mixture for application in a conversion process.

Presenter: **Caroline CARRIEL SCHMITT, Karlsruhe Institute of Technology, IKFT Dpt., Eggenstein-Leopoldshafen, GERMANY**

Presenter's biography:

.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Moreira, Institute for Technological Research, Sao Paulo, BRAZIL
R. Cruz Neves, Brazilian Bioethanol Science and Technology Laboratory, Sao Paulo, BRAZIL
P. Coelho Tambani, Institute for Technological Research, Sao Paulo, BRAZIL
A. Funke, Karlsruhe Institute of Technology, Karlsruhe, GERMANY
A. Hakuo Ushima, Institute for Technological Research, Sao Paulo, BRAZIL
K. Raffelt, Karlsruhe Institute of Technology, Karlsruhe, GERMANY

Session reference: 1DV.1.6
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Spatial Biomass Supply of Fast-Growing Plantations for Energy

Short introductive summary:

The present study aims at a spatialization of fast-growing plantation yields for energy at European level. The data are based on spatialized estimates of previous models and estimates, calibrated with measurements of plantations (particularly willow and poplar). These records entail harvesting records from commercial plantations in different countries, as well as a database of yield results from academic publications and reports: including 2096 records for 13 countries from 61 publications. The results are presented in maps at 1 x 1 km resolution. The process for spatialization uses surrogate variables for top-down disaggregation of previous models or records related to yield, combined with climatic and soil variables and land use maps, among others.

Presenter: **Blas MOLA, University of Easter Finland, Joensuu, FINLAND**

Presenter's biography:

I work as Adj Prof at the University of Eastern Finland (UEF, Joensuu, Finland), and at the Swedish University of Agricultural Sciences (SLU, Uppsala, Sweden) in topics related to biomass production systems for energy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Mola-Yudego, UEF/SLU, Joensuu, FINLAND
I. Dimitriou, SLU, Uppsala, SWEDEN

Session reference: 1DV.1.7
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Assessing Biomass Resources from Olive Oil Production in Spain

Short introductive summary:

Olive oil industry generates several residues, i.e., extracted olive pomace (EOP) and olive leaves (OL) that could be used to produce high-added value products in an integrated biorefinery, which would also include olive crop residues, i.e. olive tree pruning biomass (OTP). Olive pomace is the main by-product of the two-phase system oil extraction process currently used in practically all the olive mills in Spain. It is generally processed in pomace oil extracting industries where the material is dried and extracted with hexane to separate the residual oil, generating a solid residue named extracted olive pomace (EOP). Moreover, in the initial olive cleaning process carried out in olive mills, small branches and leaves from harvest (OL) are separated by density, generating a significant amount of residual biomass. Besides, the olive tree cultivation requires a pruning operation to remove old branches that also generates an important volume of this kind of biomass (OTP).
In this work, the analysis of the potential of EOP, OL and OTP residues is addressed by estimating the production volumes of these residues at national level and the spatial distribution using software GIS.

Presenter: **Paloma MANZANARES, CIEMAT, Biofuels Unit, Renewable Energy Division, Madrid, SPAIN**

Presenter's biography:

Paloma Manzanares is PhD in Biology and Senior Scientist at Biofuels Unit of CIEMAT, Spain. She has large expertise in biomass production and utilization and in the last years has specialized in advanced technologies for 2nd generation bioethanol.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Manzanares, CIEMAT, Madrid, SPAIN
M.J. Negro, CIEMAT, Madrid, SPAIN
I. Ballesteros, CIEMAT, Madrid, SPAIN
M. Ballesteros, CIEMAT, Madrid, SPAIN
F.J. Gallego, Universidad de Jaen, Jaen, SPAIN
E. Castro, Universidad de Jaen, Jaen, SPAIN
J.C. Lopez-Linares, Universidad de Jaen, Jaen, SPAIN
E. Ruiz, Universidad de Jaen, Jaen, SPAIN

Session reference: 1DV.1.8
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Energy Crops for the Tropics and Subtropics

Short introductive summary:

This presentation describes results of energy-crop growth trials designed to measure the genotype-environment interactions of high-yielding energy crops grown sustainably in the tropics and subtropics.

Presenter: **Andrew HASHIMOTO, University of Hawaii at Manoa, Molecular Biosciences and Bioengineering Dpt., Honolulu, USA**

Presenter's biography:

Principal Investigator, Conversion of High-Yield Tropical Biomass into Sustainable Biofuels

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Hashimoto, University of Hawaii, Honolulu, USA
R. Ogoshi, University of Hawaii, Honolulu, USA
S. Crow, University of Hawaii, Honolulu, USA

Session reference: 1DV.1.14
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

An Innovative GPS System for the Improvement of Work Time Study in the Agroenergy Sector

Short introductive summary:

The purpose is to test the reliability of an innovative GPS system aimed at work time measurement of machines involved into bioenergy sector. The GPS system, developed by CREA-ING with the Company Arvatec srl, consists of a GPS receiver, a touch screen vehicular PC and a dedicated software, named Arvaciosta. The geographic positions, the speed and route, are acquired each second. Data analysis by means of Arvaciosta software, allows to determine field size, time consumption, turning and idle time, machine efficiency, effective and productive working time. Being the barley a biomass source for both first and second generation ethanol production, the harvesting of about 12 hectares including straw baling was monitored at CREA-ING fields. Work time study was performed both with the GPS system and with manual measurements by researchers. The harvested area was subdivided in several plots and the results obtained with the two approaches were compared.

Presenter: **Luigi PARI, CREA- Council for Agricultural Research and Economics, Unità di Ricerca per l'Ingegneria Agraria - CREA-ING, Monterotondo RM, ITALY**

Presenter's biography:

Dr. Luigi Pari has a PhD in Agricultural Engineering in 1990 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). In 2002 he became Scientific Director of the Non Food Agriculture - Energy Crops Group (PANACEA), coordinating the activities of 18 researchers, which main activity is to develop new agricultural machineries prototype for energy crops harvesting and logistic.

Authors of more than 200 scientific publications, he was scientific responsible of more then 30 research projects, funded by European Union, Italian Ministry of Agriculture and private enterprises

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Pari, CREA-ING, Monterotondo (Rome), ITALY
V. Alfano, CREA-ING, Monterotondo (Rome), ITALY
A. Scarfone, CREA-ING, Monterotondo (Rome), ITALY
P. Mattei, CREA-ING, Monterotondo (Rome), ITALY
A. Del Giudice, CREA-ING, Monterotondo (Rome), ITALY
E. Santangelo, CREA-ING, Monterotondo (Rome), ITALY

Session reference: 1DV.1.15
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Bioenergy Development as a Sustainable Energy to Counter Energy Crisis in Bangladesh

Short introductive summary:

In this modern era, non-renewable energy resources dominate in terms of employment to produce energy. However, such heavy dependence on non-renewables not only generates threats to the environment and health but also puts worldwide energy security into jeopardy. Thus, the importance of renewable energy sources, biomass in particular, is increasing day by day. Bioenergy from utilization of biomass, not only is environment friendly but also ensures sufficient availability in future due to being a crucial renewable energy source. Bangladesh, like many other developing nations across the globe, had been facing acute energy deficits following insufficient indigenous energy sources. Moreover, the country’s vast dependence on natural gas and imported oils hampers local electricity generation which in turn exerts negative impacts on its economic growth. Furthermore, Bangladesh being an agricultural country has infinite biomass reserves that can be tapped to produce power. Hence, it is recommended that Bangladesh should now focus on making best use of its bioenergy generation potentials which would complement the other renewable and non-renewable energy sources already in use.

Presenter: **Muntasir MURSHED, North South University, School of Business and Economics, Dhaka, BANGLADESH**

Presenter's biography:

Muntasir Murshed is a student in School of Business and Economics (SBE) under North South University in Dhaka, Bangladesh

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.B. Amin, North South University, Dhaka, BANGLADESH
M. Murshed, North South University, Dhaka, BANGLADESH

Session reference: 1DV.1.16
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Biomass Demand Point Location Analyze at Regional Level Agent-Based Simulation

Short introductive summary:

The Agent-based simulation model was used to estimate costs and availability of feedstock for a number of biomass demand points by taking into account the geographical properties of resources and logistics. Demand point locations was chosen inside the European region. The costs of the acquiring the feedstock and processing the feedstock ready to use was analyzed to compare the demand points placement.

Presenter: **Mika AALTO, Lappeenranta University of Technology, Laboratory of Bioenergy, Mikkeli, FINLAND**

Presenter's biography:

Junior researcher from Lappeenranta University of Technology, Finland. Specialised in agent-based modelling and numerical methods in biofuel quality modelling. Recently have been working on simulation models of biomass logistic systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Aalto, Lappeenranta University of Technology, Mikkeli, FINLAND
O.-J. Korpinen, Lappeenranta University of Technology, Mikkeli, FINLAND
T. Ranta, Lappeenranta University of Technology, Mikkeli, FINLAND

Session reference:	1DV.1.21
Subtopic:	1.1 Biomass Potentials and Biomass Mobilisation
Topic:	1. BIOMASS RESOURCES

Composting of Different Agricultural By-Products with Raw Digestate: Preliminary Considerations about Technical Feasibility

Short introductive summary:

Animal waste management has a key role in complying with the lowering of livestock farming environmental pressure.
Re-using animal sewage as raw material for anaerobic digestion (AD) has been leading to a global reconsideration of farm effluents that, from refuse, are currently being understood as a resource.
In our work we focus on the further reuse of raw digestate testing the composting of it with agricultural by-products (grass, wheat straw and vineyard pruning) as bulking agents.
Preliminary results show that the resulting organic fertilizer achieves a volume reduction between 70-80% of the original weight in compliance with the required quality parameters.

Presenter: **Massimo BRAMBILLA, Consiglio per la Ricerca in Agricoltura e l'analisi dell'economia Agraria, Unità di Ricerca per l'Ingegneria Agraria, Treviglio, ITALY**

Presenter's biography:

Graduated in Agricultural Science in 1996, in 2002 achieved the Ph.D. in Agricultural Chemistry. Since 2012 he is been working as full time researcher at CREA-Consiglio per la ricerca in agricoltura e l'analisi del'economia agraria.
ORCID ID: http://orcid.org/0000-0002-0998-0522

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Boscaro, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali (TESAF), Legnaro, ITALY
A. Chiumenti, Università di Udine, Department of Agricultural, Food, Environmental and Animal Sciences (DI4A), Udine, ITALY
F. Da Borso, Università di Udine, Department of Agricultural, Food, Environmental and Animal Sciences (DI4A), Udine, ITALY
M. Brambilla, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA), Unità di ricerca, Treviglio, ITALY
C. Bisaglia, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria (CREA), Unità di ricerca, Treviglio, ITALY
L. Sartori, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali (TESAF), Legnaro, ITALY
A. Pezzuolo, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali (TESAF), Legnaro, ITALY

Session reference: 1DV.1.22
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Vacuum Technology for Woodchips Drying

Short introductive summary:

This article is focused on wooden biomass, especially on wooden chips. All technological applications of woodchip deal with humidity of input material. Pelleting, briquetting and also combustion of wooden chips solves problems of humidity of input material. Drying of wooden biomass is expansive process. This text represents solution which was invented by cooperation of university and research activities of private companies. Reduction of drying costs motivates research of vacuum drying technology. Vacuum drying technology is commonly used process in production of timber goods. Commonly used technology is not suitable for drying wooden chips. Energetic behaviour, processing method and drying speeds make wood-chip drying and timber-goods drying so different. New vacuum technology operates with large amount of input heat, constant under pressure in workspace and high recuperation of input heat. Developed technology is tested on prototype of vacuum dryer. Developed device provides wood chips for briquetting machine. It is new developed, tested technology with high level of potential. Paper describes invented technology, vacuum potential and opportunities of vacuum technology.

Presenter: **Vaclav MAREK, University of West Bohemia, Mechanical Engineering Dpt., Pilsen, CZECH REPUBLIC**

Presenter's biography:

I am student of PhD studies at University of West Bohemia in Pilsen, faculty of mechanical engineering. My fields of interest are: machine design, CDF and FEM simulations and CAE systems. I am interested also in energy efficiency and research in this field.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V.M. Marek, University of West Bohemia, Pilsen, CZECH REPUBLIC

Session reference: 1DV.1.25

Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation

Topic: 1. BIOMASS RESOURCES

Regional Biomass Potentials from Airborne Laser Scanning Data, Case South-East Finland

Short introductive summary:

The aim of this study is to analyze how the results of forest laser scanning can be utilized when analyzing the availability of forest fuel in the regional level, case example South-East Finland. The airborne laser scanning measures the time of laser pulses emitted from aircraft and reflected by trees located on the ground. The laser scanning results indicate the volume of ground wood (m3/ha), stumps (kgd), branch (kgd) and foliage (kgd). This information is presented by forest plots which areas and locations are known.

Presenter: **Mika LAIHANEN, Lappeenranta University of Technology, LUT Energy Dpt., Lappeenranta, FINLAND**

Presenter's biography:

Mika Laihanen, M.Sc. (Eng.), works as a project researcher at Lappeenranta University of Technology. His main research subjects are biomass availability, utilization and regional energy balances.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Laihanen, Lappeenranta University of Technology, FINLAND
A. Karhunen, Lappeenranta University of Technology, FINLAND
T. Ranta, Lappeenranta University of Technology, FINLAND

Session reference: 1DV.1.27
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

A Bi-Objective Model to Locate Several Bio-Refineries and Optimize their Supplies

Short introductive summary:

Many research projects are devoted to biomass production, selection of new crops and bio-refinery processes but in comparison the biomass supply chain to satisfy the planned demands of refineries are relatively neglected, although it could constitute the Achille's heel of the system. Indeed, an important fraction of biomass cost at refinery gates resides in logistic costs. This paper briefly presents a mathematical model to locate several refineries over a large territory and optimize their supplies over one year divided into weeks. Two objectives are minimized: the total cost of the system, GHG emissions, and energy consumptions.

Presenter: **Nasim ZANDI ATASHBAR, University of Technology of Troyes, France, FRANCE**

Presenter's biography:

I am Phd student in the laboratory of industrial system optimization(LOSI), Troyes, France.I work with Dr Christian Prins and Dr Nacima Labadie. My thesis is about modeling and optimization of biomass supply chain for several biorefineries.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Zandi Atashbar, University of Technology of Troyes, Troyes, FRANCE
N. Labadie, University of Technology of Troyes, Troyes, FRANCE
C. Prins, University of Technology of Troyes, Troyes, FRANCE

Session reference: 1DV.1.28
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Comparative Study of Time Investment on Cooking Energy Fuel Transition in Rural India And Nepal

Short introductive summary:

Fuelwood is the primary source of cooking energy for rural areas. Heavy reliance on this free energy has resulted in deforestation. Because of this shortage and scarcity of firewood, women are forced to walk a longer distance to collect wood. In response to this crisis, many international efforts and government policies have been launched. Despite such good intentions, many interventions have failed. This is because all the solutions have been equated with fuel crisis alone. The time requirement in the production of fuelwood has been excluded from the energy analysis, as time plays an important role for rural people. Hence, this study focuses on the time consumed in the production of energy and how different intervention in cooking system effects this time consumption. The analysis has been done on two different locations i.e. one village from a hilly area of Nepal and another from the low-lying village from India. It has been found that due to the hilly area, Nepal has a very high demand for fuelwood. Furthermore, in the analysis of cooking intervention on the different energy system, it shows that fuelwood with improved cookstove has very less time demand than other energy systems.

Presenter: **Karabee DAS, University of Groningen, IVEM, ESRIG Dpt., Groningen, THE NETHERLANDS**

Presenter's biography:

I am a PhD researcher at University of Groningen, Netherlands and also working as teaching assistant. My area of Specialization is Energy and Environment. I am working on input-output analysis of agri-based resources in rural areas.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Das, University of Groningen, THE NETHERLANDS
G. Pradhan, Univeristy of Groningen, THE NETHERLANDS
M. Hiloidhari, Jawaharlal Nehru University, Delhi, INDIA
D.C. Baruah, Tezpur University, Tezpur, INDIA
S. Nonhebel, University of Groningen, THE NETHERLANDS

Session reference: 1DV.1.30
Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation
Topic: 1. BIOMASS RESOURCES

Agricultural and Forest Residues in Peru: Potential for Bioenergy Use

Short introductive summary:

In the world, bioenergy is the most important renewable energy option, both at present, as well as in the near- and medium-term future. However, in Peru despite its enormous potential this is not considered. This paper presents, at provincial and departmental level, the amount of agricultural and forest residues energy available for bioenergy use. This work involved the selection of biomass residues with more energy potential, analysis of statistics of agricultural and forestry production from 2003 to 2013 year; waste field sampling and physical chemical characterization. A mathematical model was applied to determine the energy potential of each residue. The result was Peru Biomass Energy Atlas which is the first energy map of the residual biomass of the country.
The research shows that Peru generates over 11´ 553,700 tonnes of wastes that represent 2’882,777 TOE of energy. These wastes are mainly composed by crop residues from sugarcane (20%), corn stems, leaves and cobs (37%), bagasse (17%), rice husk (3%), rice straw (12%), asparagus straw (4%), cotton straw (6%), chip and sawdust (1%). La Libertad (30%), Lambayeque (18%), Lima (13%) and Ica (7%) show the highest energy

Presenter: **Estela ASSUREIRA, Pontificia Universidad Católica del Perú, Engineering Dpt., Lima, PERU**

Presenter's biography:

I am a Mechanical Engineer and Master of Science from the Pontificia Universidad Católica del Perú (PUCP). At PUCP I am a principal professor at the Engineering Department teaching Fluid Mechanics and Turbomachinery courses. Since 1981, I am a Director of Coal and Biomass Research Group.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Assureira, Pontificia Universidad Católica del Perú, Lima, PERU

Session reference: 1DV.1.32

Subtopic: 1.1 Biomass Potentials and Biomass Mobilisation

Topic: 1. BIOMASS RESOURCES

How to Preserve the Energy Potential of Organic Residues During Storage? Focus on Anaerobic Digestion

Short introductive summary:

In order to enable a continuous supply of biogas plants throughout the year, seasonal feedstock needs to be preserved and in most cases for extended periods. However, several doubts still persist about the good management practices for part of the organic residues used for anaerobic digestion, since this subject has received limited attention so far. This work brings together a compilation of long-term storage assays at laboratory scale for two different types of catch crops and cattle manure. Comparison between the impact of ensiling and open-air storage techniques on organic matter and energy preservation was performed. Preliminary tests on the use of additives for ensiling of cattle manure were done as well.

Presenter: **Ruben FRANCO, Universitè de Lyon, INSA Lyon, DEEP Research Group, Villeurbanne, FRANCE**

Presenter's biography:

I am a chemical engineer, graduated in Portugal, my motherland. Since 2014 I live in France, where I'm doing my PhD thesis on the field of biomass storage before anaerobic digestion. When not doing research,I will probably be playing guitar, drums, football, chess or watching cycling.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Teixeira Franco, Universitè de Lyon, INSA Lyon, DEEP Laboratory, Villeurbanne, FRANCE
P. Buffiere, Universitè de Lyon, INSA Lyon, DEEP Laboratory, Villeurbanne, FRANCE
R. Bayard, Universitè de Lyon, INSA Lyon, DEEP Laboratory, Villeurbanne, FRANCE

Session reference:	1DV.1.35
Subtopic:	1.2 Biomass Feedstock, Residues and By-products
Topic:	1. BIOMASS RESOURCES

Vane Torque Tester for Forest Biomass

Short introductive summary:

Biomass as a renewable source of energy is widely used directly as woodchips, shavings, sawdust or in form of briquettes or pellets. Biomass fuels are unique materials composed of particles varying in size and shape, with elongation larger than other agro granular materials. The knowledge of mechanical properties of granular biomass is necessary for design and efficient operation of equipment for handling, storage and processing.
The prototype vane tester was constructed for determination of shear strength of consolidated sample of granular biomass. The device comprise cylindrical chamber 40 cm in diameter, 40 cm high. Axially, near the bottom of the chamber 8 cm high and 12 cm wide rotating vane tool having four blades is located. The normal pressure is exerted by pneumatic system with rubber air spring and the yoke. The rotating vane impeller is assumed to shear only the material in the immediate vicinity of the blades.
The measurements could be performed for different kind of granular biomass materials widely used in firing and co-firing, handling and storage. Normal consolidation pressures in a range from 5 to 30 kPa and rotation rate ranged from 3 to 13 r/min could

Presenter: **Mateusz STASIAK, Institute of Agrophysics, Polish Academy of Sciences, Lublin, POLAND**

Presenter's biography:

Mateusz Stasiak is employed in the Institute of Agrophysics, Polish Academy of Sciences, Poland, M.Sc. Eng. in mechanics, Ph.D. in agronomy. A current research emphasis is in areas of mechanics of plant granular materials, food powders and granular biomass as well as in methods and its testing.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Stasiak, Institute of Agrophysics, Polish Academy of Sciences, Lublin, POLAND
M. Molenda, Institute of Agrophysics, Polish Academy of Sciences, Lublin, POLAND
S. Nosek, Termall Sp. z o.o. Rozruch Moc Ekologia, Belchatów, POLAND

Session reference: 1DV.1.36
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Woody Biomass for Energy Use From Residues and Waste of Forest Utilisations and Pruning Woody Crops in Italy

Short introductive summary:

In this paper we evaluated the woody biomass availability from residues and wastes of forest exploitation, silviculture (plantations of arboriculture), prunings of agricultural crops, in particular orchards, vineyards and olive groves. Are valued the amount of obtainable biomass from agricultural and forest resources, characteristics for the three Italian areas (Northern, Central and Southern), minimizing the mobilization of biomass to meet the constraints established for short chains.

Presenter: **Domenico COALOA, CREA-Council for Agricultural Research end Economics, Trasformazioni Industriali Dpt., Casale Monferrato (AL), ITALY**

Presenter's biography:

Domenico Coaloa, graduated in Agricultural Science, it has a long experience as a researcher in Arboriculture at CRA-PLF with particular attention to studies on the economic and environmental sustainability of wood production.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Coaloa, Council for Agricultural Research and Economics, Casale Monferrato, ITALY
G. Facciotto, Council for Agricultural Research and Economics, Casale Monferrato, ITALY

Session reference: 1DV.1.38
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Mechanical Properties of Granular Biomass Determined in Vane Torque Tester

Short introductive summary:

The knowledge of mechanical properties of granular biomass is necessary for design and efficient operation of equipment for handling, storage and processing. Reliable processing and efficiency of equipment require actual values of material parameters. Inappropriate design of the handling and storage equipment results in material loss, biomass degradation, flow stops which in consequence increase operation costs or causes damage of equipment.
The prototype vane tester was constructed for determination of shear strength of consolidated sample of granular biomass. The measurements were performed for forest woodchips, material widely used in firing and co-firing, handling and storage. Normal consolidation pressures in a range from 5 to 30 kPa and rotation rate from 3 to 13 rpm were adopted. The value of measured maximum torque was found to be affected by both, the consolidation pressure and time of consolidation. No significant influence of rotation speed on shear strength was observed. The determination of shear torque may be used for design and control of processing equipment.

Presenter: **Marek MOLENDA, Institute of Agrophysics, Polish Academy of Sciences, Lublin, POLAND**

Presenter's biography:

Marek Molenda is employed at the Ins. of Agrophysics, Polish Ac. of Sc.. M.Sc.Eng. in mech. Eng., Ph.D. in agronomy, Prof. of Agronomy. A research emphasis is in areas of mech. of plant granular materials, food powders and granular biomass as well as in methods and instrumentation for its testing.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Molenda, Institute of Agrophysics, Polish Academy of Sciences, Lublin, POLAND
M. Stasiak, Institute of Agrophysics, Polish Academy of Sciences, Lublin, POLAND

Session reference: 1DV.1.39
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Energy-Efficient Cold-Air Ventilation of Coarse Wood Chips from Short Rotation Coppice

Short introductive summary:

Coarse wood chips from SRC offer the opportunity for energy efficient drying by forced cold-air ventilation. Cold-air ventilation is a well know low-cost alternative for intermediate storage and preservation in agriculture. Electrical energy is needed for driving the blower only. During winter, the low drying potential of the ambient air leads to a slow drying of the product, but due to the simultaneously low temperature of the drying-air microbiological degradation processes can be reduced to a minimum. This technique has been investigated for the storage of coarse wood chips from poplar at practice scale (150 m^3 pile). To reduce the drying cost, a control scheme for the blower has been developed to operate the blower in dependence to ambient-air conditions, pile temperature and drying progress.
The results of first cold-air storage and drying tests have shown that even under unfavourable weather conditions at the SRC-harvest season in winter dry matter losses can be reduced to less than 5%. Furthermore, after 8 weeks of storage and controlled cold-air ventilation average moisture contents of 20% could be realised for coarse wood chips from poplar.

Presenter: **Ralf PECENKA, Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB), Post Harvest Dpt., Potsdam, GERMANY**

Presenter's biography:

Dr. Ralf Pecenka works as a researcher at the Leibniz Institute for Agricultural Engineering and Bioeconomy(ATB), Germany. His main research subjects are harvest, storage and processing of short-rotation woody crops. Further information: www.atb-potsdam.de

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Pecenka, Leibniz Institute for Agricultural Engineering, Potsdam, GERMANY
H. Lenz, Leibniz Institute for Agricultural Engineering, Potsdam, GERMANY
C. Idler, Leibniz Institute for Agricultural Engineering, Potsdam, GERMANY

Session reference: 1DV.1.41
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Mechanical Extraction And Recovery Of Rootstoks From End Life Orchards To Produce Bioenergy

Short introductive summary:

Study about the mechanical extraction performance of an agricultural machine, rootstock quality study, rootstock yield according to grape type.

Presenter: **Luigi PARI, CREA- Council for Agricultural Research and Economics, Unità di Ricerca per l'Ingegneria Agraria - CREA-ING, Monterotondo RM, ITALY**

Presenter's biography:

Dr. Luigi Pari has a PhD in Agricultural Engineering in 1990 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). In 2002 he became Scientific Director of the Non Food Agriculture - Energy Crops Group (PANACEA), coordinating the activities of 18 researchers, which main activity is to develop new agricultural machineries prototype for energy crops harvesting and logistic.
Authors of more than 200 scientific publications, he was scientific responsible of more then 30 research projects, funded by European Union, Italian Ministry of Agriculture and private enterprises

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Pari, CREA-ING, Monterotondo (Rome), ITALY
A. Scarfone, CREA-ING, Monterotondo (Rome), ITALY
V. Alfano, CREA-ING, Monterotondo (Rome), ITALY
E. Santangelo, CREA-ING, Monterotondo (Rome), ITALY
A. Suardi, CREA-ING, Monterotondo (Rome), ITALY
A. Del Giudice, CREA-ING, Monterotondo (Rome), ITALY
F. Gallucci, CREA-ING, Monterotondo (Rome), ITALY

Session reference: 1DV.1.42
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

A Preliminary Analysis on the Potential Bioenergy Production from Agro-Forestry Crops and Residues in Angola

Short introductive summary:

In this work, a preliminary assessment of biomass resources potential for bioenergy in the province of Huíla, in Angola, is given. More specifically, the present study determined the amount and types of sustainable agroforest residues and dedicated crops to energy and their provincial distribution. Agricultural residues included those generated from sugarcane, maize, rice, sorghum and millet, and other cereals, roots and tubers (cassava, sweet potato), pulses and oil crops, and fruits processing. Regarding dedicated crops, sugarcane, sorghum and soya are the most representative crops for bioenergy. Natural forest residues were also addressed in this study. The preliminary analysis to the data shows that circa 500 000 tonnes of agroforest biomass could be collected and transformed into heat or energy carriers, such as bioethanol, biobutanol, biodiesel, biogas and biohydrogen. The characteristics of the different agroforest residues are presented in the study and different scenarios for the exploitation of this biomass are taken into account.

Presenter: **Ana Luisa FERNANDO, Universidade Nova de Lisboa, Ciências e Tecnologia Biomassa Dpt., Caparica, PORTUGAL**

Presenter's biography:

Ana Luísa Fernando holds a PhD in Environmental Sciences. Assistant Professor at Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.Main scientific areas: energy crops, remediation of contaminated soils, valorization of agro residues.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Cativa, FCT/UNL, Lisbon, PORTUGAL
A.L. Fernando, FCT/UNL, Lisbon, PORTUGAL

Session reference: 1DV.1.43
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Ambient Drying of Eucalyptus Grandis in Hawaii: Experimental and Model Results

Short introductive summary:

Eucalyptus grandis has a high growth rate and material density which makes it a potential source for alternative fuel in Hawaii. One of the challenges to implementing biomass-based energy systems is managing material moisture using low cost methods. This paper reports results of natural-environment, wood drying experiments and development of empirical models to describe the moisture loss over time as a function of solar insolation, ambient temperature, and precipitation.

Presenter: **Scott TURN, University of Hawaii, Hawaii Natural Energy Institute, Honolulu, USA**

Presenter's biography:

Scott Turn is a Researcher on the faculty of the Hawaii Natural Energy Institute at the University of Hawaii. Research interests include biomass resource assessment, feedstock processing and characterization, thermochemical conversion, hot gas cleaning, fuel reforming, and biofuel properties.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D.H. Harris, Hawaii Natural Energy Institute, Honolulu, USA
S.Q. Turn, Hawaii Natural Energy Institute, Honolulu, USA

Session reference: 1DV.1.48
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Conceptual Description of Integrated Biomass Logistical Centres (IBLCs)

Short introductive summary:

The main goal of the AGROinLOGproject is the demonstration of Integrated Biomass Logistic Centres (IBLCs) for food andnon-food products, evaluating their technical, environmental and economic feasibility.Applying IBLCs in existing agro-industries can have a positive impact in final product price, givinga clear competitive strength to anagro-industry, which can exploit this privileged situation comparedto a new biomass supply business built from scratch.Main challenges are being able to integrate logistics, harvesting and equipment infood and non-food applications, ensuring marketability of the final bio-commodities.

The main objective of WP6 ’generic strategies for the development of future IBLCs’ within AGROinLOG is to establish a practical and theoretical framework for the development of new value chains with IBLCs. The first task is to provide an updated conceptual description of an IBLC. This task will build further on results from previous projects (such as Sucellog), which describe the current thoughts on IBLCs. The result of this taskwill be a conceptual description that will be described in the paper.

Presenter: **Bert ANNEVELINK, Wageningen Food & Biobased Research, Biorefinery & Sustainable Value Chains Dpt., Wageningen, THE NETHERLANDS**

Presenter's biography:

The expertise of Dr Bert Annevelink is logistics, production planning and scheduling in the field of biomass supply chains. He is involved in several studies on the optimization of biomass logistics, e.g. the S2Biom project and the Biomass Yard project.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Annevelink, Wageningen Food & Biobased Research, Wageningen, THE NETHERLANDS

Session reference: 1DV.1.50

Subtopic: 1.2 Biomass Feedstock, Residues and By-products

Topic: 1. BIOMASS RESOURCES

Caracterization of Torrefied Biomass and Co-Firing Experimetal Investigation in Pilot Scale Combustion System

Short introductive summary:

Torrefaction is a pre-treatment technology used to produce high-grade solid biofuels through thermal conversion (drying and devolatilization). Torrefied biomass shows the increase of carbon content, heating value, energy density and grindability compared to raw biomass before such treatment. Also, handling and storage of the torrefied biomass can be simplified since its hydrophobic properties lower microbial degradability. Such advantages allows torrefied biomass to run simultaneously with coal for the existing thermal power generation. This study aimed to analyze fuel properties of torrefied biomass using steam and N2 (Nitrogen) as purging gas in a lab-scale test equipment. In addition, torrefied biomass was produced through the pilot-scale equipment facilitating continuous production. Through the co-firing of such torrefied biomass with coal in a combustion system, the combustion characteristics were analyzed.

Presenter: **YongWoon LEE, Korea Institute of Industrial Technology, Thermochemical Energy System Group, Cheonansi, REPUBLIC OF KOREA**

Presenter's biography:

Dr. YongWoon Lee received his Ph.D. degrees (2016) in department of mechanical engineering at Sungkyunkwan University. Currently he is a researcher of Thermochemical Energy System R&D Group at KITECH, and performing a biomass co-firing project in Korean pulverized coal power plants.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

Y.W. Lee, Korea Institute of Industrial Technology, Cheonan-si, REPUBLIC OF KOREA
T. Chae, Korea Institute of Industrial Technology, Cheonan-si, REPUBLIC OF KOREA
J. Lee, Korea Institute of Industrial Technology, Cheonan-si, REPUBLIC OF KOREA
B. Kang, Korea Institute of Industrial Technology, Cheonan-si, REPUBLIC OF KOREA
C. Ryu, Sungkyunkwan University, Suwon-si, REPUBLIC OF KOREA
W. Yang, Korea Institute of Industrial Technology, Cheonan-si, REPUBLIC OF KOREA

Session reference: 1DV.1.55
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Benchmarking Different Treatment Methods for Organic Municipal Solid Waste

Short introductive summary:

The objective of this paper is to show results of a benchmarking exercise of different treatment methods (anaerobic digestion, landfilling, incineration, MBT, composting) for organic municipal solid waste in the framework of the EU project Bin2Grid.

Presenter: **Dominik RUTZ, WIP, Biomass Unit, München, GERMANY**

Presenter's biography:

Dominik Rutz is a Senior Project Manager at WIP Renewable Energies (www.wip-munich.de) since 2005. He graduated in Environmental Science (Dipl.-Ing.) and Consumer Science (M.Sc.). His main field of experience includes the technical and non-technical analysis of bioenergy and its supporting policies in developing countries and emerging economies worldwide. He is coordinator of several EU funded projects.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D Rutz, WIP, Munich, GERMANY
R Mergner, WIP, Munich, GERMANY
R Janssen, WIP, Munich, GERMANY
B. Ribic, Zagreb City Holding, Zagreb, CROATIA
A. Hadzic, Zagreb City Holding, Zagreb, CROATIA
G. Mijic, Zagreb City Holding, Zagreb, CROATIA
T. Puksec, University of Zagreb (UNIZAG FSB), Zagreb, CROATIA
N. Duic, University of Zagreb (UNIZAG FSB), Zagreb, CROATIA
R. Zweiler, Güssing Energy Technologies, Güssing, AUSTRIA
C. Doczekal, Güssing Energy Technologies, Güssing, AUSTRIA
P. Novakovits, Güssing Energy Technologies, Güssing, AUSTRIA
A. Gruevska, JSP Skopje, Skopje, REPUBLIC OF MACEDONIA
G. Antevski, JSP Skopje, Skopje, REPUBLIC OF MACEDONIA
M. Caloski, JSP Skopje, Skopje, REPUBLIC OF MACEDONIA
D. Mitkovski, City of Skopje, Skopje, REPUBLIC OF MACEDONIA
K. Petrusevski, City of Skopje, Skopje, REPUBLIC OF MACEDONIA
E. Cvetkovska, City of Skopje, Skopje, REPUBLIC OF MACEDONIA
L. Chacón Ladrón de Guevara7, Instituto Andaluz de Tecnologia, Sevilla, SPAIN
M. Kazeroni, Observatoire Régional des Déchets d'Île-de-France, Paris, FRANCE

Session reference: 1DV.1.58
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Biomass-Concepts for Tourism Aereas

Short introductive summary:

Tourism as important economic factor worldwide, is about to integrate sustainability and resource efficiency as core components, helping to preserve nature and to adress conscious guests. Biomass and organic wastes represent the major part of wastes within tourism resorts – especially food waste is a valuable resource within a sustainability strategy.

Basing on experiences with TUI-Group at the example of a resort in Turkey, where University of Stuttgart has implemented a waste and resource management concept with separate collection of wastes and recycling material, waste water treatment, production of biogas, fertilizers and compost, the presentation will show potencials and scenarios for a tourism aerea in Dominican Republic (DR). This ongoing project with partners from GIZ (German Society for International Cooperation) and authorities in DR has the aim to detect the potencial of biomass-concepts with a special glance on production of secondary fuel and biogas.

Presenter: **Gerold HAFNER, University of Stuttgart, ISWA - Institute for Sanitary Engineering, Water Quality and Solid Waste Management Dpt., Stuttgart, GERMANY**

Presenter's biography:

Civil and Environmental Engineer, graduated 1992; since 2003 University of Stuttgart; since 2009 Head of Department: "Resources Management and Industrial Wastes" at University of Stuttgart

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Hafner, University of Stuttgart, GERMANY

Session reference: 1DV.1.59

Subtopic: 1.5 Municipal and Industrial Wastes

Topic: 1. BIOMASS RESOURCES

Economic Evaluation of the Production and Utilization of Bio-Fertilizers from Organic Waste Digestates in Comparison to Mineral Fertilizers

Short introductive summary:

Biowaste contains valuable plant nutrients. After using it as a substrate in biogas plants, the resulting digestates can be used as fertilizers or soil amendments. In the ongoing project VeNGA , four products were developed on the basis of fermented and subsequently composted biowaste. For the production and sale of marketable fertilizers and soil amendments a price must be defined. Up to this point the monetary value of the plant nutrients contained in the four products as well as the additional worth of the organic substance in form of long-lasting humus (Humus-Carbon) has been evaluated. The next step was the calculation of the production costs for the four products on the basis of actual processing and composting costs as stated by German communal companies. Varying product prices and qualities of composts with different degrees of rotting and particle sizes were taken into consideration.
Parallel to this the first results of a field trial in which the four products were tested in comparison to standard mineral fertilization are now available. For the 25th EUBCE in June 2017 all results will be analyzed and presented at the conference.

Presenter: **Felicitas BECHSTEIN, Institut für Agrar-und Stadtökologische Projekte an der Humboldt-Universität zu Berlin, Food Technology Dpt., Berlin, GERMANY**

Presenter's biography:

She works as agricultural economist and has a focus on renewable energies in rural areas. Predominantly she studies aspects of economics of biogas production. In the project presented at EUBCE she is calculating the profitability of different fertilizers based on bio-wastes from households.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Bechstein, Institute of Agricultural and Urban Ecological Projects affiliated to Berlin Humboldt University (IA, Berlin, GERMANY
C.-L. Ross, Institute of Agricultural and Urban Ecological Projects affiliated to Berlin Humboldt University (IA, Berlin, GERMANY
K. Sensel-Gunke, Institute of Agricultural and Urban Ecological Projects affiliated to Berlin Humboldt University (IA, Berlin, GERMANY
V. Wilken, Institute of Agricultural and Urban Ecological Projects affiliated to Berlin Humboldt University (IA, Berlin, GERMANY

Session reference: 1DV.1.61
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

A Four-Step Gasification-Combustion Process for the Clean Conversion of MSW

Short introductive summary:

In view of the dioxin emission of incineration, a four-step gasification-combustion process is proposed for the safe disposal of MSW, consisting of updraft gasification, homogeneous conversion, staged combustion and ash melting. In the gasification product, Cl can be in the form of Cl·, Cl2, HCl and C-Cl. Then the syngas goes through the homogeneous conversion zone, where all the Cl is directional transferred into HCl, and dioxin formation is inhibited as a result. Subsequently, a proper-designed staged combustion procedure is applied to realize the selective oxidation of the syngas. Combustible gases are completely oxidized and output heat energy, while Cl remains in HCl.

In previous work, the updraft gasification process and the homogenous conversion process have been well studied, and the HCl-targeted Cl transfer was achieved. In present work, the staged combustion process is the emphasis. Cl· reproduction and C-Cl reformation from syngas combustion will be studied, and the range of reaction conditions satisfying the selective oxidation of the syngas will be gained. Based on these results, the clean gasification-combustion conversion process for MSW is expected to be fulfilled.

Presenter: **Ruizhi ZHANG, Shanghai Jiao Tong University, Institute of Thermal Energy Engineering, Shanghai, P.R. CHINA**

Presenter's biography:

I was born in 1985, Shanghai, and received a B.Eng in thermal engineering from Shanghai Jiao Tong University in 2007 and Ph.D. in thermal engineering from Shanghai Jiao Tong University in 2015. Now I'm a post doctor in Shanghai Jiao Tong University. My research interest is the clean conversion of biomass and MSW, especially the gasification technologies. In recent years, I'm focusing on the control of the dioxins and nitrogen oxides in the gasification process.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.Z. Zhang, Shanghai Jiao Tong University, Shanghai, P.R. CHINA
R.H. Yin, Shanghai Jiao Tong University, Shanghai, P.R. CHINA
Y.H. Luo, Shanghai Jiao Tong University, Shanghai, P.R. CHINA

Session reference: 1DV.1.62
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Demand-Oriented Generation of Sewage Gas from Organic Waste Material by Co-Fermentation of Liquid Components in Sewage Sludge Digesters

Short introductive summary:

The utilization of liquid organic-waste-press-water (PW) as co-substrate in existing sewage sludge digesters is a concept for recovering most of the energy potential of organic waste without necessitating additional fermentation plants and units. Demand-oriented generation of sewage gas and its utilization in CHPs allows need-based electricity generation without large storage facilities. Due to the high share and rapid degradability of the dissolved organic substance, the organic-waste-press-water is very suitable for demand-oriented gas production, while the solid parts are qualified for conventional compost production. This work examines the potential for increasing sewage gas generation by co-fermentation of the liquid components of organic waste material in sewage sludge digesters. First estimations result in a potential for electricity generation from PW fermentation in Germany of approx. 3,000 TJ/a, which would increase the electricity generation on sewage treatment plants by approx. 75%. Furthermore, the suitability of this concept for demand-oriented gas production on wastewater treatment plants is shown in preliminary experiments.

Presenter: **Philipp PILSL, University of Stuttgart, Institute for Sanitary Engineering, Water Quality and Solid Waste Management, Stuttgart, GERMANY**

Presenter's biography:

Research associate in group Resources Management and Industrial Wastes at the Chair of Waste Management and Emissions in the Institute for Sanitary Engineering, Water Quality and Waste Management at the University of Stuttgart.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Pilsl, University of Stuttgart, GERMANY
C. Maurer, University of Stuttgart, GERMANY
L. Boehme, University of Stuttgart, GERMANY
D. Leverenz, University of Stuttgart, GERMANY
P. Maurer, University of Stuttgart, GERMANY
M. Kranert, University of Stuttgart, GERMANY

Session reference: 1DV.1.63
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Organic Fraction Characterization of Municipal Solid Waste from Municipal Landfill of Santo André Aiming the Energy Application by Anaerobic Digestion.

Short introductive summary:

This study presents an overview of Municipal Solid Waste of Santo André in Brazil, in order to characterize the organic fraction using the chemical composition to evaluate the possibility of energy recovery treatment by biochemical process of anaerobic digestion.
The main objective of this study was to characterize the organic fraction of household and commercial solid waste sent to municipal landfill of Santo André, and compare it with the organic fraction of MSW from CRAISA (Regional Company of Integrated Supply Santo André) and free markets considering its physicochemical properties targeting its energy use via anaerobic digestion.

Presenter: **Graziella COLATO, Ufabc, BRAZIL**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.A. Silva, UFABC, Santo Andrè, BRAZIL
K.B.B. Marana, UFABC, Santo Andrè, BRAZIL
J.T.C.L. Toneli, UFABC, Santo Andrè, BRAZIL
G.C. Antonio, UFABC, Santo Andrè, BRAZIL
A.R. Santana, UFABC, Santo Andrè, BRAZIL
J.M.G. Rios, UFABC, Santo Andrè, BRAZIL
D.S. Rodrigues, UFABC, Santo Andrè, BRAZIL

Session reference: 1DV.1.64
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Technology of Drying and Characteristics of Solid Refuse Fuel from Organic Wastes With High Water Contents

Short introductive summary:

In this research, a set of various experiments were conducted on the typical organic wastes - sewage sludge, wastewater sludge, livestock waste sludge and food waste - using the fry-drying method in order to study an efficiency of the drying system and the characteristics of dried substances as fuel and the results were as follows

Presenter: **Tae-In OHM, Hanbat National University, Civil & Environmental Engineering Dpt., Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

Professor Tae-In, OHM, Ph.D(Dep’t of Civil & Environmental Eng., Hanbat National University, Korea)?Research field : - Design of incinerator for solid and liquid wastes. - New drying technology of sludges for solid fuel and vitrification. - Destruction technology of waste refrigerants with high GWP.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T. Ohm, Hanbat National University, Deajeon, REPUBLIC OF KOREA
J. Chae, Hanbat National University, Deajeon, REPUBLIC OF KOREA
S. Kim, Hanbat National University, Deajeon, REPUBLIC OF KOREA
S.Y. Kim, Hanbat National University, Deajeon, REPUBLIC OF KOREA

Session reference: 1DV.1.66
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Characterization of Ashes from MSW Incineration Plants

Short introductive summary:

In this work, ashes were collected from two Norwegian MSW incineration plants, from different locations along the flue gas flow. The collected ash samples were analysed via X-ray fluorescence (XRF) and scanning electron microscopy equipped with energy dispersive X-ray spectroscopy (SEM-EDX), in order to obtain both bulk and micro chemical compositions. In addition, mineralogical phases in the ash samples were characterized via X-Ray powder diffraction (XRD). The analyses results revealed evident partitioning of different ash forming elements at different sampling positions in the incinerator. For the bulk deposit sample with dense structure, a layered structure is clearly identifiable according to colour and morphology. SEM-EDX and XRD analysis on each layer revealed differences concerning chemical and mineralogical compositions. Analyses of the ash deposits collected showed that they generally contain mixtures of alkali rich salts, silicates and oxides formed during combustion of the MSW. Therefore, different processes and disposal methods should be considered for ash collected from different locations in incineration plants.

Presenter: **Liang WANG, SINTEF Energy Research, Thermal Energy Dpt., Trondheim, NORWAY**

Presenter's biography:

Liang Wang is a research scientist at SINTEF Energy Research in Trondheim Norway. His research focuses on thermal conversion and utilization of biomass and wastes for renewable energy and green fuel production and substainable metal prodcution processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Wang, SINTEF Energy Research, Trondheim, NORWAY
B. Oye, SINTEF Materials and Chemistry, Trondheim, NORWAY
M. Becidan, SINTEF Energy Research, Trondheim, NORWAY
O. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
P. Vatland, EGE (Waste-to-Energy Agency), Oslo, NORWAY
E. Evensen, Statkraft Varme, Trondheim, NORWAY
J. Stuen, EGE (Waste-to-Energy Agency), Oslo, NORWAY
M. Fossum, Statkraft Varme, Trondheim, NORWAY

Session reference: 1DV.1.68
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Organic Waste- and Resource Management in Tourism Areas

Short introductive summary:

Particularly attractive destinations are often located in sensitive regions - far away from central infrastructure such as wastewater treatment plants, waste management and landfills. However, the preservation of a healthy environment in these regions is an essential precondition for a sustainable use of these destinations This means, a sustainable tourism depends heavily on an environmentally aware resource management.

Therefore, a local solution for sewage and waste problems independently from central treatment and disposal systems represents a significant advantage. As a result, decentralized concepts are becoming increasingly interesting. In addition a sustainable resource management can benefit from economic advantages.

A methodological approach, developed at University of Stuttgart - together with AT-Association (Association for Adapted Technology, Stuttgart), for a sustainable tourism by implementing an decentralized management of waste water, solid waste and resources will be described.

Furthermore a successful implementation within an investigation project will be shown at the example of a Hotel of 2.000 beds in Turkey: “MODULAARE”.

Presenter: **Dominik LEVERENZ, University Stuttgart, Institute for Sanitary Engineering, Water Quality and Solid Waste Management, Stuttgart, GERMANY**

Presenter's biography:

PhD student at the ISWA of the University of Stuttgart

Since 2012 involved in several studies and projects dealing with municipal waste management and resource management - especially food waste management. Development of the feedback tool called RESOURCEMANAGER-FOOD.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Hafner, University of Stuttgart, GERMANY
D. Leverenz, University of Stuttgart, GERMANY
P. Pilsl, University of Stuttgart, GERMANY

Session reference: 1DV.1.72

Subtopic: 1.5 Municipal and Industrial Wastes

Topic: 1. BIOMASS RESOURCES

Performance and Microbial Dynamics of Full-Scale Wastewater Treatment Plant that Diversified Denitrification Carbon Source by Using Two Organic Wastes

Short introductive summary:

Biological nutrient removal (BNR) processes are commonly used to remove nitrogen from wastewater, in other words, biological denitrification can transform nitrate and nitrite in the presence of several heterotrophic bacteria. But They need sufficient carbon source to ensure bacterial metabolism. Usually,methanol and acetate were used to complement the carbon source in wastewater treatment plant. However, methanol have toxicity to microorganism and acetate was much mere expensive. So, this study investigated whether two organic wastes are useful for the denitrification of wastewater.

Presenter: **Seokhwan HWANG, Pohang University of Science and Technology, Pohang, REPUBLIC OF KOREA**

Presenter's biography:

I am a professor working on anaerobic digestion of biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E.J. Kim, Postech, Pohang, REPUBLIC OF KOREA
S.G. Shin, Postech, Pohang, REPUBLIC OF KOREA
M.A.H. Jannat, Postech, Pohang, REPUBLIC OF KOREA
J.H. Shin, Postech, Pohang, REPUBLIC OF KOREA
J.Y. Lee, Postech, Pohang, REPUBLIC OF KOREA
J.VV. Tongco, Postech, Pohang, REPUBLIC OF KOREA
S.H. Hwang, Postech, Pohang, REPUBLIC OF KOREA

Session reference: 1DV.1.73
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Comparison of Different Methods to Determine the Solids Content for MSW Characterization

Short introductive summary:

This article used the samples of municipal solid waste of the Municipal landfill of the city of Santo André, SP to accomplish the characterization by determining the solids content and ash through two different methodologies trying to analyze if it has difference between the results.

Presenter: **Aline RUIZ, Universidade Federal do ABC, Santo André, BRAZIL**

Presenter's biography:

Pos graduate in Energy working with biomass

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.R. Santana, Universidade Federal do ABC, Santo André, BRAZIL
D.S. Rodrigues, Universidade Federal do ABC, Santo André, BRAZIL
J.M.G. Rios, Universidade Federal do ABC, Santo André, BRAZIL
K.B.B. Marana, Universidade Federal do ABC, Santo André, BRAZIL
C.A. Silva, Universidade Federal do ABC, Santo André, BRAZIL
G.C. Antonio, Universidade Federal do ABC, Santo André, BRAZIL
J.T.C.L. Toneli, Universidade Federal do ABC, Santo André, BRAZIL

Session reference: 1DV.1.74
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Cyclone Drying of Secondary Sludge from Pulp and Paper Mills

Short introductive summary:

Traditional forest industries are facing an increasing waste disposal problem due to regulations aimed at conserving the environment. Pulp and paper mills generate large amounts of sludge by-products that are usually dewatered by different mechanical methods, from where a product with a total solids content of 18-50% is usually obtained. Cyclone drying has in pilot-scale studies been shown as a technology capable of utilizing low-temperature secondary energies of industrial environments. The main objective of this work was to study the effect of the cyclone geometrical relations and process parameters on the moisture content of the final product and particle residence time. An experimental design will be used to achieve the objective.

Presenter: **Alejandro GRIMM, Swedish University of Agricultural Sciences, Forest Biomaterials and Technology Dpt., Umeå, SWEDEN**

Presenter's biography:

PhD in energy engineering

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Grimm, Swedish University of Agricultural Sciences, Umea, SWEDEN
M. Segerström, Swedish University of Agricultural Sciences, Umea, SWEDEN
S.H. Larsson, Swedish University of Agricultural Sciences, Umea, SWEDEN

Session reference: 1DV.1.76
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Internal Pellet Density Heterogeneity Viewed in 3D using X-ray Tomography

Short introductive summary:

Transportation and handling of wood pellets causes abrasion and increase the amount of fine particles resulting in decreased pellet quality. In this study wood pellets with clear differences in bulk density and mechanical durability (CEN/TS 15210-1) were scanned using an innovative method in X-ray tomography in order to study the influence of internal morphology traits such as voids and cracks. Preliminary results indicate that:

• There were marked differences in the distribution of voids and cracks for pellets with similar bulk density.
• Pellets with similar mechanical durability showed a more homogeneous distribution of voids and cracks.
• It appeared that some pellets had zones containing larger voids and cracks. Possibly these zones could be defined as potential “break up” zones with lower dimensional stability.

Presenter: **Mikael THYREL, Swedish University of Agricultural Sciences, Forest Biomaterials and Technology Dpt., Umeå, SWEDEN**

Presenter's biography:

I'm a researcher at SLU. My research is focused on biofuels and other bio-based processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M Thyrel, Swedish University of Agricultural SCiences, Umeå, SWEDEN
T.A Lestander, Swedish University of Agricultural SCiences, Umeå, SWEDEN

Session reference: 1DV.1.79
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Prediction of Lower Heating Value of Wastes of Santo Andre Using Multivariate Regression

Short introductive summary:

With the growing of the world population, the amount of solid waste produced is rapidly increasing. In Brazil, the situation is even more serious, because, besides the fact that Brazilian population produces a high quantity of waste, the final destination for them is inappropriate. In this context, energy recovery by thermochemical processes is a good option, due to the reducing of the waste volume, and the useful energy generated with the solid waste incineration.

However, for the proper operation of a waste incineration plant it is necessary to predict the amount of energy that can be obtained from the waste used as fuel (Zhou et al, 2014; Ryu and Shin, 2013; Shi, 2016). Several heating value models of MSW have been developed (Channiwala and Parikh, 2002), (Kathiravale et al, 2003) (Chang et al, 2007).

This paper to present a prediction model lower heating value of wet waste from the city of Santo André, based on experimental data using multivariate regression

Presenter: **Juliana Tofano DE CAMPOS LEITE TONELI, Universidade Federal do ABC, Centro de Engenharia, Modelagem e Ciências Sociais Aplicadas, Santo André, BRAZIL**

Presenter's biography:

Graduated in Agricultural Engineering at Universidade Estadual de Campinas, master's degree in Agricultural Engineering from Universidade Estadual de Campinas and PhD in Food Engineering at the Universidade Estadual de Campinas. Professor of Energy Engineering at Universidade Federal do ABC.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Drudi, Federal University of ABC, Santo Andre, BRAZIL
R. Drudi, Federal University of ABC, Santo Andre, BRAZIL
J. Tofano, Federal University of ABC, Santo Andre, BRAZIL
G. Martins, Federal University of ABC, Santo Andre, BRAZIL
G. Antonio, Federal University of ABC, Santo Andre, BRAZIL

Session reference:	1DV.1.81
Subtopic:	1.5 Municipal and Industrial Wastes
Topic:	1. BIOMASS RESOURCES

Role of Efficient Microorganisms in Rapid Composting of Kitchen Waste

Short introductive summary:

Rapid increase in population and urbanization has led to a sweeping increase in the rate of waste generation, disposal of which is a major concern worldwide. A report by World Bank (2012) has estimated that the amount of municipal solid waste generated globally is 1.3 billion tons per year and by 2025 this will likely increase to 2.2 billion tons per year. The organic kitchen waste produced from restaurants and canteens forms a major component of putrefying organic waste that ends up in landfill sites or disposed off into roadsides and waterways in many developing countries. The current disposal methods such as land filling and incineration are big threats to the environment stability (Nair et al., 2006). The role of microbes has been realized in order to exploit their vast potential to possible solution of some such problems. Here comes the role of efficient microbes having the potential to accelerate waste degradation process and thereby generate nutrient rich compost that can be utilized for plant nutrient and disease management.

Presenter: **Ritika PATHAK, Indian Institute of Technology, Centre for Rural Development and Technology, New Delhi, INDIA**

Presenter's biography:

I am a research scholar working under the supervision of Prof. Satyawati Sharma on the topic" Development of microbial formulations for rapid composting of kitchen waste. I have done my M.tech from MNNIT Allahabad

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Pathak, Indian Institute of Technology, Delhi, INDIA
S. Sharma, Indian Institute of Technology, Delhi, INDIA
R. Prasad, Indian Institute of Technology, Delhi, INDIA

Session reference: 1DV.1.83
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Estimation of Crop Residue Production in the European Union with Empirical Models. A New Approach Considering Crop Physiological Characteristics

Short introductive summary:

This study presents an assessment of the production of crop residues in the European Union (EU) for cereals, oilseeds, potato and sugar beet. Empirical models relating economic yield with residues and harvest index were constructed from more than 1,600 field observations reported in the scientific literature. The relationship between the growth of vegetative and reproductive plant organs was analysed taking into consideration agronomic differences among crops, and crop-specific regression models were derived accordingly. Those models were then fed with sub-national statistics of economic yield to calculate residue production for the EU including confidence intervals to quantify model uncertainties. The estimation of total annual residue biomass production for the crops mentioned above amounts to 435 Mt of dry-matter for the 2011-2015 reference period. These results present moderate differences compared to previous studies conducted in the EU and these are associated with the approach followed in this study. Our results indicate that contrasting differences exist in the relationships between crop yield and residues, which needs to be accounted for when computing statistical models

Presenter: **Sara GARCIA CONDADO, European Commission, JRC, Directorate for Sustainable Resources - Food Security Unit (D.5), Ispra, ITALY**

Presenter's biography:

Sara Garcia Condado works in food security, crop monitoring and agricultural bioeconomy related activities in the JRC. She holds a PhD in Environmental and Forestry Engineering, and has experience as a consultant elaborating technical and economical biomass availability studies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. García-Condado, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
R, López-Lozano, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
M. Van der Velde, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
L. Panarello, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
A. Zucchini, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
I. Cerrani, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
L. Nisini, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY
B. Baruth, European Commission, Joint Research Center (JRC), Directorate for Sustainable Resources – Food Secur, Ispra, ITALY

Session reference: 1DV.1.84
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

Optimization of Waste Management Scenarios by Principal Component Analysis: A Case Study in Reunion Island.

Short introductive summary:

In this article, we make use of Principal Components Analysis (PCA) to identify similarities between local administrative areas. This simple method is directly based on the quantitative and qualitative evaluation of biowastes at the desired level of observation. The axes are based on the biowaste characteristics that are the most discriminining in the dataset.
Through the example of Reunion Island, we demonstrate effectiveness of PCA analysis to identify biowaste composition and production patterns among different administrative areas. One of the assets of PCA is the fact that it features graphical representation of the dataset, enabling anyone to visualize correlation existing between the different administrative areas. Principal Components Analysis of biowastes production can then be used for different purposes: biowaste management scenarios pooling, cooperation among administrative authorities, location and optimization of waste treatment plants, and more generally waste management decision-making.

Presenter: **Christelle HATIK, University of La Reunion, Le Tampon, FRANCE**

Presenter's biography:

Christelle Hatik is a temporary associate professor at the PIMENT Laboratory of the University of La Reunion. Her work focuses on the creation of waste management scenarios adapted to small scale territories and tropical conditions.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Hatik, University of la Réunion, Le Tampon, FRANCE
J.C. Gatina, University of la Réunion, Le Tampon, FRANCE

Session reference: 1DV.1.86
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Cost-Effective Utilisation of Horse Manure for Energy Production in Finland

Short introductive summary:

In the study, four local models for utilisation of horse manure were defined as being economically viable to implement both for the horse entrepreneurs as well as the energy producers. Some of the created service production models can also be alternatively applied to other horse manure productisation methods in addition to utilisation in energy production.

Presenter: **Riikka TANSKANEN, South-Eastern Finland University of Applied Sciences, Forest, the Environment and Energy, Mikkeli, FINLAND**

Presenter's biography:

Riikka Tanskanen (M.Sc) is a Project Manager at South-Eastern Finland University of Applied Sciences. The current projects concentrate on renewable energy sources and possibilities, as well as, promoting energy efficiency in South Savo Finland.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Tanskanen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
H. Soininen, South-Eastern Finland University of Applied Sciences, Mikkeli, FINLAND
J. Föhr, Lappeenranta University of Technology, Mikkeli, FINLAND
T. Ranta, Lappeenranta University of Technology, Mikkeli, FINLAND

Session reference: 1DV.1.87
Subtopic: 1.2 Biomass Feedstock, Residues and By-products
Topic: 1. BIOMASS RESOURCES

A Municipal Waste Heating Value Modelling Using Computational and Mathematical Techniques

Short introductive summary:

Artificial Neural Networks are a good computational technique to improve the accuracy of heating value prediction models of the municipal solid waste. However, an ANN requires lots of samples to work properly. Physical analysis or ultimate analysis of the waste are very expensive, and usually there no enough data to train the ANN. A new kind of ANN, called Extreme Learning Machines, could overcome this issue, using just a few samples to train the ANN. Thus, it is possible to have the accuracy of an ANN with the same number of samples required by a traditional multiple linear regression.

Presenter: **Gilberto MARTINS, Universidade Federal do ABC, CECS Dpt., Santo André, BRAZIL**

Presenter's biography:

I am presently an Associate professor at Federal University of ABC, researching the biogas production from organic fraction of municipal solic waste. I am a mechanical Engineer with PhD in thermodynamics and transport phenomena.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Drudi, UFABC, Santo André, BRAZIL
K.C.R. Drudi, UFABC, Santo André, BRAZIL
G.C Antonio, UFABC, Santo André, BRAZIL
J.T.C.L. Toneli, UFABC, Santo André, BRAZIL
G. Martins, UFABC, Santo André, BRAZIL

Session reference: 1DV.1.88
Subtopic: 1.5 Municipal and Industrial Wastes
Topic: 1. BIOMASS RESOURCES

Simulation of Demand-Oriented Biogas Production by a Simplified Kinetic Model

Short introductive summary:

This contribution presents the simulation of the demand-oriented biogas production from maize silage based on a simplified version of the Anaerobic Digestion Model No. 1 (ADM1). Experimental results of the discontinuous feeding of maize silage on a pilot scale clearly evince a great potential to flexibilize the biogas process for a demand-oriented energy supply of existing plant concepts. Depending on the required process variables it can be shown that in comparison to the complex ADM1 a simplified model structure entirely based on the superposition of first-order kinetics can describe the gas production of the anaerobic digestion of maize silage equally well. Due to its low computational cost, this particular model can easily be implemented and used as a robust tool for process evaluation and control.

Presenter: **Soeren WEINRICH, DBFZ-German Biomass Research Centre, Leipzig, GERMANY**

Presenter's biography:

-since 2013
Research associate at the DBFZ - Deutsches Biomasseforschungszentrum gemeinnützige GmbH
since 2010
Doctoral student at the University of Rostock
2008-2010
Research associate at the University of Applied Sciences Stralsund
2004-2008
University of Applied Sciences Stralsund

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Weinrich, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
E. Mauky, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
H.F. Jacobi, Hessian State Laboratory, Bad Hersfeld, GERMANY

Session reference: 2DO.4.1
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effects of Alkaline and Beating Pretreatment on Anaerobic Digestion of Distillery Co-Products

Short introductive summary:

Whiskey distillery co-products such as pot ale, spent lees, spent barley, spent yeast are suitable feedstock for anaerobic digestion (AD) as they have high amount of organic content. Pretreatments are required in order to maximize methane yield in produced biogas due to the co-products' lignocellulosic nature. Effects of alkaline and beating pretreatments have been observed on pot ale and spent lees mixture which has the ratio 5:1 by volume. 285 percent higher biogas production has been seen when alkaline and 7.5 minuntes beating pretreated sample in comparison to non-treated sample. It is also found that first alkaline pretreatment then beating pretreatment has slightly higher effect on generation of biogas.

Presenter: **Burcu GUNES, Dublin City University, School of Biotechnology, Dublin, IRELAND**

Presenter's biography:

I am a Turkish chemical engineering graduate, currently working as a PhD student in Ireland. My research is focussed on optimisation of anaerobic digestion of whiskey distillery co-products. My previous research has also focussed on production and evaluation of novel adsorbents.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

B. Gunes, School of Biotechnology, Dublin City University, Dublin, IRELAND
K. Benyounis, School of Mech. & Manu. Eng. Dublin City University, Dublin, IRELAND
J. Stokes, School of Mech. & Manu. Eng. Dublin City University, Dublin, IRELAND
P. Davis, School of Business Dublin City University, Dublin, IRELAND
C. Connolly, Alltech European Bioscience Centre, Meath, IRELAND
J. Lawler, School of Biotechnology, Dublin City University, Dublin, IRELAND

Session reference: 2DO.4.2
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Effects of Anaerobic Digestion and Hot Water Pretreatment on Lignin

Short introductive summary:

This research was conducted at the University of Hawaii at Manoa investigating lignin changes through two conversion processes. Funding support was supplied through several US government agencies.

Presenter: **Jon WELLS, University of Hawai at Manoa, Natural Resources and Environmental Management Dpt., Kailua, USA**

Presenter's biography:

I'm currently a PhD student at the University of Hawaii studying energy grasses, their conversion, and the environmental aspects of large scale agriculture. I focus on offsetting GHG emissions related to feedstock production and harvest through soil carbon capture and storage.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.M. Wells, University of Hawaii at Manoa, Honolulu, USA
S.E. Crow, University of Hawaii at Manoa, Honolulu, USA
S.K. Khanal, University of Hawaii at Manoa, Honolulu, USA
S.Q. Turn, University of Hawaii at Manoa, Honolulu, USA
A. Hashimoto, University of Hawaii at Manoa, Honolulu, USA

Session reference: 2DO.4.3
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Head-Space Gas Pressure Driven Acidogenesis of Food Waste in Leach Bed Reactor

Short introductive summary:

Control of the head-space pressure and gas composition provides a potential manipulation of the metabolic pathways of the acidogenesis of a two phase AD digestion.

Presenter: **Jonathan WONG, Hong Kong Baptist University, Sino-Forest Applied Research Centre for Pearl River Delta Environment, Kowloon, HONG KONG**

Presenter's biography:

Prof. Jonathan Wong Woon Chung is currently a Professor of the Dept of Biology at the Hong Kong Baptist Univ. . He received his Ph.D. in Environmental Science from Murdoch University, Western Australia. He is the Director of the Sino-Forest Applied Research Centre for Pearl River Delta Environment

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.W.C. Wong, Hong Kong Baptist University, Hong Kong, HONG KONG

Session reference: 2DO.4.4

Subtopic: 2.6 Anaerobic digestion for biogas production

Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Modelling and Perspectives of Two-Stage Pressurized Fermentation

Short introductive summary:

The German government aims for the reduction of GHG emissions by increasing amount of renewable energy until 2030. At the same time, energy must remain affordable and reliable. By the end of 2015 only about 115,000 m3/h of methane produced by 185 biogas plants were fed into the German gas grid. A more efficient production of upgraded biogas could help to achieve the initial aim. The two-stage pressurized fermentation process offers high potentials for increasing the efficiency of the production and upgrading efficiency of biogas.
The two-stage approach allows adjusting optimal conditions in the hydrolysis and the methanogenesis reactors in terms of temperature and pH-value individually. Consequently, these reactors can be operated with higher throughput. Furthermore, the methane rich gas is produced at high pressure by the bacteria itself and pumping of the liquid feed consumes by far less energy than downstream gas compression for gas upgrading and injection into the gas grid (= State-of-the-art).
The conference contribution will cover an introduction to the process model and experimental results of measurements at the University of Hohenheim, used to validate the model.

Presenter: **Katharina BÄR, DVGW-Research Centre at Engler-Bunte-Institute, Karlsruhe, GERMANY**

Presenter's biography:

Katharina Baer studied chemistry engineering at the Karlsruher Institut für Technologie (KIT) until 2011. Since 2011 she has been working as a project engineer at the German Technical and Scientific Association for Gas and Water (DVGW).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Baer, DVWG-Research Centre at Engler-Bunte-Institute, Karlsruhe, GERMANY
F. Ortloff, DVWG-Research Centre at Engler-Bunte-InstitutDVWG-Research Centre at Engler-Bunte-Institute, Karlsruhe, GERMANY
F. Graf, DVWG-Research Centre at Engler-Bunte-InstitutDVWG-Research Centre at Engler-Bunte-Institute, Karlsruhe, GERMANY
W. Merkle, University of Hohenheim, Stuttgart, GERMANY
A. Lemmer, University of Hohenheim, Stuttgart, GERMANY

Session reference: 2DO.4.5
Subtopic: 2.6 Anaerobic digestion for biogas production
Topic: 2. BIOMASS CONVERSION TECHNOLOGIES FOR HEATING, COOLING AND ELECTRICITY

Evaluating the Water Impacts & Benefits of Biomass Production for Bioenergy - Developing a Sustainability Indicator Analysis Methodology

Short introductive summary:

60 countries currently have policies supporting renewable energy. Although biomass is unevenly distributed with some regions with the greatest demand having comparatively low availability. Trade therefore has an important role to play, with 30% of Europe's bioenergy feedstocks currently imported. This has sustainability implications, with impacts on water systems representing a key concern for countries where biomass is being increasingly produced for energy. This research introduces a sustainability analysis methodology for evaluating the impacts (& benefits) of biomass production on water systems. The research applies LCA and GIS analysis techniques to evaluate; the volumes of water required by biomass production systems compared against the 'renewable' water available within watersheds. Also the potential impacts that biomass production may have on water quality, based on the contaminants potentially introduced during typical production practices. Case studies demonstrating the application of the methodology will be presented for production reflecting: palm crop production in South East Asia; sugarcane production in West Africa; and Eucalyptus production in Europe.

Presenter: **Andrew WELFLE, University of Manchester, Manchester, UNITED KINGDOM**

Presenter's biography:

Andrew Welfle is a Research Associate with the Tyndall Centre for Climate Change Research at the University of Manchester UK. Andrew's research interests are biomass resource modelling, bioenergy scenarios, the global trade of biomass trade for energy end uses, the GHG performance of bioenergy and the wider benefits and impacts of bioenergy pathways. Andrew also has experience of lifecycle assessment and analysis of bioenergy policy. Prior to joining the Tyndall Centre, Andrew worked for an engineering consultancy specialising in sustainability and energy of the built environment.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Welfle, University of Manchester, UNITED KINGDOM

Session reference: 4DO.5.1

Subtopic: 4.3 Environmental impacts of bioenergy

Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Can the Cultivation of Perennial Biomass Crops on Buffer Strips Become a Win-Win Strategy? Life Cycle Assessment and Energy Performance.

Short introductive summary:

The Water Framework Directive 2000/60/EC establishes the guidelines for the protection and improvement of water quality in EU. Several measures beyond good farming practice are introduced, as the realization of buffer strips along water courses. Based on this Directive, the idea of this work is to create bioenergy buffer strips (BBS), composed by perennial woody (i.e willow and black locust) and herbaceous crops (i.e. miscanthus and switchgrass) to couple environmental benefits (i.e. to protect surface water quality, to increase the biodiversity) and economic return to the farmer producing biomass for energy purposes (i.e. second generation biofuel production).
We aim to evaluate potential environmental benefits and risks of second generation biofuels produced from the biomass grown in the BBS through a life cycle assessment (LCA). We evaluate climate change mitigation potential, including accumulation of Soil Organic Carbon (SOC) as well as acidification potential and marine and freshwater eutrophication. In addition, the LCA method was tested to evaluate the possible increase of biodiversity due to the BBS.

Presenter: **Alessandro AGOSTINI, ENEA Research Centre, Rome, ITALY**

Presenter's biography:

Alessandro Agostini is an environmental scientist, researcher at ENEA. His main activity is the environmental impact assessment of bioenergy, with a life cycle approach, with a focus on GHG emissions from solid and gaseous biofuels.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Serra, Università Cattolica del Sacro Cuore, Piacenza, ITALY
J. Giuntoli, European Commission, JRC, Petten, THE NETHERLANDS
A. Ferrarini, Università Cattolica del Sacro Cuore, Piacenza, ITALY
A. Agostini, ENEA, Rome, ITALY
S. Amaducci, Università Cattolica del Sacro Cuore, Piacenza, ITALY

Session reference:	4DO.5.2
Subtopic:	4.3 Environmental impacts of bioenergy
Topic:	4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Brazilian Sugarcane Expansion and the Impacts on Water Resources: A Review of the Recent Results

Short introductive summary:

Integration of bioenergy production and water resources management is essential for the effective sustainability of biofuels within local and international markets. Brazil has the largest sugarcane area worldwide (635 million Mg in 2014/2015 season), accounting for about a third of global harvested area and production. This review, based on public databases and recent papers, has the objective to gather and understand the impacts of sugarcane expansion on water resources in Brazil, and search for more integrated and conclusive answers to this question. Sugarcane expanded mostly in the state of São Paulo and towards the Cerrado biome, usually replacing pasture and annual crop areas. Studies were, in general, focused in evapotranspiration and water footprint evaluations, with no conclusive results concerning the benefits or constraints associated to sugarcane intensification. More consistent and reliable answers are expected to be obtained through more integrated approaches, that enable the simultaneous evaluation of all the main components of the water balance at the basin level, considering the watershed hydrological processes.

Presenter: **Thayse HERNANDES, CTBE - Brazilian Bioethanol Science and Technology Laboratory, Agricultural Division, Campinas, BRAZIL**

Presenter's biography:

Agricultural Engineer from Unicamp with specialization in Environmental Engineering by the École Supérieure d’Agronomie de Rennes. Currently, is a PhD candidate at the Energy Systems Planning (Unicamp) and biomass production specialist at the Brazilian Bioethanol Science and Technology Lab.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T.A. Dourado Hernandes, CTBE/UNICAMP, Campinas, BRAZIL
F. Vale Scarpare, CENA-USP, Piracicaba, BRAZIL
M. Cristina Araújo Picoli, UNICAMP-FEM, Campinas, BRAZIL
M. Regis Lima Verde Leal, CTBE, Campinas, BRAZIL
D. Garbelini Duft, CTBE/UNICAMP, Campinas, BRAZIL
J. Eugênio Abel Seabra, UNICAMP-FEM, Campinas, BRAZIL

Session reference: 4DO.5.3
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Influence of Development of Fuel Ethanol on Water Resources

Short introductive summary:

In this study, the spatial distribution of the total water requirement of development for sweet sorghum-based fuel ethanol in three provinces (Heilongjiang, Jilin and Liaoning) in the Northeast of China was simulated using a biochemical process model and marginal land as one of the types of input data for the model to avoid impacts on food security. The total water requirement of fuel ethanol was then compared with the spatial distribution of water resources, and the influence of the development of fuel ethanol on water resources at the pixel - river basin region scales was analyzed. The result showed that considering water resource restrictions, not all of the marginal land is suitable for the development of sweet sorghum-based fuel ethanol and approximately 23,458 km2 of marginal land is suitable for the development of sweet sorghum-based fuel ethanol in three provinces in the Northeast of China.

Presenter: **Fangyu DING, Chinese Academy of Sciences, Institute of Geographical Sciences and Natural Resources Research, Beijing, P.R. CHINA**

Presenter's biography:

Fangyu DING is studying in Institute of Geographical Sciences and Natural Resources Research as a master candidate. He is good at machine learning algorithms and he also studied the environmental impact of biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Hao, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, P.R. CHINA
D. Jiang, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, P.R. CHINA
J. Fu, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, P.R. CHINA
M. Hao, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, P.R. CHINA
F. Ding, Institute of Geographical Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, P.R. CHINA

Session reference: 4DO.5.4
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Bioenergy and Biodiversity Loss: What we Know, What we Don't Know and what we can Estimate.

Short introductive summary:

The planet is currently living through an unprecedented biodiversity crisis. WWF reports that almost 60% of vertebrate population abundance has been lost in the last 40 years. The rate of species extinction is higher than in any other historical period, including the Big Five mass extinctions. And the number of threatened species continues to increase. We are in fact shaping and living in a new epoch: the Anthropocene.
In 2010 the International Convention on Biological Diversity (CBD) adopted the Aichi Biodiversity Targets for 2020. These strategic goals aim to reduce the anthropogenic pressures on biodiversity and to significantly decrease the rate of species extinction by 2020. These targets were also adopted by the EU in 2011 with the publication of the EU Biodiversity strategy.

We take stock of the potential pressures that Bioenergy-related activities could pose on biodiversity loss. We identify cause-effect chains linking bioenergy activities to impacts and we review the methods and indicators currently under study to quantify biodiversity impacts through Life Cycle Assessment approaches.

Presenter: **Jacopo GIUNTOLI, European Commission, JRC, Directorate C: Energy, Transport and Climate, Petten, THE NETHERLANDS**

Presenter's biography:

Jacopo Giuntoli has a PhD in Energy Engineering, member of the Sustainable Transport Unit in the IET – JRC (European Commission). He is part of a team providing scientific and technical support to policymakers on bioenergy environmental sustainability.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Giuntoli, Joint Research Centre, Petten, THE NETHERLANDS
C. Bulgheroni, Joint Research Centre, Ispra, ITALY
A. Agostini, ENEA, Rome, ITALY
S. Rocca, Joint Research Centre, Petten, THE NETHERLANDS
L. Marelli, Joint Research Centre, Ispra, ITALY

Session reference: 4DO.5.5
Subtopic: 4.3 Environmental impacts of bioenergy
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Catalytic Hydroprocessing of Ground Cottonseeds in a Cottonseed Oil and I-Octane Solvent to Produce Renewable Diesel

Short introductive summary:

In the production of renewable diesel, bio-oil can also be used as feedstock for hydrotreatment. The bio-oil is obtained during liquefaction and then fed to a catalytic reactor where it is treated with hydrogen to produce renewable diesel. In this study, vegetable oil (raw cottonseed oil) and dried, ground cottonseed were added together in a batch reactor to determine whether liquefaction and hydrotreatment can be combined in a single processing step.

Presenter: **Corneels SCHABORT, North-West University, School of Chemical and Minerals Engineering, Potchefstroom, SOUTH AFRICA**

Presenter's biography:

Corneels Schabort is a senior lecturer in chemical engineering at the North-West University, South Africa. He is part of the Bio-Energy Research Group.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.J. Schabort, North-West Univeristy, Potchefstroom, SOUTH AFRICA
Z. Broodryk, North-West Univeristy, Potchefstroom, SOUTH AFRICA
R. Venter, North-West Univeristy, Potchefstroom, SOUTH AFRICA
S. Marx, North-West Univeristy, Potchefstroom, SOUTH AFRICA

Session reference: 3DO.6.1

Subtopic: 3.2 Pyrolysis and other biomass liquefaction technologies

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Evaluation of GHG Emissions and Energy Balances of Innovative Aviation Biofuel Pathways

Short introductive summary:

This study was carried out at the European Commission’s Joint Research Centre and aimed at analyzing and assessing the GHG emissions reduction potential of alternative fuels for aviation; and providing insights on the GHG emissions profiles and the energy efficiency of representative options for the provision of alternative aviation fuels. Such insights are critical for the biofuel market players in making investment decisions and for the policy makers when defining regulatory measures, including support mechanisms.

Presenter: **Adrian O’CONNELL, European Commission, JRC, Ispra, ITALY**

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Kousoulidou, JRC-European Commission, Ispra, ITALY
L. Lonza, JRC-European Commission, Ispra, ITALY
A. O'Connell, JRC-European Commission, Ispra, ITALY

Session reference: 3DO.6.2
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Upscaling and Operation of a Biomass Derived Fischer-Tropsch Pilot Plant Producing 1 Barrel Per Day

Short introductive summary:

Production of Fischer Tropsch product derived by biomass derived syngas is a promising way to increase the yield of biofuels in the transport sector. Over 10 years of experience in the field of Fischer Tropsch producing 5 kg/day of product could be gathered. Out of these data a 1 barrel per day pilot plant was designed. This plant is operated now and first results could be achieved.

Presenter: **Jürgen LOIPERSBÖCK, Bioenergy 2020+, Güssing, AUSTRIA**

Presenter's biography:

The author is Junior Researcher in the company Bioenergy2020+ , area Gasification and Syngas application. His main work is the investigation of hydrogen production from biomass derived products and production of renewable Fischer Tropsch products from biomass.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Loipersböck, Bioenergy2020+, Güssing, AUSTRIA
G. Weber, Bioenergy2020+, Güssing, AUSTRIA
R. Rauch, Bioenergy2020+, Güssing, AUSTRIA
H. Gruber, TU Wien, Vienna, AUSTRIA
P. Groß, TU Wien, Vienna, AUSTRIA
H. Hofbauer, TU Wien, Vienna, AUSTRIA

Session reference: 3DO.6.3
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Green Diesel Production from the Palm Oil Deoxygenation Over Metal-Based Nanocatalysts

Short introductive summary:

Diesel substitutes derived from fats and oils have gained considerable attention as means to increase the supply of energy availability. Biodiesel is one diesel substitute typically synthesized from transesterification of fats/oils and methanol. Some of the biodiesel properties such as unsaturated C-C bonding and oxygenated components result in low thermal and oxidation stability. Alternatively, the deoxygenation of fats/oils using hydrogen has been proposed as an alternative and attractive method to convert fats/oils containing fatty acids or triglycerides into a renewable diesel, or so-called green diesel, which have a molecular structure of alkanes similar to petroleum diesel. Metal sulfide catalysts exhibited high performance for deoxygenation of oils/fats. However, sulfur leaching can potentially contaminate the product quality. Hence, industrial and inexpensive transition metals have become topics of study. In this work, Co metal catalysts were proposed for the deoxygenation of palm oil to green diesel. The catalytic performance and behavior were systematically studied and discussed.

Presenter: **Kajornsak FAUNGNAWAKIJ, National Science and Technology Development Agency, National Nanotechnology Center, Pathumthani, THAILAND**

Presenter's biography:

Dr. Faungnawakij is a principal researcher at NANOTEC, Thailand. He has published 70 articles (h-index=22), and filed 30 patents on his research on biomass&biofuel. He has received prestigious awards; National Young Scientist Award 2011, Wiley-CST Award for Contribution to Green Chemistry 2012.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Srifa, Kyoto University, Kyoto, JAPAN
R. Keawmeesri, National Nanotechnology Center, Pathumthani, THAILAND
V. Itthibenchapong, National Nanotechnology Center, Pathumthani, THAILAND

Session reference: 3DO.6.4
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Effect of Fatty Acid Structures on Product Distribution of Catalytic Cracking

Short introductive summary:

The catalytic cracking of three different vegetable oils, i.e. palm oil (Elaeis guineensis), Reutealis trisperma oil, and Calophyllum inophyllum oil, has been investigated over an equilibrium zeolite-based catalyst. The experiments were conducted under fluid catalytic cracking conditions in a Microactivity-test (MAT) reactor at 516 ?C and atmospheric pressure, with catalyst-to-oil ratio of 1. The results show that despite of higher saturation of palm oil, the yield of total useful organic liquid product (gasoline and light cycle oil fractions) were comparable for all feed types, they were in the range of 57-63% wt, and the selectivity toward gasoline fraction was much higher for Reutealis trisperma and Calophyllum inophyllum oil compared to palm oil.

Presenter: **Verina WARGADALAM, Ministry of Energy and Mineral Resources, P3TKEBTKE Division, Jakarta, INDONESIA**

Presenter's biography:

Verina J. Wargadalam obtained a Ph.D. in Chem.Engineering at Technische Universität Wien, Austria. From 1999 to 2001, she was research fellow at Chiba Inst.of Technology and Tohoku University, Japan. Since 2002 she works for R&D Center at Ministry of Energy and Mineral Resources, Indonesia.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Wargadalam, Ministry of Energy and Mineral Resources, Jakarta, INDONESIA
E. Saadudin, Ministry of Energy and Mineral Resources, Jakarta, INDONESIA
D. Nomara, Ministry of Energy and Mineral Resources, Jakarta, INDONESIA
B. Budiyanto, Institute of Technology Bandung, Bandung, INDONESIA
S. Subagjo, Institute of Technology Bandung, Bandung, INDONESIA

Session reference: 3DO.6.5
Subtopic: 3.3 Oil-based biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Genetic Diversity of Elephantgrass Ecotypes for Bioenergy Production

Short introductive summary:

The aim of this work was to study the genetic diversity of elephantgrass ecotypes and recommend crosses for bioenergy production. The accessions of the Active Elephantgrass Germplasm Bank of Embrapa (BAGCE) classified in the standard ecotypes Cameroon and Napier were evaluated. Three evaluation cuttings were carried out. The 1st and 2nd cuttings were harvested at 250 days, and the 3rd, at 315 days. The genetic values were predicted by mixed model methodology via REML/BLUP. The Tocher clustering method was used to infer about the genetic diversity within the Cameroon and Napier ecotypes, based on the genetic dissimilarity matrix, obtained by the standardized Euclidean distance. The crosses recommendation was based on Tocher method using the matrix of genetic similarity. To the best of our knowledge this is the first study that investigate the genetic diversity of elephangrass ecotypes, aiming to select genitors and crosses to breed elephantgrass for bioenergy production. Elephantgrass accessions have high genetic diversity distributed in different clusters within each ecotype and crosses between Cameroon ecotypes are recommended to improve the elephantgrass for bioenergy.

Presenter: **João DO AMARAL SANTOS DE CARVALHO ROCHA, Federal University of Vicosa, Vicosa, BRAZIL**

Presenter's biography:

I am an Agricultural Engineer (UFV-2014), Magister scientiae in Genetics and Plant Breeding (UFV-2015) and PhD Student in Genetics and Plant Breeding by the Federal University of Viçosa (UFV).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.R.A.S.C. Rocha, Universidade Federal de Viçosa, BRAZIL
P.C.S. Carneiro, Universidade Federal de Viçosa, BRAZIL
R.A.D.C. Ferreira, Universidade Federal de Viçosa, Viçosa, BRAZIL
J.C. Carneiro, Embrapa Gado de Leite, Juiz de Fora, BRAZIL
J.C. Machado, Embrapa Gado de Leite, Juiz de Fora, BRAZIL

Session reference: 1DV.2.1
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Molecular Mechanism of Response and Adaptation of the Energy Plant Jatropha Curcas L. to Cold Stress

Short introductive summary:

Jatropha. curcas L. is a cold-sensitive energy plant, and low temperature is an important limiting factor for their distribution and production. The present work found that the cold hardening at 10 or 12 □ for 1 and 2 days significantly improved cold tolerance of J. curcas seedlings. Measurement of activities of antioxidant enzymes, and the levels of antioxidants, as well as the contents of compatible solutes and analysis of metabolic pathways indicated antioxidant defense system and osmotic adjustment play important roles in the cold hardening-induced cold tolerance in J. curcas. lipidomic analysis suggesting that remodeling and increase in unsaturation degree of membranes lipids may be a common physiological basis for the cold hardening-induced cold tolerance. transcriptome response and gene expression profiling showed that 3,178 genes were significantly upregulated and 1,244 were downregulated when exposed to the cold hardening, then these genes were functionally annotated , and 12 genes were cloned and identified. This study provided a preliminary elucidation of the molecular mechanism for cold tolerance formation in J. curcas.

Presenter: **Ming GONG, Yunnan Normal University, School of Life Sciences, Kunming, P.R. CHINA**

Presenter's biography:

GONG Ming, born on July 1963, graduated from Peking Univerity on June 1991 with a Ph.D degree

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Gong, Yunnan Normal University, Kunming, P.R. CHINA
H.B. Wang, Yunnan Normal University, Kunming, P.R. CHINA
Z.R. Zou, Yunnan Normal University, Kunming, P.R. CHINA
Z.G. Li, Yunnan Normal University, Kunming, P.R. CHINA
P.X. Ao, Yunnan Normal University, Kunming, P.R. CHINA
S.S. Wang, Yunnan Normal University, Kunming, P.R. CHINA

Session reference: 1DV.2.2
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Breeding New Variety of Camelina Sativa Adapted to Temperate Continental Climate

Short introductive summary:

Camelina sativa has been already recognized as a high potential feedstock for biofuel production. The purpose of the work was to deliver a new camelina genotype/variety with improved productivity and oil content. By immature embryo rescue technique and open field randomized hybridization, has been obtained a new line with better characteristics (productivity and oil content). The new genotype has registered up to 20% increased in productivity under Romanian temperate continental climate with heavy winters, while in semi-arid conditions the increase was less significant, even negative. In terms of oil content, in all the location the new line FP-05-2 has registered higher oil content (+2.4 ÷ +4%). The new line is going to be tested for its potential in other temperate continental European area (Northern Spain, Slovenia).

Presenter: **Florentina MATEI, University of Agronomical Sciences, Biotechnologies Dpt., Bucharest, ROMANIA**

Presenter's biography:

PhD in Biological Sciences since 2001; Doctoral degree in Horticulture since 2003.
Current position: Associate Professor, UASVM Bucharest, Department of Biotechnologies
Expertise related to the project: biomass/feedstock production for biologically active compounds production

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Matei, UASVM Bucharest, ROMANIA
F. Sauca, NARDI Fundulea, ROMANIA
N. Farcas, UASVM Bucharest, ROMANIA
P. Dobre, UASVM Bucharest, ROMANIA
B. Matei, UASVM Bucharest, ROMANIA
S. Jurcoane, CBM Biotehgen, Bucharest, ROMANIA
C.P. Cornea, UASVM Bucharest, ROMANIA
M. Ciuca, NARDI Fundulea, ROMANIA

Session reference:	1DV.2.3
Subtopic:	1.3 Biomass Crops and Energy Grasses
Topic:	1. BIOMASS RESOURCES

Determination of Important Traits for Seed Oil of Garden Cress (Lepidium Sativum L.) as a Potential for Biodiesel Production

Short introductive summary:

https://www.scopus.com/authid/detail.uri?authorId=13406849000

Presenter: **Naser SABAGHNIA, University of Maragheh, Plant Breeding Dpt., Maragheh, IRAN**

Presenter's biography:

PhD degree in Plant Breeding, Sabbatical period in Breeding Methodologies of Brassica napus L. from University of Goettingen/Germany. Member of Editorial board of Agriculture and Forestry and Australian Journal of Crop Science.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

N. Sabaghnia, University of Maragheh, Maragheh, IRAN
M. Mohebodini, University of Maragheh, IRAN

Session reference: 1DV.2.5
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Vegetative Propagation of Ulmus Pumila L. By Stem Cuttings with a View to the Development of Bred Lines for Woody Biomass Plantations

Short introductive summary:

Vegetative propagation of a twenty-tree selection ofUlmus pumila L. (Siberian elm) managed in short rotation was carried out aiming at the production of bred lines for biomass production in Spain. The chosen method of vegetative propagation was cuttings. Factors influencing plant propagation: diameter cutting class and rooting medium were studied in relation to the rate of propagation success for each parent plant. Main findings of this work were that cutting preparation should be made immediately after twig/stem removal and that direct field planting of 13-21 mm diameter cuttings provides high success rate.

Presenter: **Pedro V. MAURI ABLANQUE, IMIDRA, Investigación Agroambiental Dpt., Alcalá de Henares, SPAIN**

Presenter's biography:

Research in IMIDRA. Director del Departamento de Investigación Agroambiental
Instituto Madrileño de Investigación y Desarrollo
Rural, Agrario y Alimentario (IMIDRA)
Finca El Encín, Autovía A-2. Km. 38,200
28800 Alcalá de Henares (MADRID)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Bautista, IMIDRA, Alcalá de Henares, SPAIN
P.V. Mauri, IMIDRA, Alcalá de Henares, SPAIN
A. Plaza, IMIDRA, Alcalá de Henares, SPAIN
J. Ruiz-Fernandez, IMIDRA, Alcalá de Henares, SPAIN
M.C. Amoros, IMIDRA, Alcalá de Henares, SPAIN
M. Sanz, ETSIA-UPM, Madrid, SPAIN
M.D. Curt, ETSIA-UPM, Madrid, SPAIN

Session reference: 1DV.2.6
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Assessment of Optimal Plant Density for Switchgrass Transplants Obtained by the Float System

Short introductive summary:

Switchgrass (Panicum virgatum L.) is a perennial warm season grass well suited to grow on marginal lands and it is considered a low-input crop for producing bioenergy. Owing to the tiny seeds and their low germination rate, the establishment of the crop at proper density might be problematic. The float system method has been traditionally used for tobacco transplant production. We evaluated the float system as method for producing plants suitable for transplantation. We used this hydroponic system under greenhouse, then we evaluated in a field experiment the agronomic performance of transplants at three plant density.

Presenter: **Enrico CEOTTO, CREA- Council for Agricultural Research and Economics, Research Center for Agriculture and Environment, Bologna, ITALY**

Presenter's biography:

Enrico Ceotto is Senior Researcher Agronomist at the Research Center Agriculture and Environment, located in Bologna, Northern Italy. Currently, his research activity is focused on perennial energy crops and their ecosystem services. E-mail address: enrico.ceotto@crea.gov.it.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Castelli, CREA- Council for Agricultural Research and Economics, Bovolone, ITALY
E. Ceotto, CREA- Council for Agricultural Research and Economics, Bologna, ITALY

Session reference: 1DV.2.7

Subtopic: 1.3 Biomass Crops and Energy Grasses

Topic: 1. BIOMASS RESOURCES

Poplar Short-Rotation Coppice in Southern Italy

Short introductive summary:

To verify the biomass production of poplar clones in Southern Italy,characterized by low water availability, five trials were established in the frame of the FAESI Project funded by the National Ministry of Agricultural, Food and Forestry Policies during the last seven years. Due to the extreme poplar plasticity, and with the interest on SRC cultivation on marginal soils, these plantations may represent a valid alternative or an additional income also in part of these areas.

Presenter: **Gianni FACCIOTTO, CREA- Council for Agricultural Research & Economics, Foreste e Legno Dpt., Casale Monferrato, ITALY**

Presenter's biography:

Gianni Facciotto,since 1981 he has been working as a researcher for the former Poplar Research Institute, now Intensive wood production Research Unit of Council for agricultural research and economics (CREA), in Casale Monferrato (Italy).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Facciotto, CREA, Casale Monferrato, ITALY
G. Nervo, CREA, Casale Monferrato, ITALY
S. Bergante, CREA, Casale Monferrato, ITALY

Session reference: 1DV.2.10
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Perennial Grasses: Biomass Quality and Yield Comparison of 12 Different Species in the Northern Great Plains of the United States

Short introductive summary:

Traditionally, perennial grasses, both cool- and warm-season species, are planted as a permanent forage for livestock production, offering additional ecosystem services such as soil erosion reduction, greenhouse gases mitigation, and wildlife, and pollinators habitat. With new technologies, perennial grasses can be transformed and used as biofuel crops, at small or big scale, which increases the biodiversity giving another reason for planting these species that are also very friendly with the surrounding habitat. In this context, the objective of this work was to determine the yield potential and biomass quality of 12 different species of perennial grasses, eight cool-season and four warm-season grasses under rain-fed conditions and without mineral amendments, in the Northern Great Plains.

Presenter: **Carlos Sixto CIRIA RAMOS, CIEMAT, Biomasa Dpt., Lubia (Soria), SPAIN**

Presenter's biography:

Agricultural Engineer at Lérida University. phD researcher in Energy Department of Centre for Energetic Environmental and Technological Research (CIEMAT), Biomass Unit in the Centre for the Development of Renewable Energy Sources (CEDER). Research activity is close to biomass production, economic,

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.S. Ciria Ramos, CIEMAT, Lubia,Soria, SPAIN
M.T. Berti, North Dakota State University, Fargo, North Dakota, USA
M. Kazula, North Dakota State University, Fargo, North Dakota, USA
A. Peterson, North Dakota State University, Fargo, North Dakota, USA

Session reference: 1DV.2.13
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Energy Crops: Herbaceous Perennial in Production with Different Fertilizers in the Center of Spain

Short introductive summary:

In this work we have evaluated two plant species candidates for energy uses (non-food), switchgrass and Miscanthus sinensis on experimental plots in central Spain. Control (C), composted sewage sludge (CS) and treated with sewage sludge thermal drying (TD): Three fertilization treatments were established.

Presenter: **Pedro V. MAURI ABLANQUE, IMIDRA, Investigación Agroambiental Dpt., Alcalá de Henares, SPAIN**

Presenter's biography:

Research in IMIDRA. Director del Departamento de Investigación Agroambiental
Instituto Madrileño de Investigación y Desarrollo
Rural, Agrario y Alimentario (IMIDRA)
Finca El Encín, Autovía A-2. Km. 38,200
28800 Alcalá de Henares (MADRID)

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P.V. Mauri Ablanque, IMIDRA, Alcalá de Henares, SPAIN
A. Plaza, IMIDRA, Alcalá de Henares, SPAIN
J. Ruiz-Fernandez, IMIDRA, Alcalá de Henares, SPAIN
M.C. Amoros, IMIDRA, Alcalá de Henares, SPAIN
S. Iglesias, IMIDRA, Alcalá de Henares, SPAIN

Session reference: 1DV.2.15

Subtopic: 1.3 Biomass Crops and Energy Grasses

Topic: 1. BIOMASS RESOURCES

Evaluation of New Perennial Grasses for Biomass Production Italy

Short introductive summary:

In Spring 2016 an experimental trial was established in Northern Italy at Casale Monferrato, in the frame of SidaTim project (FACCE-SURPLUS), comparing two provenances of Sida, one of Silphium and the poplar clone ‘Orion’. The objective of this trial is to collect information on the yields of the two perennial grasses, never tested in Italy, characteristics of the biomass and on the cultivation costs.

Presenter: **Gianni FACCIOTTO, CREA- Council for Agricultural Research & Economics, Foreste e Legno Dpt., Casale Monferrato, ITALY**

Presenter's biography:

Gianni Facciotto,since 1981 he has been working as a researcher for the former Poplar Research Institute, now Intensive wood production Research Unit of Council for agricultural research and economics (CREA), in Casale Monferrato (Italy).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Facciotto, CREA, Casale Monferrato, ITALY
S. Bergante, CREA, Casale Monferrato, ITALY

Session reference: 1DV.2.16
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Path Analysis of Biomass and Seed Yield of Garden Cress for High Biodiesel Production

Short introductive summary:
Development of new cultivars needs efficient tools to monitor trait association in a breeding program. This investigation was aimed to characterize traits related to seed yield and biomass in garden cress.

Presenter: **Mehdi MOHEBODINI, University of Mohaghegh Ardabili, Horticultural Science Dpt., Ardabil, IRAN**

Presenter's biography:
I am academic staff from University of Mohaghegh Ardabili.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
M. Mohebodini, University of Mohaghegh Ardabili, Ardabil, IRAN
N. Sabaghnia, University of Maragheh, IRAN
M. Mostafaei, Razi University, Kermanshah, IRAN

Session reference: 1DV.2.17
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Evaluation of Biomass Quality of Endemic Plants of Cape Verde Aiming its Possible Use for Fiber and Energy Production

Short introductive summary:

The bet in renewable energies is considered essential to Cape Verde. Moreover, the use of endogenous sources will allow greater energy independence as well as access to energy at competitive costs for families and for companies. Periploca chevalieri, Whitania chevalieri and Artemisia gorgonum are three endemic plants of Cape Verde. These plants have been widely used in traditional medicine for its pharmacological properties. Additionally, these plants have been also widely used as firewood in cooking. The objective of this study was to characterize Periploca chevalieri, Whitania chevalieri and Artemisia gorgonum biomass in order to assess their potential to be valorized as a source of fiber, in energy production or in other applications. In this sense the quality of the biomass was analyzed be the following parameters: organic matter content, ash content, total carbon content, total nitrogen content, phosphorus content, fiber content, fat content and sugar content. Results were compared with results obtain with other plants used for energy production.

Presenter: **Maria Paula DUARTE, Universidade Nova de Lisboa, Ciências e Tecnologia da Biomassa Dpt., Caparica, PORTUGAL**

Presenter's biography:

Graduation in Applied Chemistry, specialisation Biotecnhology, Faculdade de Ciências e Tecnologia da Universidade Nova de Lisboa in 1991. Master in Food Technology/Quality, FCT/UNL in 1997. PhD in Environmental Sciences, FCT/UNL in 2008. Professor at FCT/UNL, since 1993.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Lima, MEtRICs/DCTB/FCT/UNL, Lisboa, PORTUGAL
M.P. Duarte, MEtRICs/DCTB/FCT/UNL, Lisboa, PORTUGAL
A.L. Fernando, MEtRICs/DCTB/FCT/UNL, Lisboa, PORTUGAL
B. Mendes, MEtRICs/DCTB/FCT/UNL, Lisboa, PORTUGAL

Session reference: 1DV.2.18
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Combining Harvest Date and Cutting Height to Optimize the Sustainability of Miscanthus Production for Energy in the Mediterranean Region

Short introductive summary:

Considering Miscanthus sustainable production, the aim of this work was to evaluate the influence of harvest date and cutting height on the yields and biomass quality of Miscanthus for energy purposes. In this context, Miscanthus biomass from field studies in Portugal were sampled at three different harvest dates: September, November and January. For each harvest date, stems were separated into fractions of 50 cm. The first 50 cm near the soil were additionally cut into fractions of 10 cm. The fresh and dry weight of each fraction was recorded and the moisture, ash and mineral content (N, P, K, Ca, Mg and Na) were measured. Results indicate that higher yields are obtained in September and the higher the stubble height the lower the yields. Yet, extending the harvest date to November and January improves the biomass quality for combustion. The integrated analysis indicate that Miscanthus should be harvested in the period November-January, and that fractions above 200 cm should be left in the ground along with leaves. In order to maximize the yield, the cutting height should be as low as possible given the constraints associated with the harvest machinery.

Presenter: **Ana Luisa FERNANDO, Universidade Nova de Lisboa, Ciências e Tecnologia Biomassa Dpt., Caparica, PORTUGAL**

Presenter's biography:

Ana Luísa Fernando holds a PhD in Environmental Sciences. Assistant Professor at Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa.Main scientific areas: energy crops, remediation of contaminated soils, valorization of agro residues.

Co-authors:

A.L. Fernando, FCT/UNL, Lisbon, PORTUGAL

Session reference:	1DV.2.21
Subtopic:	1.3 Biomass Crops and Energy Grasses
Topic:	1. BIOMASS RESOURCES

Response of the Energy Grass Giant Reed to Three Harvest Strategies: Crop Growth Rate and Dry Matter Yield

Short introductive summary:

Giant reed (Arundo donax L.) is a perennial grass that can be conveniently used for partial substitution of maize for producing biogas. The interest for giant reed is due to the low agronomic input requirement and the high yield. For this type of utilization, giant reed needs to be ensiled to be preserved and used. This requires that the crop is harvested twice during the summer. However, little is known about the response of giant reed to different harvest strategies in terms of crop growth rate, dry matter yield and stand duration.

Presenter: **Enrico CEOTTO, CREA- Council for Agricultural Research and Economics, Research Center for Agriculture and Environment, Bologna, ITALY**

Presenter's biography:

Enrico Ceotto is Senior Researcher Agronomist at the Research Center Agriculture and Environment, located in Bologna, Northern Italy. Currently, his research activity is focused on perennial energy crops and their ecosystem services. E-mail address: enrico.ceotto@crea.gov.it.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Ceotto, CREA- Council for Agricultural Research and Economics, Bologna, ITALY
F. Castelli, CREA- Council for Agricultural Research and Economics, Bovolone, ITALY
M. Diozzi, CREA- Council for Agricultural Research and Economics, Bologna, ITALY

Session reference: 1DV.2.22

Subtopic: 1.3 Biomass Crops and Energy Grasses

Topic: 1. BIOMASS RESOURCES

Use of a Flexible Bar in Stony Soil

Short introductive summary:

Marginal lands have been proposed as the target area for energy crops cultivation aimed at reducing the competition for fertile soil with food crops. In marginal conditions the soil tillage may result inaccurate and the presence of stones very common. During the harvesting the traditional heads with a rigid cutter bar can be damaged, and the need to increase the cutting height results in excessive biomass losses. The use of floating, flexible and floating flexible cutter bars following the contour of the ground, was reported for the harvesting of pulse for minimizing the loss of low hanging pods. CREA-ING was involved in designing a new flexible bar for reducing losses in stony soil suitable for the energy crops. The work presents the main results of the a first study on the efficiency of the bar.

Presenter: **Luigi PARI, CREA- Council for Agricultural Research and Economics, Unità di Ricerca per l’Ingegneria Agraria - CREA-ING, Monterotondo RM, ITALY**

Presenter's biography:

Dr. Luigi Pari has a PhD in Agricultural Engineering in 1990 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). In 2002 he became Scientific Director of the Non Food Agriculture - Energy Crops Group (PANACEA), coordinating the activities of 18 researchers, which main activity is to develop new agricultural machineries prototype for energy crops harvesting and logistic.
Authors of more than 200 scientific publications, he was scientific responsible of more then 30 research projects, funded by European Union, Italian Ministry of Agriculture and private enterprises

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Pari, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
A. Del Giudice, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
D. Pochi, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
F. Gallucci, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
E. Santangelo\, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY

Session reference: 1DV.2.23
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Prototype For Unloading Fresh Biomass from Silo-Bags

Short introductive summary:

The storage of cereals and other biomasses in horizontal plastic bags represents an innovative system for more European countries. Silo-bags are a good and well-known solution for dry grain storage but they also represent an interesting solution for crop storage aiming at energy production. Inside the bags, preservation is attained without thermal or insecticide treatments. In Italy, starting from 2010 when it was third European country (EurobObserv'ER, 2011), the proliferation of biogas energy plants has been very fast and in only few years, the number of plants has increased from ten to nearly nine hundred (Fabbri et al, 2013) and many more plants are now under construction. Despite the new incentivised Italian mechanism allows the use of only by-product (DM 6/7/2012 Economic development art. 8 comma 4), the silage remains a preferred storage system for fresh biomass. Additionally, the plastic material of silo bags proved to be an efficient physical barrier preventing insects from getting into the grain bag. Different commercial solutions are available only for loading grain and fresh matter, but the main problems concern the unloading of fresh matter, not dry grain, whe

Presenter: **Alberto ASSIRELLI, CRA - Agricultural Research Council, Monterotondo - RM, ITALY**

Presenter's biography:

Dr. Alberto Assirelli has a PhD in Agricultural Engineering in 1997 and start working in the Department of Economics and Agricultural Engineering at the University of Bologna, continuing his works in other public and private research centers.
Researcher in the Agricultural Engineering Unit (CREA-ING) of the Agricultural Research and Experimental Council (CREA), in Monterotondo (Roma).
Author of more than 400 publications in the fields of agricultural mechanization with particular reference to the development and testing of new machinery for food, feed and energy crops.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Assirelli, CREA, Roma, ITALY
G. Caracciolo, CREA, Forlì, ITALY
E. Santangelo, CREA, Roma, ITALY

Session reference: 1DV.2.24
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Innovative System For Industrial Hemp Harvesting

Short introductive summary:

Despite the growing interest for hemp, the mechanical harvesting remains an obstacle for the diffusion of the crop. The separation of the different fractions (fibre, seeds, residual biomass) is a crucial aspect for obtaining products complying with the requirements of the processors/end users. The harvesting strategies must be shaped according to the cultivation techniques and the crop physiology. For building a sustainable supply chain the separation of the different fractions should be carried out directly in the field thus optimizing the recovery of single fraction. Several constraints make difficult the full mechanization of the harvesting: the fibrous nature of the plant, the resistance of the fibres and their ability, once released to adhere and wrap the bodies of rotary machines mainly those unprotected or lacking of specific cleaning systems. The wheat combine equipped with express devices can be used without any problems for seeds while the collection of the fibre for textile requires special care to safeguard the integrity of the fibre length. When the target is the fibre for non-textile industrial purposes, e.g. material for filling or insulation the harvesting

Presenter: **Alberto ASSIRELLI, CRA - Agricultural Research Council, Monterotondo - RM, ITALY**

Presenter's biography:

Dr. Alberto Assirelli has a PhD in Agricultural Engineering in 1997 and start working in the Department of Economics and Agricultural Engineering at the University of Bologna, continuing his works in other public and private research centers.
Researcher in the Agricultural Engineering Unit (CREA-ING) of the Agricultural Research and Experimental Council (CREA), in Monterotondo (Roma).
Author of more than 400 publications in the fields of agricultural mechanization with particular reference to the development and testing of new machinery for food, feed and energy crops.

Co-authors:

A. Assirelli, CREA, Rome, ITALY
M. Cacchi, CREA, Forlì, ITALY
G. Caracciolo, CREA, Forlì, ITALY
E. Santangelo, CREA, Rome, ITALY

Session reference: 1DV.2.25
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Jatropha Curcas L. Harvesting Methods: An Economic Assessment

Short introductive summary:

Jatropha cultivation could represent an interesting source of income in developing countries. However, the harvesting of this plant presents several problems due to the presence of fruits that are in bunches and that do not ripen simultaneously: for these reasons, mechanical solutions aimed at facilitating harvesting operations are still limited. The main cost of Jatropha curcas L cultivation is the labour cost for fruit collection. Assessing the economic performances of different harvesting systems may contribute to the scientific literature towards the introduction of innovations useful to spread the Jatropha cultivation.

Presenter: **Luigi PARI, CREA- Council for Agricultural Research and Economics, Unità di Ricerca per l'Ingegneria Agraria - CREA-ING, Monterotondo RM, ITALY**

Presenter's biography:

Dr. Luigi Pari has a PhD in Agricultural Engineering in 1990 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). In 2002 he became Scientific Director of the Non Food Agriculture - Energy Crops Group (PANACEA), coordinating the activities of 18 researchers, which main activity is to develop new agricultural machineries prototype for energy crops harvesting and logistic.
Authors of more than 200 scientific publications, he was scientific responsible of more then 30 research projects, funded by European Union, Italian Ministry of Agriculture and private enterprises

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

L. Pari, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Unità di ricerca per l'in, Monterotondo (RM), ITALY
A. Suardi, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Unità di ricerca per l'in, Monterotondo (RM), ITALY
M.B. Forleo, University of Molise, Department of Economics, Campobasso (CB), ITALY
N. Palmieri, University of Molise, Department of Economics, Campobasso (CB), ITALY
A. Outzourhit, Centre de Devèloppement de la Règion de Tensift, Marrakech, MOROCCO
R. Ait babahmad, Centre de Devèloppement de la Règion de Tensift, Marrakech, MOROCCO

Session reference: 1DV.2.26
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Numerical Investigation on the Effect of Paddle Wheel Movement on the Flow Field of High Rate Micro Algae Open Pond

Short introductive summary:

This part will complete later.

Presenter: **Hamid MASHHADI, Islamic Azad University-Arak Branch, Biosystem Engineering Dpt., Arak, IRAN**

Presenter's biography:

I am faculty member of Arak Islamic Azad University as the most nongovernmental universities of Iran since 1999. I have been attendance in a lot of international conference related to Agricultural Machinery and Energy. The most of my activity are about biodiesel and renewable energy.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Mashhadi, Islamic Azad University-Arak Branch, Arak, IRAN
M.R. Vafaee, Islamic Azad University-Farmahin Branch, Arak, IRAN
M. Almasi, Islamic Azad University-Science and Research Campus, Tehran, IRAN
M. Heydarian, Iranian Research Organization for Science and Technology(IROST), Tehran, IRAN

Session reference: 1DV.2.31
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Effect of Blue Light on Growth And Oil Accumulation in the Model Green Microalga Chlamydomonas Reinhardtii

Short introductive summary:

Green microalgae have recently been recognized as a promising source of high added value products with minimum cost and without environmental deterioration. Algae utilizing similar photosynthetic processes as higher plants for energy generation and intermediates including metabolites. They consist a renewable energy source, and unlike oil crops, microalgae grow extremely rapidly and many are exceedingly rich in oil. Biomass production and oil productivity in microalgae culture are the most important key factors for algal biodiesel production. However, proper culture condition for the biomass production of microalgae is different from that for oil production from microalgae. Light and nitrogen sources are the major processing factors that affect overall biomass productivity in photoautotrophic cultures. The studied parameters have combined effect not only in the growth of the microalgae Chlamydomonas reihardtii but also in the production and quality of the recovered lipids. Blue light enhances both biomass and lipid productivity but under different nutrient conditions.

Presenter: **Ioannis ZARKADAS, Aristotle University of Thessaloniki, Chemical Engineering Dpt., Thessaloniki, GREECE**

Presenter's biography:

Qualified and experienced in waste management and chemical analysis for both solid and liquid wastes. Experienced in the scientific and technical matters of anaerobic digestion and composting of heterogeneous substrates including manures and the organic fraction of the municipal solid waste.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Karageorgou, University of Ioannina, GREECE
D. Spiliotakopoulou, University of Ioannina, GREECE
I. Zarkadas, University of Thessaloniki, GREECE
D. Sarigiannis, University of Thessaloniki, GREECE
A. Polydera, University of Ioannina, GREECE
H. Stamatis, University of Ioannina, GREECE
P. Katapodis, University of Ioannina, GREECE

Session reference: 1DV.2.32
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Optimization Of Microalgae Culture Conditions for Better Quality Biodiesel Production

Short introductive summary:

Algal oil contains saturated, monounsaturated and polyunsaturated fatty acids. The quality of biodiesel is largely determined by the ratio of saturated to unsaturated fatty acids. Saturated fatty acids are resistant to degradation and autoxidation, and therefore, increase the ability to long storage. Unsaturated fatty acids enhance cold flow characteristics. It is generally considered that microalgae with high proportion of saturated and monounsaturated fatty acid is desirable to obtain a better biodiesel quality. The fatty acid composition of microalgae can also be affected by various culture conditions, such as different nutritional and environmental factors, cultivation conditions and growth phases. In present research, Chlorella pyrenoidosa and Scenedesmus obliquus were chosen to evaluate the suitability of microalgae under different nitrate levels (0, 0.3, 0.6, 0.9, 1.5 g/L $NaNO3$) as biodiesel feedstock.

Presenter: **Xiaoling MIAO, Shanghai Jiao Tong University, School of Life Sciences & Biotechnology, Shanghai, P.R. CHINA**

Presenter's biography:

Xiaoling Miao is a professor of the State Key Laboratory of Microbial Metabolism and the School of Life Sciences & Biotechnology SJTU. Her research interests mainly focused on biofixation of carbon dioxide and biofuels production with microalgae.

Co-authors:

X.L. Miao, Shanghai Jiao Tong University, P.R. CHINA

Session reference: 1DV.2.35

Subtopic: 1.4 Algae Production Systems

Topic: 1. BIOMASS RESOURCES

Microalgae as a Water Treatment System for Recirculating Fish Water Pool

Short introductive summary:

Recirculating fish farm pool limits the polluting impact of aquaculture on environment. Water circulation reduces the produced waste water volume and need for the water replacement. At the moment recirculating fish water systems are not very competitive option of fish farming due to their high maintenance costs. Economically profitable fish farming in recirculating fish farm pools requires improvement of production methods. One way to reduce the waste water treatment costs and improve the circular economy of the production units could be the use of algae as biological water treatment system. Using algae in fish pool water treatment would have a dual benefit since the biotreatment could be coupled with algae based high value products, eg. omega-3-fatty acids or valuable pigments. Mixed culture of Euglena gracilis with Selenastrum sp. was cultured in laboratory scale photobioreactors in waste water from recirculating fish farm pool to study the biomass production as well as waste water treatment.

Presenter: **Katariina LAHTI, Helsinki University, Environmental Sciences Dpt., Auttoinen, FINLAND**

Presenter's biography:

I am a fourth year student at Helsinki University and I am currently completing my bachelor’s degree in Environmental Ecology with minors in Environmental Chemistry and Environmental Microbiology. My Master thesis deals with microalgae Euglena gracilis and its symbiotic bacteria.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K.T. Lahti, Helsinki University, Lahti, FINLAND
R. Eskola, Lahti University of Applied Sciences, Lahti, FINLAND
M. Tossavainen, Helsinki University, Lahti, FINLAND
A. Ojala, Helsinki University, Lahti, FINLAND
M. Romantschuk, Helsinki University, Lahti, FINLAND

Session reference:	1DV.2.37
Subtopic:	1.4 Algae Production Systems
Topic:	1. BIOMASS RESOURCES

Aquatic Weeds as Biomass Source: The Harvesting Technique in North Italy

Short introductive summary:

Environmental concerns about the excessive growth of the macrophytes in the freshwater ecosystems have fostered the individuation of sustainable management of the aquatic plants. The harvesting (“deweeding”) of the invasive weed can be practiced by mechanical and manual methods. The former is non-selective, but allows the removal of huge amount of biomass in less time, making it available for further uses. The work reports the data on the technical efficiency of a harvesting system using motorboats.

Presenter: **Luigi PARI, CREA- Council for Agricultural Research and Economics, Unità di Ricerca per l’Ingegneria Agraria - CREA-ING, Monterotondo RM, ITALY**

Presenter's biography:

Dr. Luigi Pari has a PhD in Agricultural Engineering in 1990 and start working as researcher in the Agricultural Engineering Unit (CRA-ING) of the Agricultural Research and Experimental Council (CRA), in Monterotondo (Roma). In 2002 he became Scientific Director of the Non Food Agriculture - Energy Crops Group (PANACEA), coordinating the activities of 18 researchers, which main activity is to develop new agricultural machineries prototype for energy crops harvesting and logistic.
Authors of more than 200 scientific publications, he was scientific responsible of more then 30 research projects, funded by European Union, Italian Ministry of Agriculture and private enterprises

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Del Giudice, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
L. Pari, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
E. Santangelo, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY
E. Santangelo, Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria, Monterotondo, ITALY

Session reference: 1DV.2.41
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

SaltGae: Algal Treatment of Saline Waste Water Coupled with Biogas Production and Biomass Valorisation

Short introductive summary:

The aim of the SALTGAE project is to implement and demonstrate at large scale the long-term technological and economic feasibility of an innovative, sustainable and efficient solution for the treatment of high salinity wastewater from the F&D industry. Conventional wastewater treatments have proven ineffective for this kind of wastewater, as the bacterial processes typically used for the elimination of organic matter and nutrients are inhibited under high salinity contents. SALTGAE aims to prove the efficiency of using microalgae cultivation for waste water salinity reduction, nutrient recovery and animal feed production

Presenter: **Robert REINHARDT, AlgEn, Director, Ljubljana, SLOVENIA REPUBLIC**

Presenter's biography:

Robert Reinhardt, a Mathematician with a career in computer science, ample business experience in a software development and system integration company. Recently a consultant and business angel. Partner and CEO of AlgEn.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Reinhardt, AlgEn, Liubjana, SLOVENIA REPUBLIC
A. Salimbeni, EUBIA, Brussels, BELGIUM
F. Englund, SP Technical Research Institute of Sweden, Stockholm, SWEDEN
G. Grassi, EUBIA, Bruxelles, BELGIUM

Session reference:	1DV.2.42
Subtopic:	1.4 Algae Production Systems
Topic:	1. BIOMASS RESOURCES

Environmental Impacts Assessment Of Alternative Microalgal Biofuels Systems

Short introductive summary:

At present, no large-scale, commercially viable algae-to-biofuels processes has been implemented yet, thus, so far, various LCA studies have focused mainly on hypothetical production chains to produce microalgal biofuels (biodiesel, biogas and bio-oil among others) and their co-products using attributional approach.
Because of the early stage of development, large uncertainties are associated to almost every step of the production chain. Therefore, a comparative assessment between alternative systems is necessary to identify potential environmental risks and benefits with respect to the energy and environmental performances of possible algal biofuel systems. Our purpose is to assess the environmental impacts of a set of algal biofuels supply chains. Specifically, by performing extensive sensitivity analysis, we aim to evaluate the influence of main parameters (e.g. resources consumption, processes efficiency and management of co-products) impacts on the environmental impacts of the selected pathways and to identify ways of minimizing them. The analysis is based on the results from pilot or projected plants publicly available in the literature.

Presenter: **Jacopo GIUNTOLI, European Commission, JRC, Directorate C: Energy, Transport and Climate, Petten, THE NETHERLANDS**

Presenter's biography:

Jacopo Giuntoli has a PhD in Energy Engineering, member of the Sustainable Transport Unit in the IET – JRC (European Commission). He is part of a team providing scientific and technical support to policymakers on bioenergy environmental sustainability.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Rocca, European Commission, Joint Research Centre (JRC), Petten, THE NETHERLANDS
M. Pucciarelli, European Commission, Joint Research Centre (JRC), Petten, THE NETHERLANDS
A. Agostini, ENEA–Italian National Agency for New Technologies, Energy and the Environment, Rome, ITALY
J. Giuntoli, European Commission, Joint Research Centre (JRC), Petten, THE NETHERLANDS
L. Marelli, European Commission, Joint Research Centre (JRC), Ispra, ITALY

Session reference: 1DV.2.44
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Algal Bioprospecting to Feedstock Production: The Trinidad and Tobago Case Study

Short introductive summary:

Microalgae are aquatic microorganisms which have the extraordinary ability to produce their food through multifarious photosynthetic activities, utilizing carbon dioxide from the atmosphere and nutrients from wastestreams as the building blocks to produce complex compounds such as carbohydrates and lipids. These valuable compounds, particularly lipids, are highly sought-after by large energy, agricultural and nutraceutical entities. Some algal biofuel products derived from the lipid component are identical to petrochemical products and hence are expected to reduce the dependence on petroleum-based fossil fuels. Diversification of an economy and energy resources is especially important in a time of economic recession, when Trinidad and Tobago is so heavily dependent on oil to secure economic stability and growth. Most of the existing research is being done by China, United States and European countries, such as the Netherlands. Very little is being done in Trinidad and Tobago and the Caribbean region to explore algal bio-resources. This project aimed at: 1) systematically searching for local algae that has similar growth and high-end commodities to commercially available sp

Presenter: **Trina HALFHIDE, University of the West Indies, Life Sciences, St Augustine, TRINIDAD AND TOBAGO REPUBLIC**

Presenter's biography:

Dr Trina Halfhide is currently an environmental science lecturer at the University of the West Indies, St. Augustine campus. She is assisting in building the Environmental Science and Sustainable Technology Program at UWI.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Mohammed, University of the West Indies, St Augustine, TRINIDAD AND TOBAGO REPUBLIC

Session reference: 1DV.2.46

Subtopic: 1.4 Algae Production Systems

Topic: 1. BIOMASS RESOURCES

Enhancing the Quality and Quantity of Panicum Maximum Jacq. Biomass by Employing Beneficial ACC Deaminase Producing Rhizobacteria Under Abiotic Stress Condition for Bioenergy Applications

Short introductive summary:

Renewable energy is extensively running as the major alternative to replace depleting fossil fuel. In this regard non-traditional lignocellulosic biomass such as, Guinea grass (Panicum maximum), could be utilized for biofuel production. It is a perennial grass and due to its multicut nature, wide adaptability, and high yield, it could offer us an one of the most promising bioenergy grass candidates for India. On the other hand use of waste/ degraded land for the production of energy crops reduce the conflict between land use for food and energy crops.

Presenter: **Garima TIWARI, Indian Institute of Technology, Centre For Rural Development And Technology, New Delhi, INDIA**

Presenter's biography:

A dynamic professional with 4 years of rich experience in Applied Biotechnology from IIT delhi during my PhD programme. I am working on title “Evaluating the potential of Perennial grasses (Panicum maximum) for fuel and fodder purpose under abiotic stress condition ”.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Tiwari, Indian Institute of Technology, New Delhi, INDIA
P. Hariprasad, Indian Institute of Technology, New Delhi, INDIA
S. Sharma, Indian Institute of Technology, New Delhi, INDIA
R. Prasad, Indian Institute of Technology, New Delhi, INDIA

Session reference: 1DV.2.50
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Cost and Profitability for Rotational Grass/Clover as Biogas Feedstock: A Swedish Scenario Study

Short introductive summary:

Grass/clover is considered an energy efficient and environmentally sound feedstock for biogas production with multiple benefits for cropping systems. By addressing positive effects, different stakeholders can get a better decision-support when and how grass/clover is of economic interest as biogas feedstock. The purpose of the study was to analyze how introduction of grass/clover in rotations with annual crops in two Swedish regions affects production cost and profitability. The calculations included all costs except for land and subsidies. Productions costs in the grass/clover rotations decreased and profitability increased due to increased yields for subsequent crops, reduced need for N mineral fertiliser thanks to N fixation and reduced cost for crop protection. The required price for grass/clover for maintaining the same profitability when including grass/clover in the rotation was considerably lower than the expected market price if there is demand. Grass/clover must be competitive compared to current production to be of interest for the farmers. When evaluating the profitability of a feedstock, it is therefore important to include the added values generated.

Presenter: **Carina GUNNARSSON, SP Technical Research Institute of Sweden, Food and Bioscience Dpt., Uppsala, SWEDEN**

Presenter's biography:

Carina Gunnarsson works as a researcher in the field of agriculture and energy production systems. Her work focus on systems and costs for production and supply of energy crops, in particular for biogas production. The projects are often done in cooperation with companies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Gunnarsson, SP Technical Research Institute of Sweden, Uppsala, SWEDEN
P. Tidaker, SP Technical Research Institute of Sweden, Uppsala, SWEDEN
H. Rosenqvist, Consultant, Billeberga, SWEDEN

Session reference: 1DV.2.52
Subtopic: 1.6 Integrated Biomass Production for Energy Purposes
Topic: 1. BIOMASS RESOURCES

Simplification of Oil Production Procedures Through Mediation of Fenton Reaction And Electro-Coagulation-Flotation (ECF)

Short introductive summary:

Miroalgae-derived oil is surely one of only a few renewable options for fuel production, but is a long way off becoming economically viable. Production cost, which is too high for the bio-oil to be commercialized at present, must and can be reduced by the innovation of each individual step of the entire process; and the energy-intensive step of harvesting is one obvious target. Electrically mediated coagulation/flotation or ECF stands out, among a good many alternatives, in its surpassing efficiency and operational easiness.

To make the best of the process feature of iron involvement, we attempted to give rise to the Fenton reaction in a way that facilitates the disruption of ever-resistant algae cells and thus the extraction of oil. In this study, optimal conditions focusing on lipid extractability were sought on the basis of cells harvested with the ECF. To this end, concentration of H2O2, reaction time, pH, and temperature were systematically evaluated. This iron-centered integration of the two discrete step is expected to simplify the process and in so doing lower the oil production cost, thereby leading to further the commercialization of the ever-promising biofuel.

Presenter: **Ahreum YANG, Korea Advanced Institute of Science and Technology, Chemical & Biomolecular Engineering Dpt., Daejeon, REPUBLIC OF KOREA**

Presenter's biography:

2012 B.S. in Dept. of Chemical & Biomolecular Engineering, Yonsei
Ph.D. candidate.in Dept. of Chemical & Biomolecular Engineering, KAIST

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Yang, Korea Advanced Institute of Science and Technology, Daejoeon, REPUBLIC OF KOREA
J.I. Han, Korea Advanced Institute of Science and Technology, Daejoeon, REPUBLIC OF KOREA
Y.K. Chang, Korea Advanced Institute of Science and Technology, Daejoeon, REPUBLIC OF KOREA

Session reference: 1DV.2.56
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Effect of Serial Subculturing on the Adaptive Potential of Dunaliella Salina Strain KU11

Short introductive summary:

At the end of our experiments, the results showed that Evolved Dunaliella (ED) population increased cell accumulation up to 2 fold greater than the Progenitor Dunaliella(PD) in the stationary phase on day 5 to 7. In addition, the ED biomass yield was approximately 1-2 fold higher than D. salina KU11 in the previous preliminary study. Our work demonstrates that the natural selection affects on the final cell accumulation in the stationary phase of D. salina strain KU11 resulting in biomass improvement.

Presenter: **Wipawee DEJTISAKDI, King Mongkut's Institute of Technology Ladkrabang, Biology Dpt., Bangkok, THAILAND**

Presenter's biography:

I got a Ph.D. in Molecular genetic from University of Maryland, Baltimore County (UMBC), Baltimore, Maryland, USA in 2014 and M.S.and B.S. in Botany from Kasetsart University, Bangkok, Thailand in 2005. My project of interest is to develop microalgae strains to become a better producer.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

W. Dejtisakdi, Department of Biology, Faculty of Science, King Mongkut’s Institute Technology of Ladkrabang, Bangkok, THAILAND
P. Pantong, Department of Biology, Faculty of Science, King Mongkut’s Institute Technology of Ladkrabang, Bangkok, THAILAND
P. Thinthungthong, Department of Biology, Faculty of Science, King Mongkut’s Institute Technology of Ladkrabang, Bangkok, THAILAND
V. Sriwisat, Department of Biology, Faculty of Science, King Mongkut’s Institute Technology of Ladkrabang, Bangkok, THAILAND

Session reference: 1DV.2.58
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Continuous Cultivation of Microalgae as an Efficient Method to Improve Carbohydrate Productivity and Biochemical Stability

Short introductive summary:

Reasons to consider this paper are:

? A rich microalgal biomass in carbohydrate has several biotechnological applications, for biofuel, such as bioethanol, butanol, hydrogen and biogas.
? Continuous cultivation of microalgae can improve the biomass productivity and helps the decreasing of production costs.
? Continuous cultivation of energetic reserves (lipids and carbohydrates) is not well discussed in literature because less information is available.
? In the abstract/explanatory pages a method using nitrogen availability is proposed to provide a higher carbohydrate content with minimal effect on biomass productivity.
? Experimental results showed an theoretical productivity of ethanol between 2-5 times higher than sugarcane (10,000-25,000 L ha-1 year-1).
? A proper selection of potential strains and an optimization of the cultivation system can improve these values, making this approach definitely promising.

Presenter: **Carlos Eduardo DE FARIAS SILVA, University of Padua, Industrial Engineering Dpt., Padova, ITALY**

Presenter's biography:

PhD Student in Industrial Engineering at University of Padova. Graduation and master in chemical engineering. Working topics are: anaerobic digestion of vinasse, biosorption,ethanol of first, second and third generation and enzyme production by semi-solid fermentation.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C.E. De Farias Silva, University of Padova, ITALY
E. Sforza, University of Padova, ITALY
A. Bertucco, University of Padova, ITALY

Session reference: 1DV.2.59
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Marginal Land for Growing Industrial Crops: Turning A Burden into an Opportunity

Short introductive summary:

This abstract gives an overview of the project that will start by 1st of June 2017. The project has the acronym MAGIC and will focus on the cultivation of industrial crops on marginal land. It is a research project with 26 partners and a total budget of 6,000,000 euros.

Presenter: **Efthymia ALEXOPOULOU, Center for Renewable Energy Sources, Biomass Dpt., Pikermi Attikis, GREECE**

Presenter's biography:

She is an agriculture engineer grantuated from the Agricultural University in Athens (AUA) with PhD on the “Adaptability and biomass productivity of the non-food crop Kenaf in Greece”. She is responsible for Energy Crops Unit in Biomass Department of Center for Renewable Energy Sources.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Alexopoulou, CRES, Athens, GREECE
M. Christou, CRES, Athens, GREECE
I. Papamichael, CRES, Athens, GREECE
K. Tsiotas, CRES, Athens, GREECE
I. Eleftheriadis, CRES, Athens, GREECE

Session reference: 1DV.2.60
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Potential Use of Non-Food Crops in Heavy Metal (-Loids) Phytoextraction

Short introductive summary:

The potential use of non-food crops in heavy metal (-loids) phytoextraction is investigated for three plant species; Arundo donax L. (giant reed), Hibiscus cannabinus L. (kenaf) and Cynara cardunculus L. (cardoon). Phytoextraction is subgroup of phytoremediation in which plants remove metals and metalloids from the soil and concentrate them into the harvestable parts of plants. Although the metal bioconcentration capacity in the aerial biomass is much lower than the corresponding capacity of hyperaccumulator plants, the possibility to combine phytoextraction with the production of biomass with a high economic value seems very promising since a double target may be achieved. The examined plant species showed tolerance ability to contaminated soils, apart from cardoon that could not grow under high Ni concentrations. The aerial biomass of giant reed and cardoon accumulate Cd and Ni, while kenaf accumulates Cd, Pb and Sb. However, the up taken values were well below the critical levels defining hyperaccumulators.

Presenter: **Eleni KOUKOUNA, Agricultural University of Athens, Crop Science Dpt., Athens, GREECE**

Presenter's biography:

I have a background in supply chain and industrial management, with a Master’s degree in Industrial Ecology. I have specialized myself on Life Cycle Assessment (LCA) of crops and bioenergy and I am currently working as a data analyst and consultant on the agri-food sector.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E.G Papazoglou, Agricultural University of Athens, GREECE
E. Koukouna, Agricultural University of Athens, GREECE

Session reference: 1DV.2.61
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Microalgae Biomass Production from Anaerobic Effluent

Short introductive summary:

Abstract: The combination of algal biomass production using sewage and anaerobic digestion seems to be a promising bioprocess to reclaim the energy from this type of effluent. This requires biomass productivities high enough to at least balance out the energy inputs to maintain the algal culture.The main objective of this study was to study the growth of the selected microalgae strains in batch and continuous mode; By using sewage effluents as culture media, selecting an autochthonous strain that grows well in it, and reducing the energy inputs, the process can potentially generate sufficient biomass to justify its transformation into bioenergy – without using chemical fertilizers, water from the distribution network or an excessive amount of energy from the grid. It is recommended further research on the biomethanization process of the biomass produced in this system.

Presenter: **Marcos Vinicius NOGUEIRA LAVAGNOLI PEREIRA, UFES - Federal University of Espírito Santo, Environmental Engineering Dpt., Vitória, BRAZIL**

Presenter's biography:

I am a biologist with a MSc in Environmental Management, currently a PhD candidate for Environmental Engineering.
My area of research is microalgae biomass production in effluents.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M.V.N.L. Pereira, Federal University of Espírito Santo, Vitoria, BRAZIL
S.T. Cassini, Federal University of Espírito Santo, Vitoria, BRAZIL
A. Dassoler, Federal University of Espírito Santo, Vitoria, BRAZIL
P.W. Antunes, Federal University of Espírito Santo, Vitoria, BRAZIL
R.F. Goncalves, Federal University of Espírito Santo, Vitoria, BRAZIL

Session reference: 1DV.2.63
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

Two-Year Old Giant Reed Ecotypes Adaptation to Drought

Short introductive summary:

Morpho-physiological traits that convey two years-old giant reed (Arundo donax) ecotypes (Moroccan and Northern Italy) high drought tolerance and water use efficiency (WUE) have been evaluated in large rhizotrons under semi-controlled environmental conditions. No large differences between the two ecotypes tested was evident in terms of plant height, number of tillers or biomass production. However, an interesting physiological parameter that distinguished both ecotypes under drought was the predawn leaf water potential (LWP), which was closely related to photosynthesis and stomatal conductance but not to the photochemical reactions of photosynthesis. Stomatal control and LWP could be important attributes to improve drought tolerance in giant reed.

Presenter: **Walter ZEGADA-LIZARAZU, University of Bologna, Department of Agricultural Science, Bologna, ITALY**

Presenter's biography:

Walter Zegada-Lizarazu has a Ph.D. in Crop Science (Nagoya University, Japan). Currently is a assistant professor at the Department of Agricultural Sciences of Bologna University. He has been working on agronomic and ecophysiological aspects at root/canopy levels and carbon dynamics of energy/industrial crops since 2000. He has been involved in several FP7-EU Projects on industrial crops for energy end uses.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

W. Zegada-Liz, University of Bologna, Bologna, ITALY
G. Di Girolamo, University of Bologna, Bologna, ITALY
G. Della Rocca, National Research Council, Sesto Fiorentino, ITALY
M. Centritto, National Research Council, Sesto Fiorentino, ITALY
A. Monti, University of Bologna, Bologna, ITALY
F. Loreto, Agriculture and Food Sciences, National Research Council, Rome, ITALY

Session reference: 1DV.2.64
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Quantitative and Qualitative Biomass Production Potential of Giant Reed Mutants Under Rainfed and Irrigated Conditions

Short introductive summary:

A large pool of arundo mutants was developed within the WATBIO EU project with the aim to increase the genetic variability within the species as a means to increase its agronomic and industrial value. The performance in quantitative and qualitative terms of a pre-selected material was evaluated for the first time in a field plot-scale experiment during two growing seasons (2015 and 2016) under irrigated and rainfed conditions. The initial results indicate that the UniBO3 mutant show some interesting morphological (higher number of tillers, higher plant height, and shallower roots) and qualitative (higher cellulose) characteristics that could be useful to improve productivity and adaptation of arundo to evolving industrial processing techniques and to stressful environmental conditions.

Presenter: **Walter ZEGADA-LIZARAZU, University of Bologna, Department of Agricultural Science, Bologna, ITALY**

Presenter's biography:

Walter Zegada-Lizarazu has a Ph.D. in Crop Science (Nagoya University, Japan). Currently is a assistant professor at the Department of Agricultural Sciences of Bologna University. He has been working on agronomic and ecophysiological aspects at root/canopy levels and carbon dynamics of energy/industrial crops since 2000. He has been involved in several FP7-EU Projects on industrial crops for energy end uses.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Salvi, University of Bologna, Bologna, ITALY
G. Di Girolamo, University of Bologna, Bologna, ITALY
A. Monti, University of Bologna, Bologna, ITALY
W. Zegada-Lizarazu, University of Bologna, Bologna, ITALY

Session reference: 1DV.2.65
Subtopic: 1.3 Biomass Crops and Energy Grasses
Topic: 1. BIOMASS RESOURCES

Forage Biomass: A Thermal Energy Source in the Cement Manufacturing Process

Short introductive summary:

The objective of this research was to evaluate the potential of two species of tropical grasses, Panicum maximum and Andropogon gayanus, as an energy source in the cement manufacturing process. To achieve this goal yields were evaluated in a crop management that allowed maximum productivity. Biomass samples were collected and proximate, ultimate and caloric analyses were performed. Biomass was used as a supplementary energy source in a pilot test in the cement plant process. Different feeding strategies and kiln operational conditions were monitored to evaluated this energy source.

Presenter: **Marcelo AYRES CARVALHO, Embrapa - Brazilian Agriculture Research Corporation, Cerrados Research Center, Planaltina, BRAZIL**

Presenter's biography:

Marcelo Ayres is a Senior Researcher at Embrapa Cerrados. He has a Ph.D. degree in Plant Breeding and Genetics from the University of Florida . Published 28 articles in professional journals and 96 papers in conference proceedings.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Ayres Carvalho, Embrapa - Brazilian Agriculture Research Corporation, Brasilia, BRAZIL
M. Mitiko Onoyama, Embrapa - Brazilian Agriculture Research Corporation, Brasilia, BRAZIL
J. Dilcio Rocha, Embrapa - Brazilian Agriculture Research Corporation, Brasilia, BRAZIL
D. Keiji Nakai, Embrapa - Brazilian Agriculture Research Corporation, Brasilia, BRAZIL
E. Santos Silva, Embrapa - Brazilian Agriculture Research Corporation, Brasilia, BRAZIL
J.M. Cabral de Sousa Dias, Embrapa - Brazilian Agriculture Research Corporation, Brasilia, BRAZIL
S. Susuki, InterCement, São Paulo, BRAZIL

Session reference:	1DV.2.66
Subtopic:	6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic:	6. INDUSTRY SESSIONS

Carbonic Anhydrase-based One-Pot CO2 Conversion and Utilization for the Accelerated Growth of Microalgae

Short introductive summary:

Carbonic anhydrase (CA) has gathered a growing attention as a biocatalyst that can be used for the reduction of CO2. CA catalyzes the conversion of CO2 to bicarbonate (HCO3-) with a fast reaction rate up to 106 sec-1. However, the stabilization of CA activity and the development of novel approaches for the utilization of converted CO2 is required. Here, we stabilized CA via the approach of magnetically-separable enzyme precipitate coating (Mag-EPC) on nanofibers. Mag-EPC exhibited 236 days of half-life under the shaking condition and showed high tolerance against ethanol, while maintaining 90% of its initial activity after the 300 min incubation under 70% ethanol. Mag-EPC was introduced for the growth acceleration of microalgae in the one-pot CO2 conversion and utilization system. Atmospheric CO2 was converted to HCO3- under the catalysis of Mag-EPC and simultaneously uptaken by the microalgae as a carbon feedstock. Cell concentration of microalgae was increased by 1.8-folds with Mag-EPC and its performance was maintained after three times of reuses. This new platform has great potential for the efficient growth of microalgae, which produces valuable chemicals.

Presenter: **Jungbae KIM, Korea University, Chemical and Biological Engineering Dpt., Seoul, REPUBLIC OF KOREA**

Presenter's biography:

Dr. Jungbae Kim is a Professor in the Department of Chemical & Biological Engineering at the Korea University. He received his B.S. in Chemical Engineering in 1986 from the Seoul National University and his Ph.D. in Biochemistry Engineering in 1995 from the University of Iowa.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.-G. Hong, Korea University, Seoul, REPUBLIC OF KOREA
H. Jeon, Hanyang University, Seoul, REPUBLIC OF KOREA
H.S. Kim, Korea University, Seoul, REPUBLIC OF KOREA
J. Yang, Korea University, Seoul, REPUBLIC OF KOREA
E. Jin, Korea University, Seoul, REPUBLIC OF KOREA
J. Kim, Korea University, Seoul, REPUBLIC OF KOREA

Session reference: 1DV.2.67
Subtopic: 1.4 Algae Production Systems
Topic: 1. BIOMASS RESOURCES

The Biomethane Map - Research Coordination for a Low-Cost Biomethane Production at Small and Medium Scale Applications

Short introductive summary:

The European Horizon 2020 project “Research Coordination for a Low-Cost Biomethane Production at Small and Medium Scale Applications”, short Record Biomap aims to build up a knowledge transfer platform aiming to foster the use of research outcomes which are often insufficiently exploited after the end of a research project. In the focus are technology solutions for a cost efficient biomethane production at small to medium scale, which is not yet economically competitive compared to large scale applications. The project is coordinated by DBFZ - Deutsches Biomasseforschungszentrum gemeinnützige GmbH from Germany. The University of Warmia and Mazury in Poland (UWM) and the Swedish Institute of Agricultural and Environmental Engineering (JTI) are partners in this project. Together and transnational, technology developments along the biomethane supply chain, from substrate pre-treatment, digestion systems up to gas upgrading processes, especially for those technologies which are yet in the first phases of their development are monitored and supported during the project duration.

Presenter: **Kathrin BIENERT, DBFZ-German Biomass Research Centre, LEIPZIG, GERMANY**

Presenter's biography:

Kathrin Bienert is a scientist at DBFZ Deutsches Biomasseforschungszentrum gGmbH in Leipzig since 2010. Before joining the DBFZ, she worked in the industrial sector as project developer for a German technology company specialized in biomass gasification technologies.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Bienert, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
E. Fischer, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
B. Schumacher, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
G. Rogstrand, JTI - Swedish Institute of Agricultural and Environmental Engineering, Uppsala, SWEDEN
M. Blom, JTI - Swedish Institute of Agricultural and Environmental Engineering, Uppsala, SWEDEN
M. Marcin, University of Warmia and Mazury in Olsztyn, Olsztyn, POLAND
M. Marcin, University of Warmia and Mazury in Olsztyn, Olsztyn, POLAND

Session reference: 3DO.7.1
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Efficient Small-Scale Plants Upgrading Biogas - Potential Analysis and Economic Assessment

Short introductive summary:

Biomethane has the potential to become an important and essential component of the future energy system in the sectors of fuel production and, especially by the use in CHPs, in power production on demand. Therefore, it is necessary to make biomethane available as cost-efficient as possible to ensure a social acceptance of this energy source. The feed-in of upgraded biogas into natural gas grid is more cost-intensive for smaller upgrading capacities compared to the feed-in of larger ones with the same feed-in pressure. It is expected that the feed-in of biomethane into gas distribution grids with lower pressure level leads (significantly) to reduced costs for investments and operation. If so, small scale upgrading plants would justify higher costs for upgrading biogas to natural gas if the specific costs in total approximately remain the same. Within the context of the joint project “Efficient micro biogas upgrading plants” (eMikroBGAA) the cost reduction potentials of an optimized constellation of biogas upgrading and biomethane feed-in of smaller capacities are evaluated to show the potential of economically optimized biogas feed-in referred to the whole of Germany and to deduce recommendations for actions for an economic operation of those plants.

The presentation resp. the contribution for the conference will comprise the first results of the project whereby potential and economic analyses of those small-scale upgrading plants are focused.

Presenter: **Jaqueline DANIEL-GROMKE, DBFZ-German Biomass Research Centre, Biochemical Conversion Dpt., Leipzig, GERMANY**

Presenter's biography:

Mrs. Jaqueline Daniel-Gromke, team leader at the department “Biochemical Conversion” has been working at the DBFZ (former Institute for Energy and Environment) since 2005. She studied environmental sciences at the University of Lüneburg and completed her degree with a diploma thesis about the research into cofermentation at a pilot biogas plant. After studying she interned at the Institute for Energy and Environmental Research (IFEU) and was involved in various topics in the field of biogas and biofuels. Since 2005 she works as project manager of biogas technology at the Institute for Energy and Environment. In 2008 the DBFZ acquired the former Institute for Energy and Environment gGmbH. Since June 2008 she is working as team leader for the work group "System optimisation" at the Department of Biochemical Conversion at the DBFZ. As team leader for “system optimisation” she is responsible for investigating the environmental effects of the biogas process with focus on following aspects: system optimisation and integration within the energy system, emissions situation and measurements, economic viability assessment of biogas and biomethane, database and monitoring of biogas and biomethane plant as well as policy advices to improve framework conditions for biogas.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Daniel-Gromke, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
G. Erdmann, UFZ, Leipzig, GERMANY
V. Denysenko, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
N. Rensberg, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
J. Hüttenrauch, DBI, Leipzig, GERMANY
R. Erler, DBI, Freiberg, GERMANY
M. Beil, IWES, Kassel, GERMANY

Session reference: 3DO.7.2
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Compared Performance of Trickle-Bed and Fluidized Bed Bioreactors for Syngas Bio-Upgrading into RNG

Short introductive summary:

Trickle-bed reactor (TBR) and fluidized bed reactor (FBR) are specialized bioreactors which can be used to carry out a variety of multiphase reactions including efficient methanation of sparingly soluble gasses such as CO and H2 to produce renewable natural gas (RNG). Generally speaking, bioreactors must provide high mass transfer and high cell concentration under no substrate limiting and no inhibitory conditions.
The present study investigates, optimizes and compares the conversion of carbon monoxide (CO) and syngas (CO/H2/CO2, 40/40/20, v/v) in both types of reactors, highlighting their respective advantages and disadvantages. The comparison examines various aspects of reactor operation efficiency with regards to the specific roles of different microbial trophic groups involved in RNG production.
The bioreactors were operated with a continuous supply of gas. Performance was evaluated under various operational conditions, such as gas composition, CO pressure (from 0.3 to 1.6 atm), CO loading rate (from 0.6 to 4 L CO·Lxr -1 ·d-1), liquid velocity, and gas recirculation rates (0-3 L·min-1) ensuring a maximal conversion and product selectivity. Microbiological and biomolec

Presenter: **Ruxandra ALBU CIMPOIA, National Research Council Canada, Energy, Mining and Environment Dpt., Montreal, CANADA**

Presenter's biography:

Ruxandra Cimpoia is engineer, project manager at National Research Council Canada. She has over 20 year experience in developing bioprocesses for organic waste bioconversion into value-added products with the emphasis on wastewater treatment, enhanced methane production through anaerobic digestion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Albu Cimpoia, National Research Council Canada, Montreal, CANADA
S.R. Guiot, National Research Council Canada, Montreal, CANADA
C.D. Dubé, National Research Council Canada, Montreal, CANADA
G. Bruant, National Research Council Canada, Montreal, CANADA
M.J. Lévesque, National Research Council Canada, Montreal, CANADA

Session reference: 3DO.7.3
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Experimental Optimization of an Innovative Biogas Upgrading Process Adapted to the Agricultural Context

Short introductive summary:

There is a need for biogas upgrading processes adapted to the agricultural context in order to develop biomethane applications (gas grid injection and bioNGV). An innovative biogas upgrading process using membrane contactors has been developed to meet the economic requirements of the agricultural context.
A design of experiment was performed to understand the influence of the parameters and to optimize process performance indicators (biomethane content and methane recovery rate).
The process was tested on-site at pilot scale to upgrade biogas (0.3 Nm3 biogas/h) produced from cow liquid manure in an agricultural farm in the French Ardennes. A gas-grid quality biomethane (97% CH4) was produced with a water closed-loop.

Presenter: **Valentin FOUGERIT, CentraleSupelec, Pomacle, FRANCE**

Presenter's biography:

Graduated in Process Engineering, I investigated downstream processing in different projects (liquid-liquid extraction in hydrometallurgical project, acid gas removal). I am pursuing a PhD to develop an innovative process to upgrade biogas into biomethane.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Fougerit, CentraleSupélec, Pomacle, FRANCE
J. Lemaire, CentraleSupélec, Pomacle, FRANCE
M.-A. Theoleyre, CentraleSupélec, Pomacle, FRANCE
M. Stambouli, CentraleSupélec, Pomacle, FRANCE

Session reference: 3DO.7.4
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Is Bio-P2G Technologically Attractive as Contribution towards Balancing the Supply and Demand of Renewable Energy?

Short introductive summary:

The Bio-P2G-program (Bio-Power to Gas) at the Hanze University of Applied Sciences evaluates the technologic feasibility of the biological reduction of carbon dioxide with hydrogen to methane. A major issue in Bio-P2G is solubility of hydrogen when it is added to the digester. Due to the low mass transfer rates of hydrogen from the gas to liquid phase, the overall process rate of biological methanation might be impaired. So, technological innovations to the bioreactors in which anaerobic digestion is performed, will be studied in order to increase these mass transfer rates of hydrogen.

Presenter: **Gert HOFSTEDE, Hanze University of Applied Sciences, iLST Dpt., Groningen, THE NETHERLANDS**

Presenter's biography:

lecturer and researcher at Hanze University op Applied Sciences, Groningen

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G.J.H. Hofstede, Hanze University of Applied Sciences, Groningen, THE NETHERLANDS
F. Faber, Hanze University of Applied Sciences, Groningen, THE NETHERLANDS
J.P.H. Nap, Hanze University of Applied Sciences, Groningen, THE NETHERLANDS
M.E.F. Apol, Hanze University of Applied Sciences, Groningen, THE NETHERLANDS
R. Wedema, Hanze University of Applied Sciences, Groningen, THE NETHERLANDS

Session reference: 3DO.7.5
Subtopic: 3.4 Biomethane
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biomass Potentials and the SDGs: Adding a Food Security, Sustainability and Distributive Justice Perspective

Short introductive summary:

With the emerging trend to replace fossil fuels, biomass demand is growing. As global biomass is limited, trade-offs between biomass uses are predictable. Modelling approaches, aiming to identify global biomass potentials, show wide variations. With the Sustainable Development Goals (SDGs), a new global normative basis entered politics. Whether food security and sustainability aspects are sufficiently reflected in the models and what it means for the use of biomass by whom, merits further investigation. Based on a systematic literature review, this research aims to (i) understand how food security is reflected in the biomass models, and (ii) discuss biomass potentials and respective uses through sustainability and distributive justice perspectives. First results show that the biomass models do not sufficiently reflect food security. Dietary assumptions are insufficient to maintain OECD food consumption patterns. While biomass may replace fossil fuels for material uses, it cannot cover additional energy needs. Environmental sustainability, regional availability and socio-economic aspects are typically neglected. The best contribution of biomass to the SDGs needs to be identified.

Presenter: **Tina BEUCHELT, University of Bonn, Center for Development Research, Bonn, GERMANY**

Presenter's biography:

Dr. Tina Beuchelt works as a researcher at the Center for Development Research (ZEF), Germany, on food security, biomass availability and biomass certifications within bioeconomies. The research concentrates on agricultural and rural development in Africa, Asia and Latin-America.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

T.D. Beuchelt, Center for Development Research (ZEF), Bonn, GERMANY
M. Nassl, Center for Development Research (ZEF), Bonn, GERMANY

Session reference: 4DO.8.1
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

A Sustainable Bioeconomy for Europe: Key Results from the EU FP7 Project S2Biom

Short introductive summary:

The EU FP7 project Delivery of sustainable supply of non-food biomass to support a “resource-efficient” Bioeconomy in Europe (S2Biom) supports the sustainable delivery of non-food biomass feedstock at local, regional and pan-European level (EU28, Western Balkans, Moldova, Turkey and Ukraine) through developing strategies and roadmaps as well as a computerized and easy to use toolset.
S2Biom addressed the sustainability of value chains across the biobased sectors, and developed a consistent sustainability framework with respective criteria and indicators.
The presentation and paper will provide an overview of key S2Biom results with regard to sustainability criteria and indicators, and the toolset which will be available to the public.

Presenter: **Uwe R. FRITSCHE, IINAS, Scientific Director, Darmstadt, GERMANY**

Presenter's biography:

He studied applied physics at TU Darmstadt, 1984-2011 head of Energy & Climate Division of Öko-Institut in Darmstadt. Since 2012, he is Scientific Director of IINAS (International Institute for Sustainability Analysis and Strategy - www.iinas.org).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

U. Fritsche, IINAS, Darmstadt, GERMANY
C. Panoutsou, Imperial College, London, UNITED KINGDOM
B. Elbersen, Alterra/WUR, Wageningen, THE NETHERLANDS
L. Wenzelides, FNR, Güstrow, GERMANY
M. Dees, ALU-FR, Freiburg, GERMANY
N. Forsell, IIASA, Laxemburg, AUSTRIA
M. Lindner, EFI, Joensuu, FINLAND
L. Pelkmans, VITO, Mol, BELGIUM
R. Janssen, WIP, Munich, GERMANY
P. Canciani, CEI, Trieste, ITALY
E. Alakangas, VTT, Jyväskylä, FINLAND
I. Straritsky, Alterra/WUR, Wageningen, THE NETHERLANDS
L. Iriarte, IINAS, Madrid, SPAIN
M. Londo, Energy Research Centre of the Netherlands, Amsterdam, THE NETHERLANDS
B. Kavalov, European Commission, JRC, Ispra, ITALY
P. Anttila, LUKE, Helsinki, FINLAND
J. van Stralen, Energy Research Centre of the Netherlands, Petten, THE NETHERLANDS
T. Lammens, BTG, Enschede, THE NETHERLANDS
J. Fitzgerald, EFI, Joensuu, FINLAND
M. Vis, BTG, Enschede, THE NETHERLANDS

Session reference: 4DO.8.2
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

The PARIS -Lifestyle - Analysis and Assessment of Biomass Use for Low Carbon Lifestyles to Reach the Climate Targets 2050

Short introductive summary:

A key to reaching the 1.5° C target in the year 2100, as set out in the Paris Agreement, is to alter our lifestyles significantly. Growing consumer-groups have become increasingly aware of the climate impact connected to their choices over the past years and new climate oriented lifestyles are developing. We study the spread and development of this emerging "Low Carbon Orientation" in consumption which stimulates growing demand for low carbon products and services, for which sustainable integrated biomass use for food, feed, material, chemical and energy plays a crucial role. "Low-Carbon Lifestyles" are characterised by having significantly (80%) lower greenhouse gas emissions than most of the current lifestyles in industrialized countries and are analysed by three questions to satisfy a consumer's needs: 1) How much? – Quantifying the amount of services and products consumed; 2) Of what? – Specifying the type of products and services with their associated greenhouse gas emissions; and 3) Why? – Analysing the behaviour and reasons for consumption. This sustainable Low Carbon Lifestyle is called „Paris Lifestyle©", which is characterised by very low GHG emissions.

Presenter: **Gerfried JUNGMEIER, Joanneum Research Forschungsgesellschaft, Research Centre for Climate, Energy and Environment, Graz, AUSTRIA**

Presenter's biography:

Highlights of professional experiences:
- life cycle assessment of bioenergy for transport, electricity, heat and biorefineries
- greenhouse gas assessment of products and services
- sustainability assessment and future scenarios for transportation fuels of the future ¡V biofuels, e-mobility and hydrogen
- Austrian Representative in activities of the International Energy Agency (IEA) on "Bioenergy", "Hybrid and Electric Vehicle (HEV)" and "Alternative Motor Fuels (AMF)"

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

G. Jungmeier, Joanneum Research, Graz, AUSTRIA
G. Lettmayer, Joanneum Research, Graz, AUSTRIA
N. Bird, Joanneum Research, Graz, AUSTRIA
S. Schwarzinger, Joanneum Research, Graz, AUSTRIA

Session reference: 4DO.8.3
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

The Balance Between Future Increased Potential Supply and Demand of Sustainable Biomass -The Case Study of Sweden

Short introductive summary:

This study analyses the potential increase in the supply of biomass from forest, agriculture and aquaculture in Sweden, based on a review of actual potential studies, in the time perspective from today to 2050. The analysis includes techno-economic restrictions and ecological constrains to an expanded biomass production. The potential increase in the demand of biomass for replacing fossil fuels for energy and feedstock in various sectors is also analysed. The result shows a rather good balance between the potential increase in supply and demand of biomass in the time perspective from today to 2030, equivalent to some 40-50 TWh. For comparison, today's supply of biomass-based energy amount to some 130 TWh/yr. By 2050, the potential increase in biomass supply may amount to 70-90 TWh, whereas the corresponding increase in the demand may amount to 60-70 TWh. However, the uncertainties are considerable regarding the potential increase in both the future supply and demand of biomass. Significant deficits or surpluses may arise depending on development pathway and to minimize the risk of conflicts new combinations of regulations and incentives are needed.

Presenter: **Pål BÖRJESSON, Lund University, Environmental and Energy Systems Studies Dpt., Lund, SWEDEN**

Presenter's biography:

1998. PhD graduation, EESS, Lund University, Sweden. Thesis title: Biomass in a sustainable energy system
2003. Associate professor
2011. Professor in Environmental and Energy Systems Studies
Approximately 50 published scientific peer-review papers and approx. 125 other publications

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Börjesson, Lund University, SWEDEN
J. Hansson, IVL Swedish Environmental Research Institute, Stockholm, SWEDEN
G. Berndes, Chalmers University of Technology, Göteborg, SWEDEN

Session reference: 4DO.8.4
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Biobuilder - Create a Biobased Value Chain from A-to-Z

Short introductive summary:

A bio-economy is complex. During discussions focus and structure is often lost; leading to misunderstandings or misinterpretations; and finally lead to unclear results and decisions. Therefore VITO and Hasselt University have designed BIOBUILDER®. Concretely, it is a set of tiles, each representing a particular aspect of the bio-economy. Ranging from biomass production and transport of processing to (waste) products. Under the guidance of experts from VITO and the Hasselt University participants, using the tiles, can lay out new value chains on the table and directly discuss them. BIOBUILDER® is useful for many purposes. For decision-making processes, feeding discussions, gaining insights and for educational purposes. The simplicity of the tool makes it possible to work tailored to each customer demand. Because BIOBUILDER® is very intuitive, does not require extensive training or introduction.

Presenter: **Ruben GUISSON, VITO - Flemish Institute Technological Research, Biomass Sustainable Transition Dpt., Mol, BELGIUM**

Presenter's biography:

Ruben Guisson MSc is an expert researcher at VITO in the fields of biomass, bioenergy and biobased economy; and Team Leader of the team ‘Biomass for a Sustainable Transition’. (VITO - Flemish Institute for Technological Research – www.vito.be). He promoted as a master in Applied Sciences.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Guisson, VITO, Mol, BELGIUM
M. Van Dael, VITO/UHasselt, Mol/Hasselt, BELGIUM

Session reference: 4DO.8.5
Subtopic: 4.4 Resource efficient bioeconomy and social opportunities
Topic: 4. BIOMASS POLICIES, MARKETS AND SUSTAINABILITY

Performance Assessment of a Pilot Autothermal Carbonization Unit

Short introductive summary:

The paper present the result of a test campaing carried out on a pilot autothermal carbonitation plant designed, built and operated by RE-CORD with a nominal throughput of around 50 kg/h of biomass. The investigation reports on the quality of the produced charcoal, the composition of gasous products and also analyses of the liquid condensate produced during the tests. Data are collated with literture and critically evaluated.

Presenter: **Andrea Maria RIZZO, University of Florence, Industrial Engineering Dpt., Florence, ITALY**

Presenter's biography:

Andrea is PostDoc researcin Industrial Engineering at the University of Florence. His research interests are on the production of bioliquids from lignocellulosic and residual feedstocks by means of pyrolysis and gasification processes, their characterization and use in adapted prime movers.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.M. Rizzo, RE-CORD/University of Florence, Florence, ITALY
M. Pettorali, RE-CORD/University of Florence, Florence, ITALY
R. Nistri, RE-CORD/University of Florence, Florence, ITALY
D. Chiaramonti, RE-CORD/University of Florence, Florence, ITALY

Session reference: 3DO.9.1
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

The Influence and Implications of Recycling Hydrothermal Process Waters on Hydrochar Combustion Chemistry

Short introductive summary:

Hydrothermal carbonisation is associated with both the production of a char and an aqueous product, of which the latter can contain around 15% which organic matter in the form of sugars and organic acids. In order to maximise resource efficiency and avoid generation of waste waters, recycling the process waters back into the HTC process has been suggested as a way of maximising efficiency and minimising wastes. These process waters however contain alkaline metals, chlorides, sulphates and nitrogen based compounds previously extracted by the HTC process and if reincorporated into the char can bring about significant issues in terms of slagging, fouling, corrosion and airborne emissions during combustion. This work investigates the effect and potential implications of recycling process waters on the fuels combustion chemistry, implications which has until now been overlooked.

Presenter: **Aidan SMITH, University of Leeds, Energy Research Institute, Leeds, UNITED KINGDOM**

Presenter's biography:

I am 3rd year PhD student at Leeds University. My research looks into the fate and influence of inorganics and heteroatoms during hydrothermal carbonisation of biomass. Prior the PhD I spent six years working on environmental issues associated the mining and renewable energy sector.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.M. Smith, University of Leeds, Leeds, UNITED KINGDOM
A.B. Ross, University of Leeds, Leeds, UNITED KINGDOM

Session reference: 3DO.9.2

Subtopic: 3.1 Production of thermally treated solid biofuels

Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

CARBOWERT: Life Cycle Assessment of Different Hydrothermal Carbonization Concepts Producing Coal for Energetic and Material Use

Short introductive summary:

The CARBOWERT project aims at contributing to resource and climate protection by developing innovative and sustainable concepts of hydrothermal carbonization (HTC) of municipal sewage sludge producing HTC coal. The HTC technology provides different opportunities for the valorisation of sewage sludge streams in new applications. Within CARBOWERT two applications have been investigated in detail: Firstly, HTC coal can be used in the energy sector where it contributes to the substitution of fossil based electricity and heat. Secondly, the application of HTC coal in agricultural systems potentially leads to improved soil fertility and increased yields.
The different HTC concepts including both applications are assessed and compared to conventional agricultural and energy production systems by means of life cycle assessments (LCA). One of the scoping questions for the application of the LCA methodology was to identify the concept with the highest greenhouse gas (GHG) saving and thus with the highest contribution to climate protection compared to its conventional system. The conducted LCAs are based on mass- and energy balances considering actual data.

Presenter: **Kathleen MEISEL, DBFZ-German Biomass Research Centre, Bioenergy Systems Dpt., Leipzig, GERMANY**

Presenter's biography:

Kathleen Meisel holds a Diploma in Geography and obtained a doctorate in the field of environmental assessments. As a research scientist at DBFZ she primarily conducts life cycle assessments of biofuel-, bioenergy- and biomaterial production systems.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

K. Meisel, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
A. Clemens, DBFZ-German Biomass Research Centre, Leipzig, GERMANY
E. Schulz, UFZ, Halle, GERMANY
C. Fühner, UFZ, Leipzig, GERMANY

Session reference: 3DO.9.3
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Technical and Economic Feasibility of Combusting Biocarbon in Small Scale Pellet Boilers

Short introductive summary:

Biocarbon is a promising fuel which can have several applications: as peak load fuel in existing bioenergy plants, as substitute fuel for boilers, as quality fuel for high efficiency small scale heating appliances, as a blending fuel etc. The purpose of this work is to produce pellets with biocarbon, test them in a 20 kWt boiler (changing air mass flow and fuel mass flow) and calculate mass and energy balances. Chestnut wood was pyrolysed at 600°C in the Integrated Pyrolysis Regenerated Plant (IPRP) of the University of Perugia (Italy). A biocarbon with an average calorific value of 29 MJ/kg was obtained. The biocarbon was grinded and mixed with 10%w water and 20%w sawdust to obtain pellets with satisfactory durability (about 98%). This innovative fuel was tested in a 20 kWt pellet boiler to measure efficiency and emissions. Thermal performance and emissions data generated from the experimental campaign were used by SINTEF in Norway to optimize boiler working conditions and to assess the overall feasibility of the value chain and the performance of biocarbon pellets combustion in small scale boilers.

Presenter: **Pietro BARTOCCI, University of Perugia, Biomass Research Centre, Perugia, ITALY**

Presenter's biography:

Pietro Bartocci, MS in Agricultural Sciences and PhD in Energy Engineering at the University of Perugia, is a research fellow at the Department of Engineering of the University of Perugia. His research interests are focused on biomass production and resources assessment, micro scale energy conversion from biomass and waste with pyrolysis and gasification technologies, kinetics behavior of biomasses during thermal conversion, syngas and oils use in gas turbines and engines and energy and environmental footprinting.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R.S. Kempegowda, SINTEF Energy Research, Trondheim, NORWAY
P. Bartocci, University Perugia, ITALY
F. Liberti, University Perugia, ITALY
G. Bidini, University Perugia, ITALY
Ø. Skreiberg, SINTEF Energy Research, Trondheim, NORWAY
F. Fantozzi, University Perugia, ITALY

Session reference: 3DO.9.4
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Biochars as Source of Anodes For Na-Ion Batteries: Feasibility Study Based on Various Biomass Types

Short introductive summary:

The last years have shown an explosion of interest about biochars. Until now, the applications targeted have mostly been in the fields of energy, as combustion fuel, or agronomy, as soil amendment, but high-added value applications in the field of electrochemistry such as anode for sodium ion battery become more and more mentioned as promising uses to investigate. Only very few studies have already explored this route. The present study aims at filling in this gap through evaluating feasibility of using biochars from various biomass types as source of anodes for sodium ion batteries and drawing the link between biomass properties and the resulting char electrochemical performance. To achieve this goal, chars were obtained by slow pyrolysis of four different biomasses. These chars were prepared as anodes, characterized in terms of structural and textural properties and finally tested during successive cycles to assess battery performance and correlate it with biomass composition.

Presenter: **Capucine DUPONT, CEA, Grenoble, FRANCE**

Presenter's biography:

Dr. Capucine Dupont is Senior Scientist in the Biomass team of the Atomic Energy and Alternative Energy Commission (CEA) of Grenoble (France). Her research interests focus on the understanding and modelling of biomass thermal decomposition in order to improve suitability feedstock/process/product.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Del Mar Saavedra Rios, CEA, Grenoble, FRANCE
V. Simone, CEA, Grenoble, FRANCE
L. Simonin, CEA, Grenoble, FRANCE
C. Dupont, CEA, Grenoble, FRANCE

Session reference: 3DO.9.5
Subtopic: 3.1 Production of thermally treated solid biofuels
Topic: 3. BIOMASS CONVERSION TECHNOLOGIES FOR LIQUID AND GASEOUS FUELS, CHEMICALS AND MATERIALS

Quality Guidelines of Wood Chips and Hog Fuels - Applying International Solid Biofuels Standards

Short introductive summary:

The quality guidelines for wood fuels in Finland (VTT-M-04712-15) is to provide unambiguous and clear classification principles for solid wood fuels, provide guidance for the determination of their quality, and thus act as a tool to enable efficient trading of wood fuels and to enable good understanding between seller and buyer, and to also serve the needs of equipment manufacturers. These guidelines will also facilitate authority permission procedures and reporting. These guidelines concentrate on wood fuels sourced from forests, and wood residues from the wood processing industry.

Guidelines give detailed information about sampling and sample dividing, and analysis of the main properties (moisture content, particle size distribution, bulk density) and also calculation formulas needed (e.g. net calorific value as received). Guidelines also give examples how classification is used and model of product specifications. Also typical data of wood chips and hog fuel properties are given.

Presenter: **Eija ALAKANGAS, VTT Technical Research Centre of Finland Ltd, Renewable Energy Processes Dpt., Jyväskylä, FINLAND**

Presenter's biography:

Mrs. Alakangas has been working at VTT since 1983, and has versatile experience on bioenergy. She has published over 300 publications. She has worked as the co-ordinator of EUBIONET for 10 years. She is leading the WG 2 for CEN Solid biofuel standardisation CEN TC335 and ISO 238.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

E. Alakangas, VTT, Jyväskylä, FINLAND

Session reference: IDV.3.4

Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)

Topic: 6. INDUSTRY SESSIONS

Predicting Biomass Yields of Corn Stover from Satellite Imaging in Eastern Canada

Short introductive summary:

A corn stover to cellulosic sugar value chain has emerged in Southern and Western Ontario, Canada to supply about 80,000 tonnes of corn stover annually to Comet Biorefining who will convert the stover into high purity cellulosic sugars. The industrial scale harvest requires information on biomass productivity to ensure protection of soils and a continuous and sustainable supply of corn stover to the plant. Working with local producers field specific information was collected to allow for predictive assessments at a regional and field level using satellite imagery. The resulting product will eliminate the need for roadside assessment during the growing season.

Presenter: **Charles LALONDE, Ontario Federation of Agriculture, Guelph, CANADA**

Presenter's biography:

Charles has been conduction bioenergy and crop residue utilization studies since 2012. Emphasis of the reserch work was focused on bioeconomy uses and sustainable supply. Use of satellite imaging to predict availability is an important part of our program development.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

C. Lalonde, Ontario Federation of Agriculture, Guelph, CANADA
M. Wellisch, Agriculture and AgriFood Canada, Ottawa, CANADA
J. Lui, Agriculture and AgriFood Canada, Ottawa, CANADA
J. Shang, Agriculture and AgriFood Canada, Ottawa, CANADA
T. Huffman, Agriculture and AgriFood Canada, Ottawa, CANADA
A. Davidson, Agriculture and AgriFood Canada, Ottawa, CANADA

Session reference: IDV.3.6
Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic: 6. INDUSTRY SESSIONS

Forest Plantation and Harvesting Systems for Eucalyptus Biomass Investments in Florida USA

Short introductive summary:

Forest biomass plantations will be important to meet global GHG reductions.

Presenter: **Tom WILLIAMS, Harvest Logistics, Lakeland, USA**

Presenter's biography:

Tom Williams (owner/forester) Harvest Logistics - Florida, USA. Specializing in eucalypt management with 25 years of woody feedstock procurement. A graduate of Auburn University School of Forestry, Tom provides consulting services for companies in need of a short-rotation-woody-crop supply.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Wright, Durania, Boone NC, USA
T. Williams, Harvest Logistics, Lakeland FL, USA

Session reference: IDV.3.8
Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic: 6. INDUSTRY SESSIONS

Self-Propelled Biomass Harvester Machine for Pruning Residues Removal and Pre-Processing in Orchards and Vineyards

Short introductive summary:

One specific machine enhancing pruning residues management and energetic exploitation has been designed and manufactured by the company CAEB International (Petosino di Sorisole, Bergamo, Italy). Compared to the technical solutions already available in the market, it allows the harvesting and the preliminary processing of pruning residues (whose lower heating value is 7.71 ± 0.05 MJ kg-1) in one passage pushing forward the sustainability and the profitability of the supply chain. Machine testing in vineyards showed high working rates, good manoeuvrability and adequate operative performances of the prototype pointing out how its operational flexibility can effectively improve the whole logistics of such lignocellulosic biomass supply chain.

Presenter: **Maurizio CUTINI, CREA, Treviglio, ITALY**

Presenter's biography:

Ing. Maurizio Cutini is a full time researcher at CREA-ING, Research Laboratory of Treviglio, Italy. After graduating in Mechanical Engineering, University of Rome, he achieved the Ph.D in Agriculture Mechanics at the University of Viterbo (Italy). ORCID ID: http://orcid.org/0000-0002-6003-5382

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Brambilla, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per, Treviglio, ITALY
C. Bisaglia, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per, Treviglio, ITALY
M. Cutini, Consiglio per la ricerca in agricoltura e l’analisi dell’economia agraria, Unità di ricerca per, Treviglio, ITALY
G. Rota, CAEB International, Petosino di Sorisole, ITALY
G. Minuti, CAEB International, Petosino di Sorisole, ITALY
R. Sargiani, CAEB International, Petosino di Sorisole, ITALY

Session reference: IDV.3.9
Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic: 6. INDUSTRY SESSIONS

Operational and Design Parameters of Microalgae Cultivation Systems for its Application in Industrial Scale

Short introductive summary:

Until now a number of various laboratory, as well as industrial cultivation systems for algae production have been developed. However, it is not possible to exactly assess which equipment or system is operationally appropriate. Therefore, comparison of different design variants is very complex and it is also difficult to define which operating conditions of the equipment affect the function the most. From the operational and design parameters comparisons, it should be possible to subsequently obtain the most suitable cultivation systems. And the study of the proper parameters of microalgae cultivation systems for its application industrial scale is the aim of this paper.

Presenter: **Vojtech BELOHLAV, Czech Technical University in Prague, Process Engineering Dpt., Prague, CZECH REPUBLIC**

Presenter's biography:

I am a student of Czech Technical University in Prague, Process Engineering and Universitat Politècnica de Catalunya, Environmental Engineering and Microbiology Group. I am interested in algae production, design of algae cultivation system in industrial scale and biomass pretreatment processes.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

V. Belohlav, Czech Technical University in Prague, Prague, CZECH REPUBLIC
T. Jirout, Czech Technical University in PragueCzech Technical University in Prague, Prague, CZECH REPUBLIC
L. Krátký, Czech Technical University in Prague, Prague, CZECH REPUBLIC

Session reference: IDV.3.10
Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic: 6. INDUSTRY SESSIONS

Bush Encroachment in Namibia - Turning an Environmental Hazard into a Socio-Economic Opportunity

Short introductive summary:

Bush encroachment in Namibia is defined as the densification and rapid spread of native bush and shrub species, resulting in an imbalance of biodiversity. The latest estimations indicate that bush encroachment affects up to 45 million hectares of land in Namibia. To give some perspective, this encroached area is equivalent to the entire surface areas of Germany, Belgium and Switzerland combined. Currently, Namibia’s concerted harvesting efforts are optimistically estimated at a mere 200,000 hectares per year (0.5 % of the total national potential). Currently, Namibia is in the process of planning multiple bush biomass-to-power plants, with the latest status being 3 times 20MW equivalent ones; driven by the national power utility provider. Utilising bush-biomass for power production has various advantages at socio-economic and environmental level: job creation; tax revenue and income generation; biodiversity and rangeland improvements; as well as fossil fuel substitution.

Presenter: **Dagmar HONSBEIN, Namibia Biomass Industry Group, Windhoek, NAMIBIA**

Presenter's biography:

I am a Namibian born, qualified wood scientist, with a post graduate degree in Chemical Engineering and Applied Sciences. I have spent some 20 years researching bush encroachment in Namibia and South Africa, with the particular interest in finding commercial use for the biomass obtained its harvest.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Honsbein, N-BiG, Windhoek, NAMIBIA
C.M. Lindeque, N-BiG, Windhoek, NAMIBIA

Session reference: IDV.3.12
Subtopic: 6.1 Biomass Resources (Crops, SRF, Algae and Organic Waste)
Topic: 6. INDUSTRY SESSIONS

Biohydrogas. A New Technology for Producing H2

Short introductive summary:
Magna Dea (www.magnadea.es) introduces a new low-carbon system for producing H2, mainly based on production of H2-gas, from liquid or liquefied organic bio and non-bio-degradable waste, to be transformed in electricity through cogeneration or to obtain a pure H2 stream by purification techniques. This new technology contributes to use liquid organic wastes as a raw materials for producing a rich H2 stream, which is purified in subsequent stages.

Presenter: **Francisco GARCIA CARRO, Magna Dea, Oviedo, SPAIN**

Presenter's biography:
PhD in Civil Engineering with 15 years of experience in the private sector. General Director, Manager and Business Owner of SMEs in the consultancy market

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
F. Garcia Carro, Magna Dea, Oviedo, SPAIN
S. Solis Gutierrez, Magna Dea, Oviedo, SPAIN

Session reference: IDV.3.13
Subtopic: 6.2 Thermochemical conversion processes
Topic: 6. INDUSTRY SESSIONS

Efficient Way to Produce Biofuels from Municipal Solid Wastes

Short introductive summary:

The interest in converting bio-based raw materials into commodities continuous gathers pace, although their economic conversion presents a number of challenges. Generally bio-based materials are all more expensive than natural gas or low priced oil and they cannot compete on commodities production.

Syngas produced by Refuse Derived Fuel throughout high temperature gasification may represent a valid, cost-competitive feedstock to produce methanol at a commercial scale.This technology will be a much more interesting option than Waste-to-Energy (WTE) not only to minimize emissions into the atmosphere and mitigate climate changes but also from an energy efficiency point of view.

The proposed waste to methanol technology is both economically valuable and environmentally advantageous (in terms of saving resources and limit carbon footprint) in comparison to both conventional production of methanol (starting from natural gas) and with respect to the use of RdF to produce energy. Moreover as bio-fuel produced from waste, it qualifies under the EU’s Renewable Energy Directive for double counting mechanism and may be considered a direct ethanol substitute.

Presenter: **Annarita SALLADINI, Processi Innovativi, Rome, ITALY**

Presenter's biography:

Annarita Salladini is a Project Manager working in Processi Innovativi from 2009. She received B.Sc. and PhD degrees in chemical engineering from the University of L’Aquila. She was involved in research and development projects regarding renewable energies and process intensification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Salladini, Processi Innovativi, Rome, ITALY
G. Iaquaniello, KT-Kinetics Technology s.p.a., Rome, ITALY
E. Antonetti, Processi Innovativi, Rome, ITALY
L. Spadacini, OESA, Rome, ITALY

Session reference: IDV.3.14
Subtopic: 6.2 Thermochemical conversion processes
Topic: 6. INDUSTRY SESSIONS

Steered Measures to Reduce Emissions from Small Scale Combustion Plants with Biofuels In Relation to the Legal Requirements In Germany

Short introductive summary:

The PM-emission problem is still relevant for biomass combustion plants in Germany – especially after the introduction of strict requirements for emission control at small scale combustion plants (SSCP) with biofuels in 2015. The new situation requires new approaches to bridge the gaps in the air-pollution through PM of SSCP. New very low limits for PM-emissions of SSCP made bundle activities to prepare the SSCP for a low emission operation. In 2014, a steering committee (SC) of experts was set up to rule and unify the measures for reduction of SSCP-emissions. The SC was borne to eliminate obstacles after the introduction of the second stage of the 1st Federal Immission Control Ordinance on 1 January 2015 in coordination with the German Federal Ministry of Food, Agriculture and Consumer Protection (BMEL), the Federal Ministry of Economics and Energy (BMWi) and the Federal Ministry for the Environment, Nature Conservation, Construction and Nuclear Safety (BMUB). The Steering Committee under the leadership of the FNR coordinate R&D activities, network stakeholders and help to implement project results in the practice.

Presenter: **Hermann HANSEN, FNR - Agency for Renewable Resources, Gülzow-Prüzen, GERMANY**

Presenter's biography:

Hermann Hansen grew up on a farm in Dithmarschen county. He studied economics and social sciences of agriculture and agricultural engineering at Kiel University. At Fachagentur Nachwachsende Rohstoffe e. V. he works in department public relation (bioenergy information).

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Stanev, Agency of Renewable Ressources (FNR), Guelzow-Pruezen, GERMANY

Session reference: IDV.3.19

Subtopic: 6.3 Power & Heat processes and systems

Topic: 6. INDUSTRY SESSIONS

Remote Condition Monitoring of Automated Biomass Power Stations

Short introductive summary:

A machine condition monitoring solution has been implemented at two remotely located German biomass power stations Bischofferode and Piesteritz. Each plant has a single 20 MW condensing steam generating unit that burns approximately 16,5 tons of residual forest wood per hour. The Bischofferode plant produces only electricity while the Piesteritz plant produces electricity and process steam for a nearby fertilizer company. Both utilize a circulating fluidized bed boiler to optimize operating efficiency.

Presenter: **Michael HASTINGS, Brüel & Kjaer Vibro, Naerum, DENMARK**

Presenter's biography:

Mike Hastings graduated from Purdue University in 1980 as a mechanical engineer, and has been with Brüel & Kjær Vibro for the past 26 years, and has written numerous articles and papers on machine condition monitoring. He is convener for ISO work group TC108/SC5/AGH and WG17.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

R. Schellbach, Stadtwerke Leipzig, Leipzig, GERMANY
G. Ceglarek, Brüel & Kjær Vibro, Darmstadt, GERMANY
M. Hastings, Brüel & Kjær Vibro, Nærum, DENMARK

Session reference: IDV.3.21
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

Innovative Approach and Technical Development About Solid Biomass Utilization for Power Plant Boilers in IHI

Short introductive summary:

We will be described in detail as the most efficient available biomass utilization system that constituted by the high efficiency pulverized coal-fired boiler. By choosing the appropriate operation condition, coal boiler system can change very excellent as a flexible and efficient system.

Presenter: **Hidekazu KASAI, IHI Corporation, Business Development Dpt., Koto-ku, JAPAN**

Presenter's biography:

I am working on the development and commercialization of Energy Coversion system That use oversea and domestic solid biomass fuel for Larg power plants in Japan.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

H. Kasai, IHI Corporation, Tokyo, JAPAN
M. Tamura, IHI Corporation, Tokyo, JAPAN
S. Ueno, IHI Corporation, Yokohama, JAPAN
F. Tamamushi, IHI Corporation, Tokyo, JAPAN
S. Miyamae, IHI Power System Malaysia, Kuala Lumpur, MALAYSIA

Session reference:	IDV.3.22
Subtopic:	6.3 Power & Heat processes and systems
Topic:	6. INDUSTRY SESSIONS

Experimental and Numerical Study on Two-Stage Combustion Process of Syngas Fuels with High Content of Nitrogen Bounded Compounds

Short introductive summary:

This abstract relates to the combustion of biomass gasification derived synthesis gases with nitrogen bounded compounds using the modified HiTAC technology called two stage combustion. Results of investigation has shown that this method allows to avoid transfer of nitrogen bounded syngas components to nitric oxides. Research was supported by numerical analysis.

Presenter: **Pawel CZYZEWSKI, Poznan Universty of Technolohy, Chair of Thermal Engineering, Poznan, POLAND**

Presenter's biography:

I am PhD student and researcher at Laboratory of Gas Technology (Poznan University of Technology). I finished several internship in Gussing (Austria) and Stockholm on gasification and its gases utilization field. My current activities are cleaning of synthesis gases and its combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

P. Czyzewski, Poznan University of Technology, Poznan, POLAND
R. Slefarski, Poznan University of Technology, Poznan, POLAND
J. Jojka, Poznan University of Technology, Poznan, POLAND
R. Jankowski, ICS Industrial Combustion System, Poznan, POLAND

Session reference:	IDV.3.24
Subtopic:	6.3 Power & Heat processes and systems
Topic:	6. INDUSTRY SESSIONS

Minimizing NOx and Dust Emissions from Pellet-Fired Biomass Boilers by Optimization of Combustion

Short introductive summary:

Pellet-fired biomass boilers is one of the obvious choices when converting from fossil to sustainable biomass energy sources. Ensuring low emissions of particles and NOx is of crucial important to avoid or reduce environmental end health damaging compounds to be released. This can be done by intelligent control of the boiler to obtain ideal combustion conditions. Focus will be on regulation of air, supply of pellets and effect of insolation of fire chamber in order to optimize combustion to ensure high efficiency and low pollution.

Presenter: **Morten Gottlieb JESPERSEN, Danish Technological Institute, Biomass and combustion technology, Aarhus, DENMARK**

Presenter's biography:

Morten Gottlieb Jespersen – Head of Section of Biomass and Combustion technology at Danish Technological Institute. Works within the area of biomass boilers, stoves and biomass for combustion.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A.M. Frey, Danish Technological Institute, Aarhus, DENMARK
A. Hastrup Jensen, Danish Technological Institute, Aarhus, DENMARK
A. Pødenphant, Danish Technological Institute, Aarhus, DENMARK
M. Gottlieb Jespersen, Danish Technological Institute, Aarhus, DENMARK
K. Gregersen, NBE, Saeby, DENMARK
J. Hansen, NBE, Saeby, DENMARK
J. Krøger Lemme, NBE, Saeby, DENMARK

Session reference: IDV.3.25
Subtopic: 6.3 Power & Heat processes and systems
Topic: 6. INDUSTRY SESSIONS

An Efficient Paper Sludge Hydrolysis Method Using Whole Cell Biocatalysts, Rendering Paper Sludge Ideal for Biogas Production.

Short introductive summary:

Paper sludge is a waste that is previously not suitable for biogas production. This study shows paper sludge is rendered suitable for biogas production by using a commercial whole cell biocatalyst. Authors have developed an enzyme and a process for pretreatment of paper sludge and efficient biogas production is observed at reasobable HRT. Opening up an industrial waste as a carbon source for biogas production enables large amounts of steady biogas production and environmentally friendly disposal of wastes.

Presenter: **Murat BALABAN, Episome Biotechnologies, Istanbul, TURKEY**

Presenter's biography:

2005 BSc Molecular Biology and Genetics, Bilkent, Turkey
2011 PhD Molecular Microbiology, University of Texas Southwestern Med. Ctr.,Dallas, USA
2013 Post-Doc Karolinska Institute, Stockholm,Sweden
Current Episome Biotechnologies, CTO,Turkey
Current Law School, Istanbul Univeristy, Turkey

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

F. Kart, Episome Biotechnologies, Kocaeli, TURKEY
G. Gorgulu, Episome Biotechnologies, Kocaeli, TURKEY
M.B. Kilinc, Episome Biotechnologies, Kocaeli, TURKEY
M. Balaban, Episome Biotechnologies, Kocaeli, TURKEY

Session reference: IDV.3.26
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Bioethanol Production by Crude Glycerol Fermentation

Short introductive summary:

In recent years, the exponential growth of biodiesel production has led to a glycerol surplus.Crude glycerol might represent a suitable, abundant and low-priced feedstock for fermentation technologies considering that can be bio-converted into several value-added products like biofuels, green chemicals and food compounds.One of the most promising among biofuels, both from marketing and technical assessment, seems to be ethanol, that can satisfy the increasing demand of advanced biofuels to meet EU obligations from waste products.The proposed process aimed to represent a more cost-efficient way to obtain ethanol, reducing the high volume of circulating water (due to the high feed dilution required to overcome the substrate inhibition) and the associated energy consumptions related to the downstream process. The economic evaluation showed a very promising process with a cost of production in line with the market.

Presenter: **Annarita SALLADINI, Processi Innovativi, Rome, ITALY**

Presenter's biography:

Annarita Salladini is a Project Manager working in Processi Innovativi from 2009. She received B.Sc. and PhD degrees in chemical engineering from the University of L'Aquila. She was involved in research and development projects regarding renewable energies and process intensification.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Salladini, Processi Innovativi, Rome, ITALY
B. Maschiocchi, Processi Innovativi, Rome, ITALY
B. Morico, Processi Innovativi, Rome, ITALY
F. Martorelli, Processi Innovativi, Rome, ITALY
G. Iaquaniello, Processi Innovativi, Rome, ITALY
A. Zarli, Processi Innovativi, Rome, ITALY

Session reference: IDV.3.31
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Challenges in Scaling Up an Non-Enzymatic Process for the Production of Second Generation Sugars

Short introductive summary:

At this point in history, one of the technological challenge of producing cellulosic ethanol through the « bio » pathway is the hydrolysis of cellulose to glucose. The latter is generally performed either through enzymatic hydrolysis of the carbohydrate macromolecule or with treatments using acidic mediums. In the latter case the most important challenge has always be of recuperating optimally the chemicals agents used in the process. Over the last months our team has developed a pilot scale non-enzymatic hydrolysis system allowing an optimal recuperation of the invested acid. The targeted capacity of this setup has been identified by our industrial partner to be 100kL EtOH per year. Although the concept has shown high efficiency and reproducibility at labory scale, scaling up involved a whole dimension of challenges that were not even considered at laboratory scale such as materials resistance and security restrictions on operation and storing.

Presenter: **Jean-Michel LAVOIE, Université de Sherbrooke, Chemical Engineering Dpt., Sherbrooke, CANADA**

Presenter's biography:

Pr Jean-Michel Lavoie is the Chairholder of the Industrial Research Chair on Cellulosic Ethanol and Biocommodities (CRIEc-B) at the Université de Sherbrooke as well as leader of the Themochemical Biorefinery Task Force and the Gasification project in the BioFuelNet network.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.M. Lavoie, CRIEC-B, Sherbrooke, CANADA
X. Duret, CRIEC-B, Sherbrooke, CANADA
J.K.W. Chang, CRIEC-B, Sherbrooke, CANADA
T. Ghislain, CRIEC-B, Sherbrooke, CANADA
J. Lessard, CRIEC-B, Sherbrooke, CANADA
I.Z. Boboescu, CRIEC-B, Sherbrooke, CANADA

Session reference: IDV.3.34
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

BIOrescue: Enhanced Bioconversion of Agricultural Residues through Cascading Use

Short introductive summary:

The BIOrescue Project aims to develop and demonstrate a new innovative biorefinery concept based on the cascading use of spent mushroom substrate supplemented by wheat Straw and other seasonal underutilised lignocellulosic feedstocks. This new concept will avoid disposal and allow for the production of some biodegradable bio-based products and bioactive compounds that will help to replace the existing ones based on fossil resources

Presenter: **Ines DEL CAMPO, CENER, Biomass Energy Dpt., Sarriguren, SPAIN**

Presenter's biography:

Ms Inés del Campo has a Msc in Chemical Engineer. Since 2002 she has been working in CENER Biomass Department as a Biomass Senior Researcher in Biomass Evaluation and Assessment and Biofuel Production projects. She worked before in CIEMAT Liquid Biofuels Group.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Del Campo, CENER, Sarriguren, SPAIN
I. Alegria, CENER, Sarriguren, SPAIN
D. Gaffney, Monaghan, IRELAND
C. Forde, Monaghan, IRELAND

Session reference: IDV.3.35
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Paving the Way for a NexT Generation Biobutanol (ButaNexT)

Short introductive summary:

The ButaNexT project is developing a highly efficient production process for converting sustainable feedstocks into the next generation of biobutanol. This will contribute to overcoming the current challenges and limitations exhibited by the first generation of biofuels.

The ButaNexT consortium is a multi-disciplinary team comprised of SMEs, a large company and research centres from Belgium, the Netherlands, Spain and the United Kingdom. The team aspires to optimise each stage of the biobutanol production value chain: biomass pre-treatment, fermentation, downstream processing and blending

Presenter: **Ines DEL CAMPO, CENER, Biomass Energy Dpt., Sarriguren, SPAIN**

Presenter's biography:

Ms Inés del Campo has a Msc in Chemical Engineer. Since 2002 she has been working in CENER Biomass Department as a Biomass Senior Researcher in Biomass Evaluation and Assessment and Biofuel Production projects. She worked before in CIEMAT Liquid Biofuels Group.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

I. Del Campo, CENER, Sarriguren, SPAIN
I. Alegria, CENER, Sarriguren, SPAIN
T. Davies, Greenbiologics, Oxford, UNITED KINGDOM
J. Hewitt, Greenbiologics, Oxford, UNITED KINGDOM

Session reference: IDV.3.36
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Technical Production Process for Innovative Antioxidants using Novel Enzymes as Biocatalyst

Short introductive summary:

OPTIBIOCAT is a European 7th Framework Programme project under theme KBBE.2013.3.3-04. It aims at developing biocatalysts based on feruloyl esterases (FAEs) and glucuronoyl esterases (GEs), for production of phenolic fatty- and sugar- esters with antioxidant activity, for cosmetic industry, expanding the number/type of industrial biotransformations. The multidisciplinary project consortium is composed of 16 partners including 8 SMEs, 1 large company, universities and research institutes, from 8 EU countries. Following a systematic approach for conceptual process design, theoretical and experimental research is combined, to result in sustainable technical production processes. This paper presents the results of the techno-economic and environmental multi-criteria assessment of the enzyme production and downstream processing to a commercial viable quantity of novel enzymes as well as the development of the most sustainable whole integrated technical biocatalytic process for production of innovative biobased ingredients with high antioxidant activity, for future use in food, cosmetic and/or pharmaceutical industries.

Presenter: **Axel GOTTSCHALK, SUPREN, Dortmund, GERMANY**

Presenter's biography:

Axel Gottschalk is chemical and process engineer, studied at TU Dortmund (DE) and INSA de Rouen (FR), is expert in conceptual design of sustainable processes, is founder/owner of SUPREN GmbH (DE) and is professor at Bremerhaven University of Applied Sciences (DE), Institute of Process Engineering.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S. Adam, Supren, Dortmund, GERMANY
S. Tlatlik, Supren, Dortmund, GERMANY
A. Gottschalk, Supren, Dortmund, GERMANY

Session reference: IDV.3.37
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Concept Study for "Manure-to-Electricity" at Small-scale Farms: The Swiss Case

Short introductive summary:

We present a study of small scale systems for “Manure-to-Electricity” from 15 to 150 kWe. This corresponds to single-farm installations or to a small grouping of neighbouring farms in Switzerland. Our focus is additionally on systems whose substrates are at least 80% manure, corresponding to the resources available at the farms.

We provide some conclusions about the reductions in capital costs that would be necessary to ensure profitability in the current Swiss framework and compare these results with the current situation in the EU. The Swiss legal and regulatory environment is different from that in other European countries. However, technological developments in EU countries and in Switzerland can benefit from each other. Technical and non-technical expertise should be shared, i.e. in the field of knowledge and technology deployment.

Presenter: **Serge BIOLLAZ, PSI - Paul Scherrer Institut, Thermal Processes & Combustion, Villigen PSI, SWITZERLAND**

Presenter's biography:

Education: Master and PhD from ETH Zürich as Mechanical Engineer
Actual Position: Head of a research group at PSI
Research interest: Biomass gasification and Biogas for electricity and biomethane generation

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

S.M.A Biollaz, PSI, Villigen PSI, SWITZERLAND
A. Calbry-Muzyka, PSI, Villigen PSI, SWITZERLAND
V. Burg, WSL, Birmensdorf, SWITZERLAND
F. Rüsch, ZHAW, Wädenswil, SWITZERLAND
U. Baier, ZHAW, Wädenswil, SWITZERLAND
S. Majerus, EPFL, Sion, SWITZERLAND
J. Van herle, EPFL, Sion, SWITZERLAND

Session reference: IDV.3.39
Subtopic: 6.4 Biochemical Conversion
Topic: 6. INDUSTRY SESSIONS

Novel Enzyme Activity Screening on Complex Biomass Structures

Short introductive summary:

Based in Copenhagen Denmark, GlycoSpot is a biotechnology company specialized in the development and production of ready-to-use enzyme activity screening tools.
GlycoSpot technology provides a high-throughput method to obtain accurate information about enzyme performance in biomass degradation, which will lead to cost reduction for enzymes, time reduction in enzymatic hydrolysis and increased product yield as well as a dramatic speed up of new enzyme discovery leading to optimized production. GlycoSpot biomass substrates are the first substrates on the market that allow for enzyme screening on natural complex biomass structures.

Presenter: **Julia SCHÜCKEL, GlycoSpot, Frederiksberg C, DENMARK**

Presenter's biography:

Julia Schückel holds a M.Sc. degree in chemistry from the Technical University of Dresden, Germany and a PhD degree in biochemistry from the University of York, United Kingdom. She specializes in protein biochemistry and characterization, biotechnology, assay development and optimisation.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J. Schückel, GlycoSpot, Frederiksberg, DENMARK

Session reference: IDV.3.41

Subtopic: 6.4 Biochemical Conversion

Topic: 6. INDUSTRY SESSIONS

Life Cycle Assessment of Hydrothermal Carbonization of Four Wet Biomass Waste Streams at Industry-Relevant Scales

Short introductive summary:

Hydrothermal carbonization (HTC) is attracting attention as a technology to treat biowaste. HTC is generally thought to be environmentally sustainable technology as it allows for production of hydrochar which can be used as a solid fuel. Beside our work, however, assessment of environmental performance of HTC is limited to one study only basing on lab scale data. Here, we present life cycle inventory and life cycle impact assessment results of HTC of green waste, food waste, organic fraction of municipal solid waste and digestate at pilot- and full commercial-scale. We show that despite its immaturity when compared to established waste treatment technologies, HTC may be an attractive treatment option for biowaste with potential for further optimization. We provide recommendations to technology developers how to further improve its environmental performance, stressing the need for taking a life cycle perspective when designing future HTC plants.

Presenter: **Mikolaj OWSIANIAK, Technical University of Denmark, Management Engineering Dpt., Kgs. Lyngby, DENMARK**

Presenter's biography:

Chemical engineer specialized in development and application of life cycle impact assessment method in LCA of products, with focus on biomass-based materials like charcoals.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Owsianiak, Technical University of Denmark, Kongens Lyngby, DENMARK
M.W. Ryberg, Technical University of Denmark, Kongens Lyngby, DENMARK
M. Renz, Universitat Politecnica de Valencia, Valenia, SPAIN
M. Hitzl, Ingelia S.L., Valencia, SPAIN
M.Z. Hauschild, Technical University of Denmark, Kongens Lyngby, DENMARK

Session reference: IDV.3.46
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

The New European Technology and Innovation Platform for Bioenergy: Promoting the Market Uptake of Cost-Competitive Innovative Bioenergy and Biofuels Value Chains

Short introductive summary:
The abstract deals with the following:

the new status of the European Technology Platform for Bioenergy (ETIP Bioenergy) in the current biofuels scenario and the broadening of its activities to the sector of intermediate bioenergy carriers;

- an update on the ETIP Bioenergy monitoring of the biofuels and bioenergy sector in Europe, including recent developments in research, industrial demonstration and strategies for advanced bioenergy at European, national and international level;

- the results of a recent survey conducted among bioenergy stakeholders about the barriers to the development of the biofuels/bioenergy sector;

- the position and the practical contribution of ETIP Bioenergy to the implementation process of the SET-Plan action 8: “Strengthen market take-up of renewable fuels needed for sustainable transport solutions “.

Presenter: **Maurizio COCCHI, ETA-Florence Renewable Energies, Bioenergy Division, Florence, ITALY**

Presenter's biography:
Agronomist with background in organic and sustainable farming. Msc in bioenergy and environment at the University of Florence. Consultant and project manager in bioenergy at ETA-Florence since 2008.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:
M. Cocchi, ETA-Florence Renewable Energies, Florence, ITALY
S. Capaccioli, ETA-Florence Renewable Energies, Florence, ITALY
B. Kerckow, FNR, Guelzow, GERMANY
F. Lempe, FNR, Guelzow, GERMANY
D. Bacovsky, Bioenergy2020+, Wieselburg, AUSTRIA
P. Canciani, CEI, Trieste, ITALY
A. Grassi, ETA-Florence Renewable Energies, Florence, ITALY

Session reference: IDV.3.48
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

Wealth from Bio Economy - National Economy Perspective on Integrated Bio- and Low Carbon Technologies

Short introductive summary:

It is clear that integrated targets of European Commissions 2030 low carbon policy create an increasing need for more detailed EU and national level tools for integrated assessments and impact evaluation. This work evaluates pathways to bio economy and low carbon economy in Finland relation to the European climate policies. The focus is on most promising concepts and impact of technology deployment on national economy level.

Presenter: **Antti ARASTO, VTT Technical Research Centre of Finland, Espoo, FINLAND**

Presenter's biography:

Research Manager of Sustainable energy and chemical technologies area. Antti is expert in techno-economic assessment especially related to bioenergy, biofuels use and conversion, biorefinery and carbon capture and storage technologies in addition to energy strategy assessments and roadmaps.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

A. Arasto, VTT Technical Research Centre of Finland, Espoo, FINLAND
T. Koljonen, VTT Technical Research Centre of Finland, Espoo, FINLAND
A. Lehtilä, VTT Technical Research Centre of Finland, Espoo, FINLAND

Session reference: IDV.3.49
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

Automated Moisture, Volatile and Ash Determination with a TGA System.

Short introductive summary:

This lecture describes the fully automated moisture, volatile and ash determination of solid biofuels with an automated macro TGA. Especially the questions about standard compliance and comparison test are discussed. TGA systems have been used since years for other solid fuel analysis (coal, coke...), the experiences are discussed regarding biofuel applications.

Presenter: **Michael JAKOB, LECO, Mönchengladbach, GERMANY**

Presenter's biography:

European Field Product Manager at LECO European Application and Technology Center, Berlin, Germany

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Jakob, Leco Instrumente GmbH, GERMANY

Session reference: IDV.3.50

Subtopic: 6.3 Power & Heat processes and systems

Topic: 6. INDUSTRY SESSIONS

The Quantitative and Qualitative Analysis of Alternative and Renewable Solid Biofuels - Development and Validation

Short introductive summary:

The current regulations regarding the qualifications of bio resources (torrefied biomass or biochar) for energy purposes are challenging for small- and medium-sized enterprises (SMEs) utilising thermal biomass conversion. Solid bio-fuels produced by SMEs do not fit the definition of biomass, SMEs and power plants cannot obtain financial support from the government for the production of green energy. The goal of the financial support is to encourage diversity in the structure of electricity suppliers to enable the use of domestic energy resources. However, methods to verify the origin of the materials, such as torrefied biomass or biochar from biomass, are still lacking. Currently used method (14C carbon isotope concentration) is only suitable for the analysis of pure biomass and for solid recovered fuels, which are biodegradable in that they do not contain non-biodegradable substances to an extent deviating from the known natural properties of the biomass. Therefore, in this study, an analytical methodology is developed that detects the additive materials, such as polymers, peat and low-quality coals, in the biochar samples.

Presenter: **Marcin SAJDAK, Institute for Chemical Processing of Coal, Centre for Laboratory Research, Zabrze, POLAND**

Presenter's biography:

Ph.D., D.Sc in Institute Chemical Processing of Coal. I'm doing research on the applied of the chemometric methods to quality and origin control of solid fuels coming from thermal conversion of biomass and also performs optimization of these process.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

M. Sajdak, Institute for Chemical Processing of Coal, Zabrze, POLAND
B. Micek, Institute for Chemical Processing of Coal, Zabrze, POLAND

Session reference: IDV.3.54
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

Biomass for Residential and Commercial Heating in a Remote Canadian Aboriginal Community

Short introductive summary:

This is a published (Renewable Energy) paper on bioheat deployment at a remote (not connected to the continental electricity grid) aboriginal community in British Columbia, Canada. The paper presents two scenarios - a district energy system (DES) and decentralized biomass heating (many boilers) - and compares these scenarios to business-as-usual of space heating with heating oil (diesel), propane, and firewood and hot water provided by diesel-generated electricity. Several DES layouts were mapped in ArcGIS and techno-economic analyses determined the delivered cost of heat. There are over 200 remote communities in Canada and we thought this topic would be of significant interest to the audience at EUBCE as bioheat (with possible biopower co-generation) has a great potential to improve the economic and social situation in many remote communities.

Presenter: **Jamie STEPHEN, TorchLight Bioresources, Ottawa, CANADA**

Presenter's biography:

Dr. Jamie Stephen is the Managing Director of TorchLight Bioresources, a bio-strategy consulting and project management firm based in Ottawa, Canada. He has managed bioenergy and cleantech projects for a broad variety of clients including national and provincial governments, utilities, airlines, vehicle manufacturers, oil producers, investment funds, aboriginal groups, and technology developers. Projects have focused on industrial growth strategies, facility feasibility, technology deployment hurdles, and policy design. He has provided investment advisory and due diligence services to both public and private sector cleantech funds. Jamie holds a Ph.D. in biofuel/bioenergy techno-economics and a Master's in Chemical Engineering from the University of British Columbia.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

J.D. Stephen, Queen's University, Kingston, CANADA
W.E. Mabee, Queen's University, Kingston, CANADA
A. Pribowo, Indonesia International Institute for Life Sciences, Jakarta, INDONESIA
S. Pledger, University of British Columbia, Vancouver, CANADA
R. Hart, Nuxalk Development Corporation, Bella Coola, CANADA
S. Tallio, Nuxalk Development Corporation, Bella Coola, CANADA
G.Q. Bull, University of British Columbia, Vancouver, CANADA

Session reference: IDV.3.55
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

IEA Bioenergy: Policies and Status of Implementation

Short introductive summary:

Globally, most countries meet their energy requirements primarily from fossil sources such as oil, gas and coal. Yet, many countries strive to diversify their energy sources and cut the share of fossil fuels. Strong national policies have proven to be effective, and the share of renewables has risen constantly between 2000 and 2010, with bioenergy largely contributing to this development.
22 countries from around the globe and the European Commission have joined the IEA Bioenergy Technology Collaboration Programme (TCP) to coordinate the work of national programmes across the wide range of bioenergy technologies. Most of these countries are among the largest net importers of crude oil and oil products, but also net exporters like Canada have joined IEA Bioenergy. In common they have policies in place supporting the development and deployment of bioenergy.
The policies, energy statistics and R&D efforts of these countries have been pulled together into one report, reflecting the current situation of bioenergy. The report provides insights into national drivers and policy measures, but also allows to compare different countries. The report is available from www.ieabioener

Presenter: **Dina BACOVSKY, Bioenergy 2020+, Wieselburg, AUSTRIA**

Presenter's biography:

Dina Bacovsky graduated from Vienna University of Technology with a Degree in Process Engineering. She is Head of the Unit Biofuels at BIOENERGY 2020+ and Secretary of the IEA Implementing Agreement on Advanced Motor Fuels. Also, she represents Austria in IEA Bioenergy Task 39 Commercialising Conventional and Advanced Liquid Biofuels from Biomass, where she holds responsible for databases and surveys. Her activities include research, consulting and information exchange on biofuels production and use. Dina Bacovsky has assessed oil and biodiesel quality from 30 different feedstocks, supported the harmonisation of GHG calculations for biofuels in the EUmonitored the development of advanced biofuels production facilities. Her worldwide overview on 2nd generation biofuels demonstration facilities has received much interest in the biofuels community. With her team she carries out research on algae cultivation and processing, and the Austrian Ministry of Transport, Innovation and Technology has tasked her to establish and maintain a network of researchers on microalgae cultivation and processing in Austria.

Biographies and Short introductive summaries are supplied directly by presenters and are published here unedited

Co-authors:

D. Bacovsky, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
C. Dissauer, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
M. Enigl, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
N. Ludwiczek, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
C. Pointner, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
A. Sonnleitner, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
V. Kumar Verma, Bioenergy 2020+, Wieselburg-Land, AUSTRIA
K. Kwant, Netherlands Enterprise Agency, Utrecht, THE NETHERLANDS
L. Pelkmans, IEA Bioenergy, Antwerp, BELGIUM

Session reference: IDV.3.58
Subtopic: 6.5 Policy
Topic: 6. INDUSTRY SESSIONS

International Scientific Advisory Committee (ISAC)

Chair:
Dr. Piotr Szymanski
European Commission, Joint Research Centre, Director of Energy, Transport and Climate

Dr. Nicolae Scarlat
European Commission, Joint Research Centre, Directorate for Energy, Transport and Climate

Dr. David Baxter
Former European Commission, Joint Research Centre

David Chiaramonti
President, Renewable Energy Consortium for Research and Demonstration RE-CORD

Dr. Paolo Frankl
Head of the Renewable Energy Division, International Energy Agency

Uwe R. Fritsche
Scientific Director IINAS - International Institute for Sustainability Analysis and Strategy
National team leader for Germany within IEA Bioenergy Task 40

Bernd Krautkremer
Fraunhofer Institute IWES, Head of Bioenergy System Technology

Géraldine Kutas
Head of International Affairs and Senior International Adviser to the President of UNICA

Kees Kwant
NL Agency and Climate Change, Senior Expert Bioenergy

Kyriakos Maniatis
European Commission, DG ENER, Principal Administrator Unit C2

Calliope Panoutsou
Senior Research Fellow, Imperial College London, Faculty of Natural Sciences, Centre for Environmental Policy

Michael Persson
Head of Secretariat of the Danish Bioenergy Association, Denmark

Yves Ryckmans
GDF-SUEZ Group, Laborelec-Sustainable Process Technologies, Chief Technology Officer Biomass

Angela Grassi
ETA-Florence Renewable Energies, Managing Director

Peter Helm
WIP - Renewable Energies, Scientific & Managing Director

25th EUBCE Executive Committee

Technical Programme Chairman
Dr. Nicolae Scarlat
European Commission, Joint Research Centre, Directorate for Energy, Transport and Climate

Dr. David Baxter
Former European Commission, Joint Research Centre

Prof. Wim Van Swaaij
University of Twente, Enschede, The Netherlands

David Chiaramonti
President, Renewable Energy Consortium for Research and Demonstration RE-CORD

Angela Grassi
ETA-Florence Renewable Energies, Managing Director

Peter Helm
WIP - Renewable Energies, Scientific & Managing Director

Linneborn Prize Committee

Chair:
Wim P.M. van Swaaij, University of Twente, Enschede, The Netherlands

Anthony V. Bridgwater, Aston University, Birmingham, United Kingdom

Philippe Chartier, Syndicat des Energies Renouvables, Paris, France

Andrè Faaij, Academic Director of the Energy Academy Europe, Distinguished Professor of Energy System Analysis, University Groningen

Giuliano Grassi, EUBIA - European Biomass Industry Association, Brussels, Belgium

Hermann Hofbauer, Vienna University of Technology, Austria

Brian M. Jenkins, University of California, Davis, USA

Spyros Kyritsis, Agricultural University of Athens, Greece

Kyriakos Maniatis, European Commission, DG ENER, Brussels, Belgium

José Roberto Moreira, CENBIO - Brazilian Reference Center of Biomass, São Paulo, Brazil

Ralph Overend, Biomass and Bioenergy, Ottawa, Canada

Wolfgang Palz, WCRE, Brussels, Belgium

Dr. John (Jack) Saddler, Professor of Forest Products Biotechnology/Bioenergy and former Dean, Faculty of Forestry at the University of British Columbia

Kai Sipilä, VTT Technical Research Centre of Finland

Liisa Viikari, University of Helsinki, Finland

Yuan Zhenhong, Guangzhou Institute of Energy Conversion, Chinese Academy of Sciences, China

Angela Grassi, ETA-Florence Renewable Energies, Florence, Italy

Peter Helm, WIP - Renewable Energies, Munich, Germany

Scientific Committee

Topic Organisers

Stefano Amaducci, Catholic University of the Sacred Heart, Italy
Andreas Apfelbacher, Fraunhofer UMSICHT, Germany
Marco Baratieri, Free University of Bozen-Bolzano, Italy
Lone Berg Frederiksen, Danish Technological Institute, Denmark
Göran Berndes, Chalmers University of Technology, Sweden
Eric Billig, UFZ, Germany
Markus Bolhàr-Nordenkampf, Valmet GesmbH, Austria
Juan Esteban Carrasco, IEMAT, Spain
Jean-Francois Dallemand, European Commission Joint Research Centre
Wiebren De Jong, Delft University of Technology, The Netherlands
Rocio Araceli Diaz-Chavez, Imperial College London, United Kingdom
Bernhard Drosg, Bioenergy2020+, AT;
Mathieu Dumont, Netherlands Enterprise Agency, The Netherlands
Andrè Faaij, Groningen University, The Netherlands
Ana Luisa Fernando, Universidade Nova de Lisboa, Portugal
Uwe Fritsche, IINAS, Germany
Maria Georgiadou, European Commission DG Research & Innovation
Jens Bo Holm-Nielsen, Aalborg University, Denmark
Ursel Hornung, Karlsruhe Institute of Technology, Germany
Birger Kerckow, FNR - Agency for Renewable Resources, Germany
Sascha Kersten, University of Twente, The Netherlands
Jaap Kiel, ECN, The Netherlands
Peter Kuikman, Alterra Wageningen UR, The Netherlands
Kees Kwant, Netherlands Enterprise Agency, The Netherlands
Jan Lindstedt, J Lindstedt LINDAB, Sweden
Alexa Lutzenberger, Leuphana Universität Lüneburg, Germany
Silvia Maltagliati, European Commission DG Research & Innovation
Andrea Monti, University of Bologna, Italy
Solange Mussatto, Technical University of Denmark, Denmark
Anders Nordin, Umeå University, Sweden
Ingwald Obernberger, Graz University of Technology, Austria
Markku Paananen, JAMK University of Applied Sciences, Finland
Calliope Panoutsou, Imperial College London, United Kingdom
Luc Pelkmans, VITO, Belgium
Wolter Prins, University of Ghent, Belgium
Tapio Ranta, Lappeenranta University of Technology, Finland
Lasse Rosendahl, Aalborg University,Denmark
Kay Schaubach, DBFZ,Germany
Dimitrios Sidiras, University of Piraeus, Greece
Jeffrey Skeer, IRENA-International Renewable Energy Agency, Germany
Raphael Slade, Imperial College London, United Kingdom
Patricia Thornley, University of Manchester,United Kingdom
Daniela Thrän, UFZ, DBFZ, Germany
Floor Van der Hilst, Utrecht University, The Netherlands
Rene van Ree, Wageningen University and Research, The Netherlands
W.P.M. Van Swaaij, University of Twente, The Netherlands
Frédéric Vogel, Paul Scherrer Institut, Switzerlan

Paper Review Experts

Nicolas Abatzoglou, Université de Sherbrooke, Canada
Alessandro Agostini, ENEA, Italy
Efthimia Alexopoulou, CRES, Greece
Andrés Anca-Couce, Graz University of Technology, Austria
Antti Arasto, VTT, Finland
Pol Arranz-Piera, Universitat Politecnica de Catalunya, Spain
Donatella Barisano, ENEA, Italy
Tanja Barth, Univerity of Bergen, Norway
Michael Becidan, SINTEF Energy Research, Norway
Marisol Berti, North Dakota State University, USA
Stella Bezergianni, Centre for Research & Technology Hellas, Greece
Guido Bezzi, CIB Consorzio Italiano Biogas, Italy
Serge Biollaz, Paul Scherrer Institut, Switzerland
Torsten Birth, Fraunhofer Institute IFF, Germany
Chiara Boscagli, Karlsruhe Institute of Technology, Germany
Nikolaos Boukis, Karlsruhe Institute of Technology, Germany
Miguel Brandão, KTH-IEA Bioenergy Task 38, Sweden
Dieter Bryniok, Fraunhofer Institute IGB, Germany
Marco Buffi, CREAR/RE-CORD, Italy
Enrico Ceotto, CREA, Italy
Myrsini Christou, Center for Renewable Energy Sources, Greece
Maurizio Cocchi, ETA-Florence, Italy
Marco Colangeli, FAO/GBEP, Italy
Maria Dolores Curt, Universidad Politécnica de Madrid, Spain
Srinivasiah Dasappa, Indian Institute of Science, India
Patrick De Jamblinne, Tuzetka, Belgium
Ferran De Miguel Mercader, Scion, New Zealand
Capucine Dupont, CEA, France
Berien Elbersen, Wageningen University and Research, The Netherlands
Wolter Elbersen, Wageningen University and Research, The Netherlands
Gianni Facciotto, ENTECRA, Italy
Emilio Font de Mora, European Commission - INEA
Matthias Franke, Fraunhofer Institute UMSICHT, Germany
Benoit Gabrielle, INRA - AgroParisTech, France
Anli Geng, Ngee Ann Polytechnic, Singapore
Jacopo Giuntoli, European Commission - Joint Research Centre
Mike Gould, Texas A&M University, USA
Giuliano Grassi, EUBIA, Belgium
Ruben Guisson, VITO, Belgium
Leif Gustavsson, Linnaeus University, Sweden
Julia Hansson, IVL, Sweden
Evert Jan Hengeveld, Hanze University of Applied Sciences, The Netherlands
Wouter Huijgen, ECN, The Netherlands
Ioana Ionel, Universitatea POLITEHNICA Timisoara, Romania
Rainer Janssen, WIP - Renewable Energies, Germany
Bryan Jenkins, University of California at Davis, USA
Gerfried Jungmeier, Joanneum Research Centre, Austria

Sotirios Karellas, National Technical University of Athens,Greece
Oli-Jussi Korpinen, Lappeenranta University of Technology, Finland
Bernd Krautkremer, Fraunhofer Institute IWES, Germany
Matthias Kuba, Bioenergy 2020+, Austria
Vladimir Kuprianov, Thammasat University, Thailand
Carmen Lago Rodriguez, IEMAT, Spain
Mika Laihanen, Lappeenranta University of Technology, Finland
Jean Michael Lavoie, Sherbrooke University, Canada
Elmer Ledesma, University of St. Thomas, USA
Jan Peter Lesschen, Wageningen University and Research, The Netherlands
Stefan Majer, DBFZ, Germany
Emiliano Maletta, CIEMAT, Spain
Luisa Marelli, European Commission - Joint Research Centre
Carlos Martin Medina, Umeå University, Sweden
Sanette Marx, North-West University, South Africa
Yukihiko Matsumura, University of Hiroshima, Japan
Jean Bernard Michel, University of Applied Sciences Western Switzerland, Switzerland
York Neubauer, TU Berlin, Germany
Timothee Nocquet, Leroux & Lotz Technologies, France
Werner Ortinger, Bavarian Ministry of Agriculture & Forestry, Germany
Ralph Overend, Nextfuels Biomass and Bioenergy, Canada
Vance Owens, South Dakota State University, USA
George Papadakis, Agricultural University of Athens, Greece
Luigi Pari, CRA-ING, Italy
Christoph Pfeifer, University of Natural Resources and Life Sciences, Austria
Paolo Pizziol, European Commission - Joint Research Centre
Elisabeth Poncelet, Direction Economie Circulaire et Déchet, France
Mingyu Qian, China University of Petroleum, PRC
Stefania Rocca, European Commission - Joint Research Centre
Mirjam Roeder, Tyndall Center for Climate Change Research, United Kingdom
Lamparelli Rubens, NIPE/UNICAMP, Brasil
Dominik Rutz, WIP - Renewable Energies, Germany
Changkook Ryu, Sungkyunkwan University, South Korea
Jhuma Sadhukhan, University of Surrey, United Kingdom
Andrea Salimbeni, EUBIA, Belgium
Arturo Sanchez Carmona, Centro Investigacion Estudios Avanzados, Mexico
Corneels Schabort, North-West University, South Africa
Robert Scharler, Graz University of Technology, Austria
Tim Schulzke, Fraunhofer Institute UMSICHT, Germany
Neeta Sharma, ENEA, Italy
Øyvind Skreiberg, SINTEF Energy Research, Norway
Don J. Stevens, Cascade Research, USA
Theocharis Tsoutsos, Technical University of Crete,Greece
Scott Turn, University of Hawaii,USA
Liang Wang, SINTEF, Norway
Carly Whittaker, Rothamsted Research, United Kingdom
Birka Wicke, Utrecht University, The Netherlands
Michael Wild, Wild&Partner LLC, Austria

Industry Committee

Vann Bush, GTI, USA
Nathalie Devriendt, VITO, Belgium
Björn Fredriksson Möller, E.ON Gasification, Sweden
Jaap Koppejan, Procede NV, The Netherlands
Edmund Langer, C.A.R.M.E.N. e.V., Germany
Sari Mannonen, UPM, Finland
Thomas Nussbauer, Verenum Zurich, Switzerland
Michael Persson, Danish Bioenergy Association, Denmark
Stefan Ruyters, Ghent Bio-Economy Valley
Yves Ryckmans, Laborelec, Belgium
Bert Van de Beld, BTG Biomass Technology Group, The Netherlands
Arthur Wellinger, EBA/IEA Bioenergy, Belgium