European Commission

JRC CONFERENCE AND WORKSHOP REPORTS

Getting (some) numbers right – derived economic indicators for the bioeconomy

Proceedings of a side-event at the EUBCE, Copenhagen, 15 May 2018

Based on presentations by:

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2018

Joint Research Centre

EUR 29353 EN

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JRC Science Hub
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JRC113252

EUR 29353 EN

PDF ISBN 978-92-79-93907-5 ISSN 1831-9424 doi:10.2760/2037

Luxembourg: Publications Office of the European Union, 2018

How to cite this report: M'barek, R.; Parisi, C.; Ronzon, T. (editors), *Getting (some) numbers right – derived economic indicators for the bioeconomy*, EUR 29353 EN, Publications Office of the European Union, Luxembourg, 2018, ISBN 978-92-79-93907-5, doi:10.2760/2037, JRC113252.

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Acknowledgements

The editors would like to acknowledge the contributions made by all participants to the side event, including their presentations, their consent to share their knowledge and ideas, and their availability to revise the text of these proceedings.

We thank the organisers of the 26th European Biomass Conference & Exhibition 2018 in Copenhagen, in particular Nicolae Scarlat, Technical Programme Chairman, and Stefano Capaccioli, Project Dissemination Team.

The proceedings are based on presentations and written contributions by M'barek, R.; Calikowski, T.; Lier, M.; Kovacs, B.; Ronzon, T.; Martti, A.; Iost, S.; Kwant, K.; Lansac, R.; Dollet, E.; Jurga, P.; Parisi, C.; Spekreijse, J.

The report was edited by M'barek, R.; Parisi, C.; Ronzon, T.

1 EU bioeconomy and the need for socioeconomic indicators

1.1 Background of workshop

Based on presentation by Robert M'barek, Researcher from European Commission, JRC, Sustainable Resource department, Spain

Europe's Bioeconomy Strategy is currently being updated and the related roadmap, published in 2018, stresses the need for better monitoring and assessment frameworks, in particular providing SMART (Specific, Measurable, Attainable, Relevant and Timely) indicators across relevant sectors.

Many bioeconomy documents refer to turnover and job numbers, see for example JRC Research Brief and Nova institute.

The workshop gathered experts in the field to discuss and compare key socio-economic indicators.

The first part of the workshop investigated the main growth and job indicators for the EU and Member States with views from different countries and stakeholders. The diversity of experiences was sought to help refining methodologies and estimations. The second part investigated economic indicators of the emerging sector of bio-based chemicals.

This side-event brought together policy officers from national and EU administrations, researchers, and sector experts to scrutinise the socioeconomic indicators we use on a daily basis. Do we have a realistic picture of today's bioeconomy in Europe? Are we using the right indicators with the correct data? What are the avenues to improve in the short-term?

1.2 State of play of the European Bioeconomy

Based on presentation by Tomasz Calikowski, Policy officer at the EC, Research and Innovation, Directorate for Bioeconomy, Brussels

The European definition of the bioeconomy is: the sustainable production and conversion of renewable biological resources and waste streams into value-added products such as food, feed, bioenergy and bio-based products.

The bioeconomy is complex and multi-layered; therefore has various meanings for its diverse stakeholders. A specific characteristic is that the bioeconomy is driven by technologies and disruptive innovations: green, microbial, industrial, bio-based and digital.

The overall challenge can be summarised as doing more with less, i.e. using better what we already use, turning waste into something that is used and using what we don’t use yet. As such, a sustainable bioeconomy has to deliver on five objectives:

1) ensuring food security,

2) sustainable management of natural resources

3) climate change adaptation / mitigation

4) reduced dependency on fossil-resources

5) job creation and EU competitiveness.

Whereas the current Bioeconomy strategy is still valid, it needs to be updated with circularity concepts, stronger protection of biodiversity, environment and natural capital, and a stronger focus on impact evaluation.

The 2018 Bioeconomy Strategy aims to move from aspiration to realization, roll-out a few but impactful actions, and support Europe as number one bioeconomy leader. It should provide a hard-wire circularity, sustainable production & consumption (consumer demand + behaviour key).

Through open possibilities for new sectors and value-chains, it should boost competitiveness – also in traditional value chains – and localize bioeconomies: regional-urban-rural-coastal, as such provide opportunities for social and economic development in Europe.

Therefore, specific actions are foreseen on Strategic research and innovation to support this transition, Education and training for a skilled workforce, Strengthen the bio-based sectors, Mobilising investments, Creation of new markets and value chains, Monitoring progress, Exploiting the opportunities at local level, Protecting and restoring natural resources on land and sea.

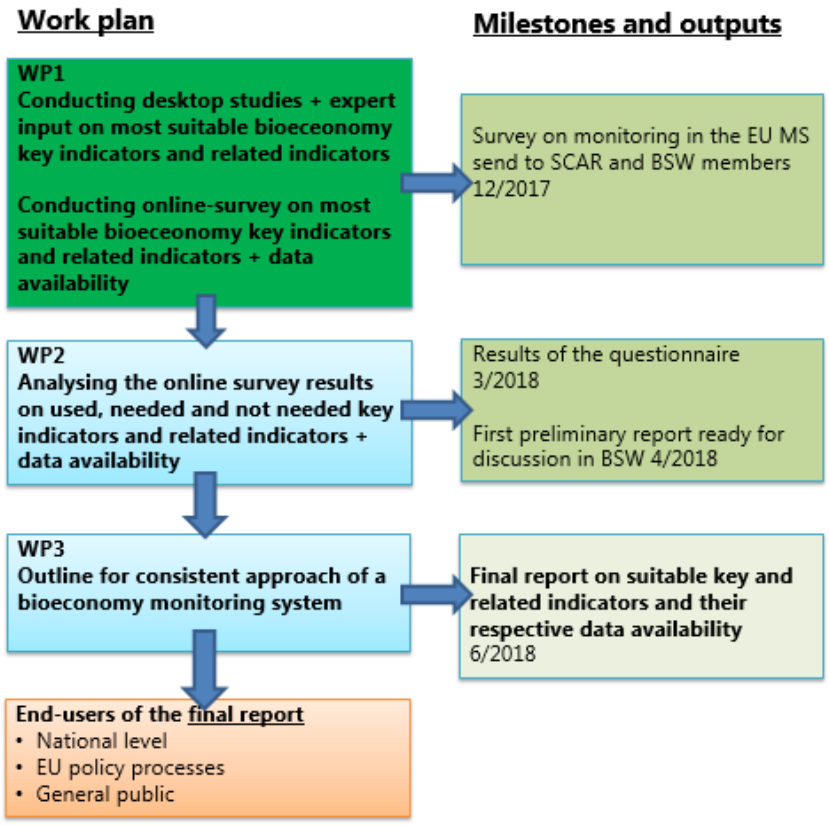
The next steps foresee the adoption of the updated Bioeconomy strategy in autumn 2018, presented during a high-level conference on 22nd of October 2018 under the Austrian presidency.

1.3 Key economic indicators from an EU perspective

Based on presentation by Markus Lier, Researcher at the Natural Resources Institute, Finland (Luke); Coordinator for MontBioeco (Synthesis on bioeconomy monitoring systems in the EU Member States. Key indicators and related indicators for monitoring bioeconomy) project

Under the lead of Luke, a 6 months project (MontBieco) on the bioeconomy monitoring systems in the EU MS started in October 2017, financed by the SCAR Bioeconomy Strategic Working Group, CASA, the Ministry of Agriculture and Forestry Finland and Luke. Preliminary results are presented in the following. According to Lier, the discussions on a future bioeconomy provide a good framework for different sectors starting to work together and create connections. The MontBioeco project is composed out of 3 work packages.

Figure 1: Work plan, milestones and output of MontBioeco.



In the context of the EUBCE workshop in particular WP1 is of relevance, as it provides survey results on the current monitoring actions in EU MS and a list of most suitable key indicators and related indicators, and respectively data availability. In a first step, a compilation of key indicators and related indicators resulted in 200 suitable indicators identified by EU MS in an online-survey. The economic indicators cover the main sectors in the bioeconomy, however show also some sectors only included in some countries, such as construction and nature tourism.

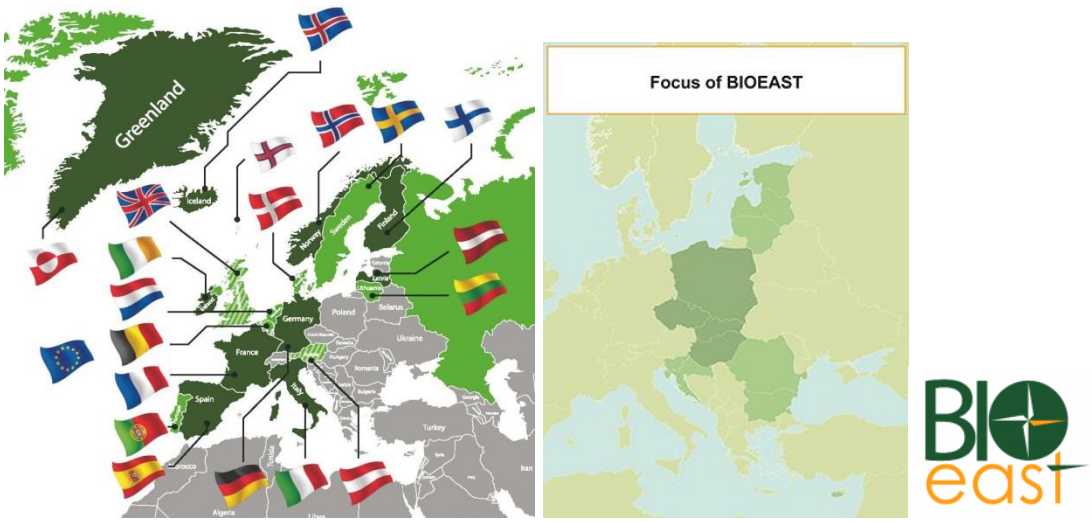
In particular, the most suitable draft key indicators and related indicators were presented at the EUBCE workshop, together with the data availability in relation to the EU Bioeconomy Strategy (version 2012) **Creating jobs and maintaining competitiveness**. The final MontBioeco report will be available in 6/2018.

1.4 Data requirements of the BIOEAST Initiative

Based on presentation by Barna Kovacs, Secretary of the BIOEAST initiative, Hungary

The Central and Eastern European countries have not yet established Bioeconomy strategies.

Figure 2: Bioeconomy strategies in Europe and BIOEAST initiative



Source: GBR 2018

Also, bioeconomy data in the Central and Eastern European countries is much scarcer than in the Western EU countries. It should be noted, that missing data does not mean the non-existence of bioeconomy activities. As a main obstacle to improve data availability, but also participation for example in H2020 programs (with the share for the Eastern MS in 2016 and 2017 below 10% of the H2020 funds), is the limited cross-sectorial collaboration at ministry level and consequently the implementation of a strategy.

First steps have been made in this direction. On 26th October 2016 a common declaration of the MINISTERS OF AGRICULTURE OF THE VISEGRAD 4 COUNTRIES (V4: Czech Republic, Hungary, Poland, Slovakia) and Bulgaria, Romania, Slovenia was released: for the stronger inclusion of the research potential of the Central and Eastern European countries into the implementation of projects within the EU Research Framework Programme Horizon2020 in the field of agriculture in the bioeconomy.

On 21st September 2017: common declaration of the MINISTERS OF AGRICULTURE OF THE VISEGRAD 4 COUNTRIES and Bulgaria, Croatia, Romania, Slovenia on broadening

the remit of the BIOEAST initiative beyond HORIZON2020. In the context of global challenges and related research and innovation gaps, it had become clear that a cross-sectorial research and innovation initiative was needed to develop a deeper cooperation for an evidence-based policy making.

With these declarations the development of the macro-regional governmental level cooperation between the 10 countries Bulgaria, Czech Republic, Croatia, Estonia, Lithuania, Hungary, Poland, Romania, Slovakia and Slovenia has been institutionalized. A roadmap has been published in 2017, a Vision is to be released in 2018, and a Strategic Research and Innovation Agenda is envisaged.

Figure 3: Intervention logic of the BIOEAST Vision

Challenges What is hindering?	Scope Where to focus?	Goal What is the aim?	Level Where to act?	Objectives How to overcome?	Actions What to do? (To be developed in the SRIA)
C1. Research and Innovation deadlock C2. Stalemate in the bio-based value chains C3. Governance impasse C4. Societal indifference C5. Financial barriers	S1. Strategic thinking in bioeconomy S 2. Quality Food and Feed for Europe and for the World S 3. Industrial boost for rural areas	G1. Productivity: Sustainable increase of biomass production; G2. Sustainability: Developing biodiversity and biosecurity; G3. Resource efficiency: Circular and value-added use of the available biomass; G 2.2. Rural development: Increasing the viability and attractiveness of rural areas and society	L1. Macro-regional L2. National L3. Regional and local	O 1. To develop strategies; O 2. To cooperate and develop evidence-based policies; O 3. To identify common challenges and validate common research areas; O 4. To provide an evidence base; O 5. To improve skills; O 6. To develop synergies; O 7. To increase visibility;	Further develop specific objectives Develop BIOEAST SRIA Start to implement the action plan of BIOEAST SRIA based on the objectives

To map and to establish data-driven support for the development and implementation of policies through the creation of an interoperable, fully integrated observing and forecasting system the following issues have to be addressed:

- Data on the bioeconomy: size of the bioeconomy and its encompassing sectors
- Biomass availability and potential
- Performance indicators (e.g.: economic and employment indicators, innovation indicators, productivity indicators such as unit labour cost, indicators of socio-economic aspects)
- Model based assessment: policy scenarios, identifying trade-offs on future pathways
- Identification of macro-regional gaps or advantages comparing with other parts of Europe
- Identification and characteristics of key untapped (niche) sectors.

2 Socio-economic indicators at EU-28 and MS level

2.1 EU-28 and individual Member States

Based on presentation by Tévécia Ronzon, Researcher from European Commission, JRC, Sustainable Resource department, Spain

For the last three years, the JRC jointly with the nova-Institute for Ecology and Innovation[1] has been testing a methodology for the quantification of bioeconomy jobs and economic performance in the EU. The methodology meets the criteria of (i) being applicable to the different sectors of the bioeconomy, (ii) using harmonised data across EU Member States and (iii) permitting annual updates.

2.1.1 The scope of the bioeconomy is defined according to NACE sectors of activities boundaries

In the EU official communication setting a bioeconomy strategy (EU COM(2012) 60), the bioeconomy is defined as encompassing "the production of renewable biological resources and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products and bioenergy". Based on this definition, we define the bioeconomy as the sum of activity sectors producing biomass and using biomass as a feedstock.

Table 1 gives the correspondence between the activity sectors considered as part of the bioeconomy in JRC quantifications and the NACE revision 2 classification (the official classification of activity sectors in use in Europe). The JRC has currently no adequate data sources to estimate employment and economic performance in the sectors of bioconstruction (part of NACE codes F41-43) and of waste management and bio-remediation (part of NACE class E38 and E39). For that reason they are not included in Table 1 although they are part of the bioeconomy.

Table 1: NACE sectors considered fully or partially part of the bioeconomy.

NACE rev.2	Bioeconomy sector
A01	Agriculture
A02	Forestry
A03	Fishing and aquaculture
C10, C11, C12	Manufacture of food, beverages and tobacco
C13*, C14*, C15	Manufacture of bio-based textiles, wearing apparel and leather
C16, C31*	Manufacture of wood products and wooden furniture
C17	Manufacture of paper
C20*, C21*, C22*	Manufacture of bio-based chemicals, pharmaceuticals, plastics and rubber
D3511*	Production of bioelectricity

* hybrid sector.

2.1.2 Indicator focus on jobs, turnover, value added and derived indicators

"Creating jobs and maintaining European competitiveness" is one of the five societal challenges the European bioeconomy strategy tackles. In the same document, the contribution of the bioeconomy to overcome this challenge is measured in terms of

[1] www.nova-institute.eu

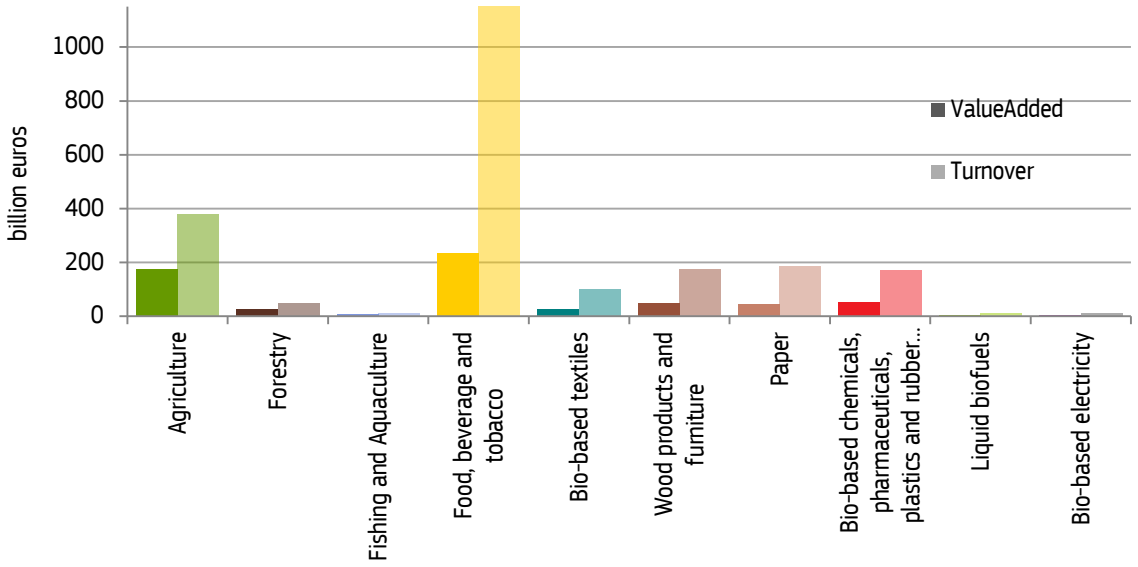
number of jobs and annual turnover. Thus, the JRC considered these two indicators as crucial for the monitoring of the socio-economic aspects of the bioeconomy.

Considering that the bioeconomy is viewed in this study as a sum of activity sectors, the JRC considered valuable to complement jobs and turnover indicators with value added. Indeed, compared to turnover, value added only values "the gross income" and therefore costs of production are not cumulated through each step of a value chain (e.g. when summing the economic performance of forestry and the manufacture of wood). Comparison between turnover and value added reflects the proportion of inputs (or high costs of bought-in goods and services, see Figure 4).

The three indicators are defined as follows:

- Jobs are measured with the number of people employed (code V16110 in EUROSTAT – Structural Business Statistics) is the total number of persons who work in the observation unit, as well as persons who work outside the unit who belong to it and are paid by it.
- The turnover (code V12110 in EUROSTAT – Structural Business Statistics) comprises the totals invoiced by the observation unit.
- The value added at factor cost (code V12150 in EUROSTAT – Structural Business Statistics) is the gross income from operating activities after adjusting for operating subsidies and indirect taxes.

Figure 4: Value added and Turnover in bioeconomy sectors (EU28, 2015)



Location quotients and apparent labour productivity are derived from the number of jobs and the value added. Location quotients are a measure of the specialisation of a specific sector (e.g. the bioeconomy) in a given country (see equation 1). The apparent labour productivity is the value added per person employed.

$$\mathrm{LQ}_{i,k,l} = \frac{\%\ \text{people employed}_{i,k,l}}{\%\ \text{people employed}_{i,EU28,l}} \qquad (1)$$

where:

- $\mathrm{LQ}_{i,k,l}$ is the location quotient of sector *i* (NACE Rev. 2), in EU Member State *k* and for year *l*;

- % people employed$_{i,k,l}$ is the proportion of people employed in sector *i* (the bioeconomy or a NACE Rev. 2 sector), in EU Member State *k* and for year *l*; and
- % people employed$_{i,EU\text{-}28,l}$ is the proportion of people employed in sector *i* (the bioeconomy or a NACE Rev. 2 sector), in the EU-28 and for year *l*.

2.1.3 The quantification of jobs, turnover and value added in bioeconomy sectors

Number of persons employed, turnover and value added of fully bio-based sectors (i.e. biomass producing sectors and sectors using mainly biomass as a feedstock) are reported by Eurostat. For these sector, the JRC only retrieve the data with no additional transformation other than filling missing data with the one of the following year. Because there is not a single Eurostat dataset reporting on the three indicators for all fully bio-based sectors, bioeconomy data are compiled from different sources. Table 2 presents the NACE rev. 2 sectors considered fully bio-based and the Eurostat dataset used by the JRC for the compilation of number of persons employed, turnover and value added data.

Table 2: Data sources used for the retrieving of number of persons employed, turnover and value added in fully bio-based sectors

Bioeconomy sector	NACE code	Number of persons employed	Turnover	Value added
Agriculture	A01	EUROSTAT – Labour Force Survey (lfsa_egan22d)	EUROSTAT – Economic accounts for agriculture (aact_eaa01)	EUROSTAT – National accounts (nama_10_a64)
Forestry	A02	EUROSTAT – Forestry Employment (for_emp_lfs)	EUROSTAT – Forestry economic accounts (for_eco_cp)	
Fishing	A03	STECF 2016 & 2014	STECF 2016 &2 014	
Manufacturing sectors	C10; C11; C12; C15; C16; C17	EUROSTAT – Structural Business Statistics (sbs_na_ind_r2)		

A different treatment is given to partially bio-based NACE rev. 2 sectors. For those sectors, the NACE classification does not differentiate bio-based and non bio-based activities and statistics report on the full sector. For example, C13 is defined as the manufacture of textiles. It mixes textiles made from "biomass fibres" (such as cotton, silk, wool) and textiles made from synthetic fibres.

Sectoral bio-based shares are determined for partially NACE bio-based sectors by:

1- Establishing the whole lists of products manufactured by NACE sectors thanks to the correspondence between activity sectors (NACE classification) and products (CPA 2015 classification)

2- Attributing a bio-based share to all products of the list. The estimation of product bio-based share results from a round of expert interviews conducted by the nova-Institute for Ecology and Innovation

3- Calculating the sectoral bio-based share as the proportion of bio-based products manufactured in one given sector in terms of production value (data from Eurostat – Prodcom).

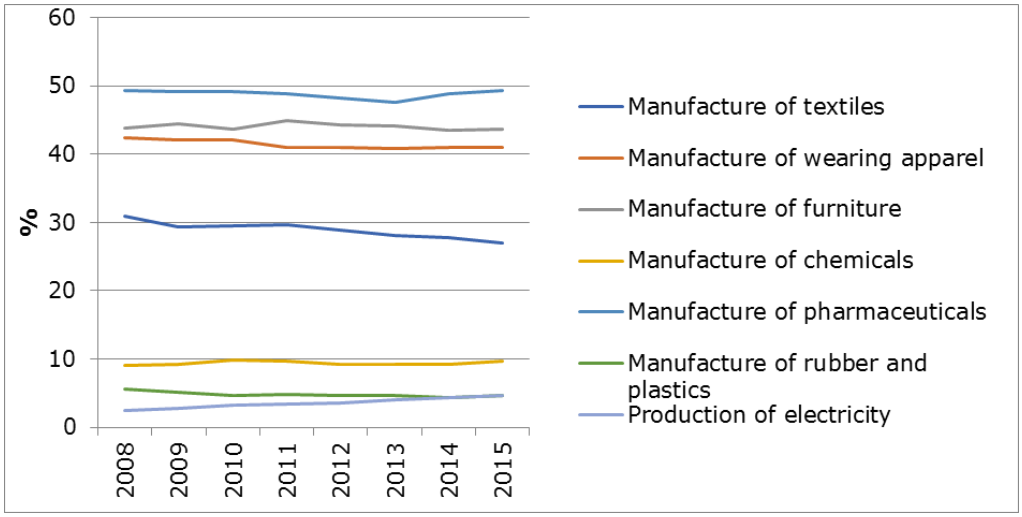
Once established at country and year level, sectoral bio-based shares are applied to Eurostat – Structural Business Statistics data.

2.1.4 Estimates of bioeconomy socio-economic indicators

The resulting estimates of number of persons employed, turnover and value added are accessible at: https://datam.jrc.ec.europa.eu/datam/perm/od/7d7d5481-2d02-4b36-8e79-697b04fa4278. Pre-visualisations of the data are accessible as interactive infographics at https://datam.jrc.ec.europa.eu/datam/mashup/BIOECONOMICS/index.html.

The 2008-2015 evolution of sectoral bio-based shares is presented in Figure 5 at the EU-28 level. No significant take-off can be observed in bioeconomy sectors at the EU level. The bio-based share of the production of electricity is the only one showing a clear upward trend over the period but it remains in a low range from 2.4% in 2008 to 4.7% in 2015. On the contrary, the bio-based share of the manufacture of textile shows a clear downward trend, from 31% in 2008 to 27%. Developments might be different at Member State level.

Figure 5: Evolution of sectoral bio-based shares in the EU (2008-2015)



2.1.5 Limitations of the methodology

The nova-JRC methodology has proved successful in delivering the first harmonised socio-economic data for the bioeconomy in the EU28 and Member States. Nevertheless, some improvements can be made to the current methodology.

First of all, the current scope discards bioeconomy sectors such as the bio-construction, waste management and bio-remediation. These sectors could be added to the scope provided sectoral bio-based shares are estimated, which is not currently the case. "Bioeconomy services" are also currently out of the scope in part due to a lack of clear definition. Is a 'bioeconomy service" a service that makes use of biomass (e.g. restauration and cooking food), or a service related to the production and transformation of biomass (e.g. research in bioeconomy fields), or a service related to biomass management (e.g. management of natural areas) or biodesign, or a mix of these?

Second, a time lag of minimum two years is associated with the data sources, not allowing a real time monitoring.

Also, some data inconstancies arise from the compilation of various data sources. There are cases of reported value added in the Fishery and aquaculture sector higher than their reported turnover.

Missing data are another issue. Data confidentiality and not reported data affect the completeness of our dataset and sometimes prevent any possibility of data cleaning. For example, only a few Member States publically report data for their production of electricity. At Member State level, a few sectors are populated for Cyprus, Malta and Luxembourg.

Finally, a large margin of uncertainty is associated with our estimation of sectoral bio-based shares and the resulting estimates have not to be taken as precise numbers. Also we made the strong assumption that bio-based shares are applicable to numbers of persons employed, turnover and value added. The same assumption is not relevant for other sectoral socio-economic indicators as the amount of investments, the enterprise size, the environmental footprint etc.

2.2 Finland

Based on the presentation by Markus Lier and Martti Aarne, Researchers at the Natural Resources Institute Finland

The strategic goals of the Finnish Bioeconomy Strategy, launched in 2014, are: 1) *A competitive operating environment for the bioeconomy, 2) New business from the bioeconomy, 3) A strong bioeconomy competence base, and 4) Accessibility and sustainability of biomasse*s. The quantitative objectives of the strategy are e.g. to push the bioeconomy output up to EUR 100 billion and to create 100,000 new jobs by the year 2025.

http://biotalous.fi/wp-ontent/uploads/2014/08/The_Finnish_Bioeconomy_Strategy_110620141.pdf

The preparation of the strategy (compiled by different ministries, as well as research organizations and other stakeholders representing the bioeconomy sector) also included a participative process, in which the public opinion was taken on board, by requesting online feedback. A set of indicators was set up to measure the progress in relation to the bioeconomy objectives. The indicators and key variables are the following:

Table 3: Key figures, indicators and data sources currently in the BE strategy

Key figure to be measured	Indicators	Data source
Growth of bioeconomy and its significance in the national economy	Bioeconomy output/value added / the number of persons employed and their share in the national economy	Statistics Finland
Added value produced for natural resource use	Raw material input/value added to raw material share	Finnish Environment Institute, Thule Institute, Statistics Finland
Environmental benefits from the bioeconomy	Raw material input used/greenhouse gas emissions avoided	Finnish Environment Institute Center, Thule Institute, Statistics Finland
Sustainability of the bioeconomy	Total use of natural resources/ growth and harvested volumes of standing timber, cereal crops, fish bag, endangered species, urban waste	Statistics Finland, Luonnontila.fi
Sustainability of the bioeconomy	Indicators to be developed for ecosystem services, environmental and resource efficiency as well as wealth and environmental assets	Statistics Finland

It is up to the Natural Resources Institute Finland (Luke) to publish annual calculations on the bioeconomy-related output, value added, number of people employed and investments by sector. In addition, exports of bioeconomy goods are reported. Time series information is available for the period 2010 to 2016, and preliminary figures for 2017 will be published in October 2018.

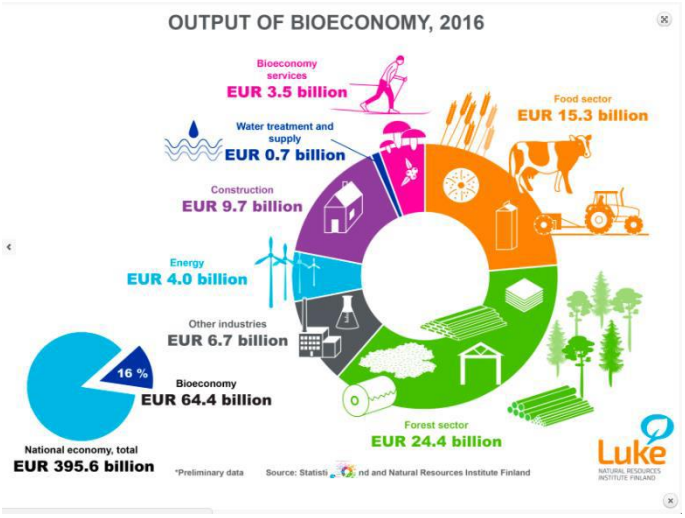
The scope of bioeconomy calculations is based on the national accounts framework provided by Statistics Finland. The information concerning the Finnish national economy is compliant with the global SNA2008 recommendation (*System of National Accounts*). The industrial division is based on the *Standard Industrial Classification* TOL 2008, which is compatible with the classification of economic activities in the European Union (NACE, Rev. 2). Those sectors defined as being part of the bioeconomy have been selected in their entirety for the calculations. In addition, the relative share of the bioeconomy has been estimated for some sectors using, alongside national accounts, other statistical

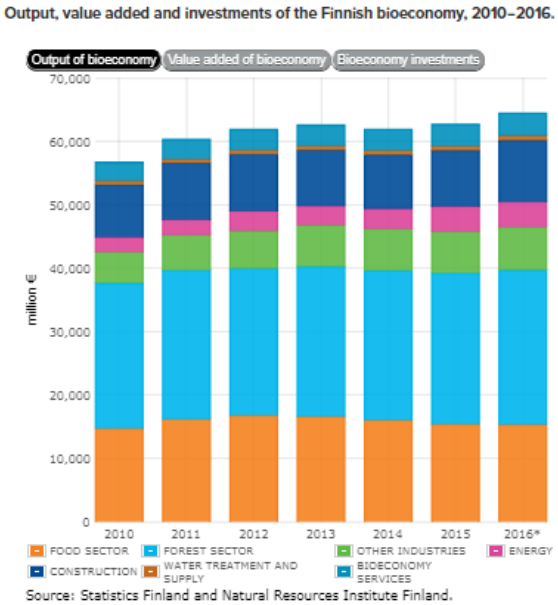
sources and expert opinions. The present calculations only take into account the direct effects generated by bioeconomy sectors.

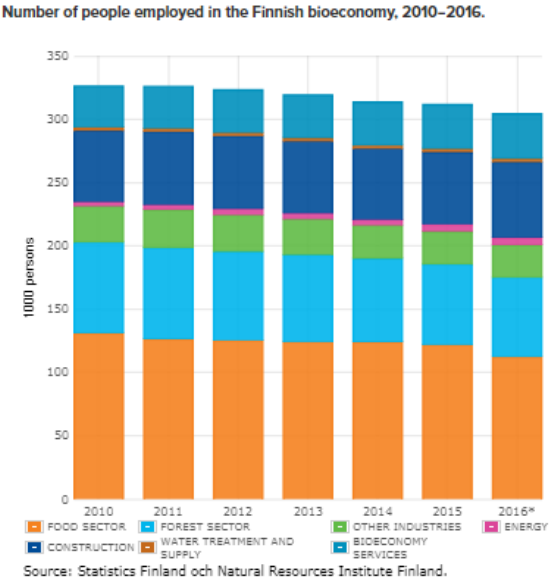
All calculations on the Finnish bioeconomy, together with background information and analyses, are available free of charge on the Luke's website:
https://www.luke.fi/en/natural-resources/calculations-finnish-bioeconomy/

Direct access to the Statistics database:
http://statdb.luke.fi/PXWeb/pxweb/en/LUKE/LUKE__10%20Muut__02%20Biotalouden%20tuotos/?rxid=d8d87dad-ebf2-4d0d-8b21-5fb0d9fa0db5

Figure 6: Output, value added, investments and jobs in the Finnish Bioeconomy







The indicators selected to national bioeconomy reporting are to a large extent similar as the ones established in the MontBioeco project, coordinated by Luke. While compiling national indicators, similar challenges of data availability were encountered as in JRC, especially for hybrid sectors. For example, based primarily on experts' estimates, the relative share of wood construction in Finland is estimated at 30% of the whole construction sector. Nature tourism and recreation, which are becoming increasingly important in the Nordic countries, are not classified as separate sectors in national accounts, causing severe difficulties for bioeconomy calculations. In several sectors, the reliability of the calculations needs to be improved.

In 2016, the bioeconomy made up 16% of the total output of, and of 12% of the value added to, the Finnish national economy. The forest industry has maintained its position as the main pillar of the bioeconomy, although higher growth percentages were achieved in other sectors, such as renewable energy production and the chemical industry.

2.3 Germany

Based on presentation Dr. Susanne Iost[1], Dr. Martin Banse[2], Natalia Geng[1], Dr. Dominik Jochem[1], Naemi Labonte[2], Dr. Jörg Schweinle, Dr. Sascha Weber[2], Dr. Holger Weimar[1]

[1]Thünen-Institute für International Forestry and Forest Economics

[2]Thünen-Institute for Market Analysis

The methodological setup of a Bioeconomy Monitoring in Germany is currently developed with focus on three different dimensions. Main focus of the project of Dimension 1 is to define material flows i.e. the resource base and to develop indicators to evaluate sustainability of bioeconomy. It is funded by the German ministry of nutrition and agriculture.[2] The estimations presented here are results of a thorough assessment of official statistics regarding their ability to provide data on material flows.

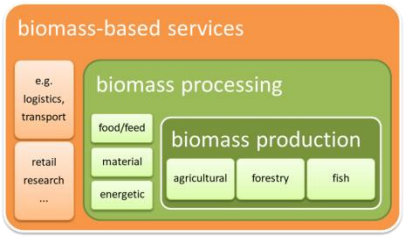
The bioeconomy in Germany is defined as follows:

Bioeconomy includes the **production** of **biomass**, **bio-based production** and **manufacturing** along the complete value chain as well as bio-based provision of **services**.

"Bio-based" refers to products that fully or partially (min. 10% of input quantity) consist of **renewable resources**. The use of bio-based products and product-related services encompasses (i) food and feed, (ii) material, and (iii) energetic use.

While **traditionally** (i) is attributed to bioeconomy, **stimuli for bioeconomy** are expected especially from material (ii) and energetic (iii) uses.

Besides **bio-based material flows**, the generation of **economic/monetary effects** through at least partial use/input of biomass attributes economic activity or product to bioeconomy. Production means and capital goods necessary for provision of bio-based products/goods are not included.



Biomass-based services are considered part of the bioeconomy. They include services to biomass processing and biomass production sectors. The fact that they cannot easily be represented in bio-based material flows makes it difficult to define their strict boundaries which are still under debate. Consequently, such services have been excluded from the presented quantification.

[2] https://www.thuenen.de/en/institutsuebergreifende-projekte/bio-economy-monitoring/

The following figure provides more details on the included sub-sectors and their bio-based shares.

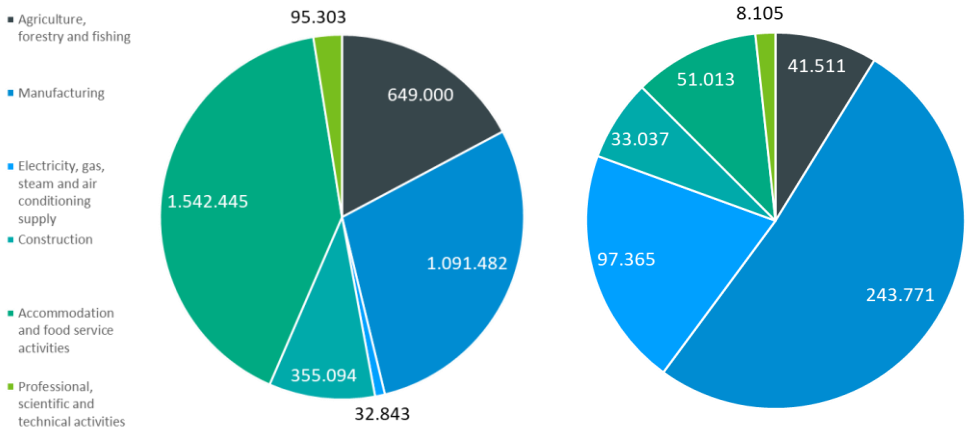
Figure 7: Description of sub-sectors and bio-based shares

NACE Code	Description	Bio-based share	Data Source
A (01, 02, 03)	Agriculture, Forestry, Fisheries	100%	
C	Manufacturing	Bio-based inputs of economic activities	Material and Goods Received Enquiry; Production Statistics
D	Electricity, gas, steam and air conditioning supply	Use of biomass related to all energy sources	Official data from environmental accounting
F	Construction		
41.20.1 & 41.20.2	Construction of residential and non-residential buildings	Wood construction share	Official data on construction permits
43.32.0 & 43.91.2	Joinery installation & Roofing activities	100%	
I (56.1 – 3)	Accommodation and food service activities	100%	
M	Professional, scientific and technical activities		
72.11.0	Research & experimental development on biotechnology	100%	
72.19.0	Other Research & experimental development on natural sciences and engineering	Expenses for natural and agricultural sciences	Official data on public sector expenses

Bio-based inputs to the economic activities of manufacturing (sector C) are determined using the official German Material and Goods received Enquiry. This enquiry lists inputs into economic activities. The bio-based shares of these inputs were estimated by using official production statistics. Single products of the least aggregated level were classified as fully, partly or non bio-based. For estimating the minimum bio-based shares of an activity, the production value of all fully bio-based product codes were summed up. To estimate maximum bio-based shares, fully and partly bio-based product categories were added up. Bio-based shares of economic activities were then applied to socioeconomic indicators of the manufacturing sector C. Bio-based shares of the other sectors listed in Figure 8 were calculated as explained in Figure 7.

Preliminary results show that the "Accommodation and food service activities" are the dominant sectors, in terms of turnover and jobs, respectively.

Figure 8: Sub-sectors of the Bioeconomy in Germany (2014), jobs (left) **and turnover** (right); continuation next page



Scope	Enterprises (no.)	Jobs (Mill.)	Added value (factor costs) (Mill. EUR)	Turnover (Mill. EUR)
Min all	389,552	3.77	122,629	474,802
Max all	396,238	3.96	135,977	520,185
Min 10% cutoff	387,606	3.69	116,386	451,817
Max 10% cutoff	390,948	3.74	119,468	462,902
DataM (2014)		**1.92**	**91,555**	**396,029**

The Thünen Institute's and the nova-JRC's approaches differ on three main aspects:

1- Differences in the definition of the bioeconomy. The Thünen Institute includes more NACE sectors than the JRC (see NACE C18 – Printings, NACE F – Construction, NACE I - Accommodation and food service activities and NACE M - Professional, scientific and technical activities in Figure 7).

2- Services are included in Thünen Institute's definition. As mentioned earlier the definition of biomass-based services is still under discussion within the project. Therefore, services have not yet been included in quantifying bioeconomy. The only exception to this rule is the inclusion of biotechnology research and research in bioeconomy fields.

3- The Thünen Institute's methodology does not rely on expert knowledge alone as in the nova-JRC's approach. Bio-based shares for manufacturing are derived from production statistics mainly. Shares of other sections are also derived from official statistics. Only in case of data gaps, secondary statistics, empirical studies and expert knowledge is applied.

Obviously, the use of different data sources can also be a source of difference in numbers. The Thünen Institute bases its calculation mainly on national statistics while nova-JRC uses Eurostat statistics. In particular, German statistics permits to differentiate construction activities according to "mainly used materials". This disaggregation is not available in Eurostat statistics but delivers crucial information at the time of differentiating bio-based from non bio-based construction activities. For sector M data on public expenses in public research was used to estimate its contribution to bioeconomy.

Methods and data of Thünen Institutes methodology will soon be described in further detail in a scientific publication.

2.4 The Netherlands

Based on presentation by Kees Kwant, Program advisor and responsible for the coordination of bio-based and bioenergy projects, Netherlands Enterprise Agency (RVO)

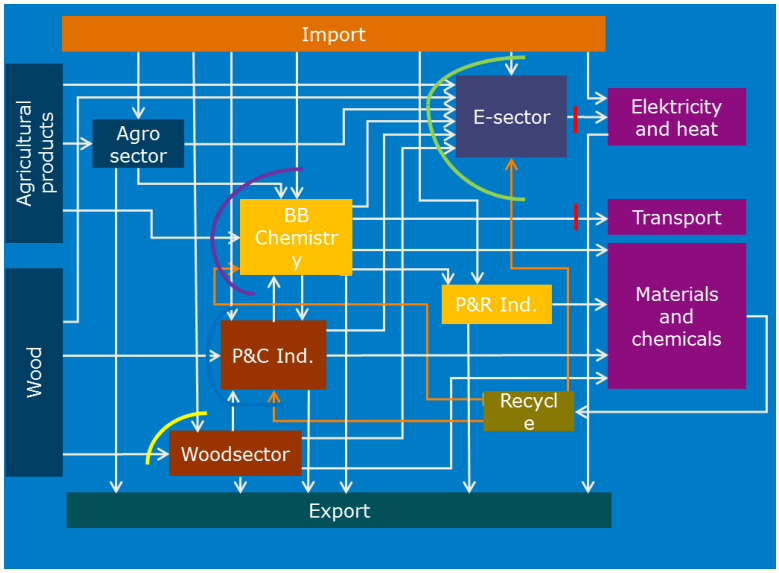
The RVO is working for the Ministry of Economic Affairs in the monitoring the bio-based economy, which is a subpart of the bioeconomy, not including food and feed sectors but only energy and material use. This difference in scope compared to other monitoring activities needs often to be clarified (also with SCAR) in order not to misinterpret numbers. Circular economy is also included in RVO's studies, being nicely linked to the bio-based economy. The aim is to collect data on both and integrate them.

In January 2018, the Netherlands published a strategic vision (transition agenda) for food and biomass, which includes new perspectives like circular economy and a different monitoring framework. One of the challenges is represented by the circularity factor, especially the recycling of biomass resources (a paper on monitoring of circular economy is forthcoming).

The monitoring framework includes two phases: the transition process (i.e. actions and the transition dynamic going on) and the effects.

RVO developed a protocol to monitor the bio-based economy based on the Renewable Energy protocol, in which all biomass flows are represented (with the exclusion of fisheries). The protocol aims to determine what we should change to make the society more sustainable and what effects it would cause.

Figure 9: Protocol for monitoring the bio-based material flows in the Netherlands, based on input bio-based raw materials measured for each sector



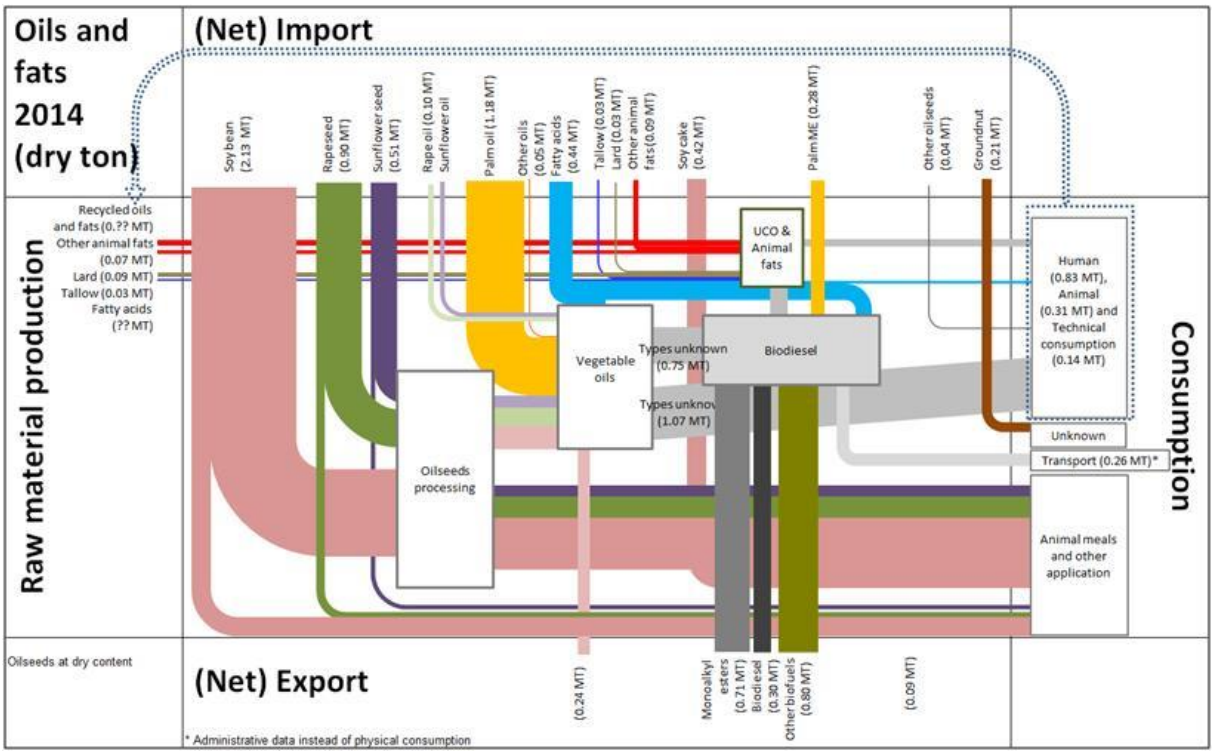
According to the monitoring activity, high amounts of feedstock biomass are imported to the Netherlands (e.g. soybean and cellulose), while other types of biomass are highly exported (e.g. tulips).

At regional level in the Netherlands, many institutes are active in the bio-based economy. Most projects are focused on applied R&D activities, which are on good track, while the market development seems to be lagging behind, although it is complex to measure.

The Netherlands government is trying to push the bio-based market development through green deals with stakeholders, including public procurements and specific business models, especially in energy and bio-based products. For monitoring purposes it is easier to measure these kind of actions than economic outcomes (like the indicators shown by the JRC), which might look stable and not reflect what is really going on.

According to the obtained results, biomass use in the Netherlands has increased by 3% per year from 2010 to 2014. The majority of biomass is used for energy purposes. Biofuels are produced in high amounts, which is a national achievement in the bioeconomy, and mainly exported. Regarding biomass flows, 2014 shows a big import of soybean and oilseeds.

Figure 10: Biomass flows description for oils and fats in 2014 in the Netherlands



Regarding economic indicators, one shot measurement was done in 2014 based on 2011 data from official statistics and included jobs and value added (direct and indirect). Bio-based chemicals were also included in the scope.

In 2017 RVO, CBS and CE Delft started with the development of a methodology to determine the bio-based material flows based on the statistical data in the CBS database. Conversion factors have been determined and for several sectors this has been executed. Though not completely covering all aspects, this method holds promising prospects for further development.

In conclusion, the methodology to measure the bio-based and the circular economy have been developed while no specific method is in place for the bioeconomy. There is in particular a need to develop a method to calculate greenhouse gas reduction for material use of biomass. A future involvement of RVO in a Horizon2020 project will help creating a platform to continue on these methodological developments.

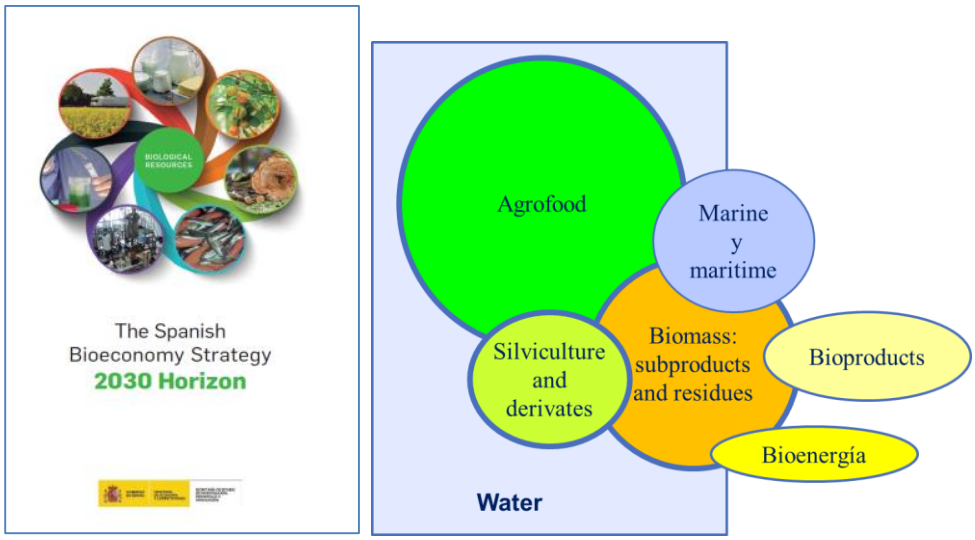
2.5 Spain

Based on presentation by Rocio Lansac, Coordinator of International Scientific Relations; National Institute of Agricultural and Food Research and Technology, Spain

The Spanish Bioeconomy Strategy was launched in 2015 by the Ministry of Economy and Competitiveness and the Ministry of Agriculture, Food and Environment.

The scope of the Spanish Bioeconomy Strategy is very similar to the European one.

Figure 11: Scope of the Spanish Bioeconomy Strategy



The national statistics show that in 2015, the bioeconomy provided 9% of the jobs (1.6 Mio) and had a turnover of 70.2 Bn €, which represents 6.5% of the GDP (Spanish National Statistics Institute (INE) / Spanish Observatory for Bioeconomy). In more detail:

Agro-Food Sector (5.59% GDP; 17% export sales):

- Processed food (2.97 GDP; 28,800 companies)
- Primary production (2.42 GDP; 890,000 farms)
- Fisheries (0.20 GDP; 5,025 entities)

Forestry Sector (0.60% GDP):

- Paper (0.34% GDP)
- Cork and Wood (0.18% GDP)
- Other (0.08% GDP)

Biotechnology & Biomass (0.34% GDP):

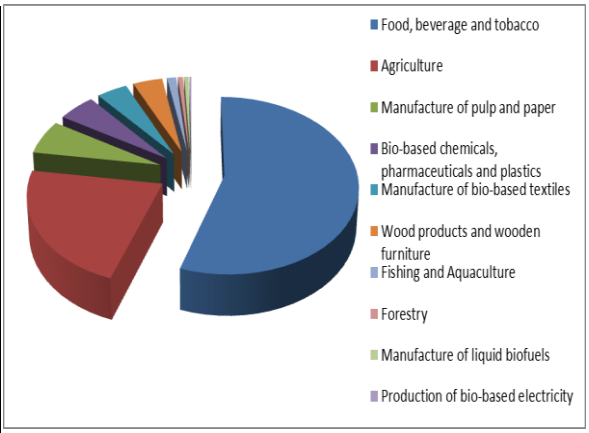
- 2,831 companies / Biotech (health not related)
- 176 companies / Biomass for Energy and more
- 47 companies / Biotech (health related)

The economically most important sector in Spain is the agro-food sector, which includes also fisheries. Interestingly, a further cluster is composed out of biotechnology (health and non-health related) and biomass.

The sub-sectorial indicators of the Spanish bioeconomy are retrieved from the Bioeconomy Knowledge Center (BKC) (Ronzon et al 2017), as shown in the following figures:

Figure 12: Economic importance of the subsectors of the bioeconomy in Spain, Source: BKC (2017)

Turnover (Spain, 2015)	Valor (M€)	%
Food, beverage and tobacco	109,646	55%
Agriculture	43,920	22%
Manufacture of pulp and paper	12,570	6%
Bio-based chemicals, pharmaceuticals and plastics	10,264	5%
Manufacture of bio-based textiles	8,391	4%
Wood products and wooden furniture	8,102	4%
Fishing and Aquaculture	2,498	1%
Forestry	1,344	1%
Manufacture of liquid biofuels	1,232	1%
Production of bio-based electricity	490	0%



value added (Spain, 2015)	Valor (M€)	%
Agriculture	24,759	43%
Food, beverage and tobacco	19,693	34%
Bio-based chemicals, pharmaceuticals and plastics	3,100	5%
Manufacture of pulp and paper	3,044	5%
Wood products and wooden furniture	2,288	4%
Manufacture of bio-based textiles	2,170	4%
Fishing and Aquaculture	1,415	2%
Forestry	1,092	2%
Manufacture of liquid biofuels	218	0%
Production of bio-based electricity	203	0%

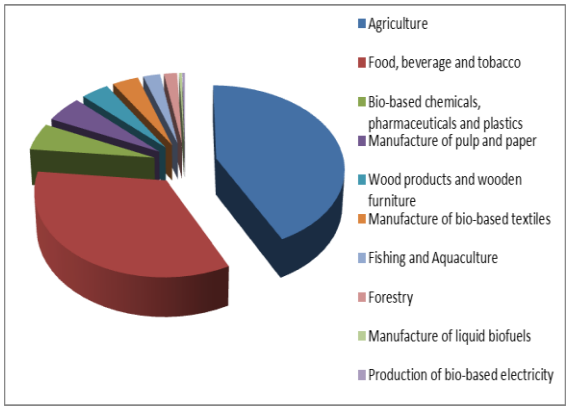
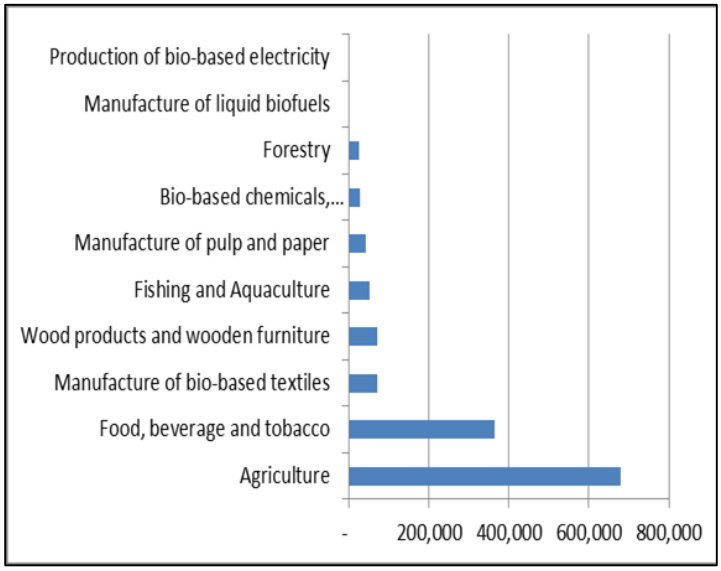


Figure 13: People employed by sectors of bioeconomy in Spain, Source: BKC (2017)

Jobs in Spain (2015)	Number	%
Agriculture	9,227,200	51%
Forestry	4,544,452	25%

Fishing and Aquaculture	1,407,184	8%
Food, beverage and tobacco	999,235	6%
Manufacture of bio-based textiles	643,104	4%
Wood products and wooden furniture	539,000	3%
Manufacture of pulp and paper	444,967	2%
Bio-based chemicals, pharmaceuticals and plastics	222,392	1%
Manufacture of liquid biofuels	26,271	0%
Production of bio-based electricity	13,844	0%



2.6 Industry viewpoint FoodDrinkEurope

Based on presentation by Evelyne Dollet, Director of Economic Affairs department, FoodDrinkEurope

FoodDrinkEurope represents the EU food and drink (f&d) industries. It has three categories of members: National Federations (25); EU sectoral associations (27) and large companies (21).

On a yearly basis, FoodDrinkEurope publishes the 'Data and Trends of the EU food and drink industry'. It provides a comprehensive picture of the entire f&d industry in the EU (and it is the only report to offer this focus on the f&d industry). It is aimed at getting clear and consistent data on the f&d industry. This brochure is the most downloaded one on FoodDrinkEurope website (2,104 times since October 2017).

Most of the data, in particular on the structure of the industry, are based on Eurostat database. Some other public sources such as UN COMTRADE and OECD are also used. JRC Research Brief also used Eurostat sources – Data are similar (see below in relation to the aggregation with tobacco)

Data covers codes 10 (food) and 11 (drinks) of NACE-Rev2.

Figure 14: The EU f&d industry as main contributor to the bioeconomy value chain (2015)

	Turnover (€ billion)	Value added (€ billion)	Employment (million)
Food and drink industry	1,115	230	4.21
Bioeconomy (JRC)	2,200	615	18
Share of f&d in bioeconomy	**51%**	**37%**	**23%**

Source: Eurostat

The EU f&d industry is the EU first manufacturing sector (13% of the EU manufacturing industry's value added), processes 70% of EU agricultural raw materials to food and drinks, and provides food and drink to 500 million consumers and to non-EU markets.

The contribution of the f&d industry and its role in the food chain needs to be better recognised and identified within the food chain (to be noted: f&d products are part of both DG Agri and DG Grow scopes - the so-called 'processed agricultural products' PAPs).

Data on the f&d industry should be completely separate from data on the tobacco industry:

- Specific data for tobacco are available in Eurostat database (code 12) whereas the f&d industry is covered by codes 10 and 11
- Products are totally different. Food and drinks are consumed (i.e. eaten and drunk)
- The structures of the industries are different, so the aggregation of data is misleading.

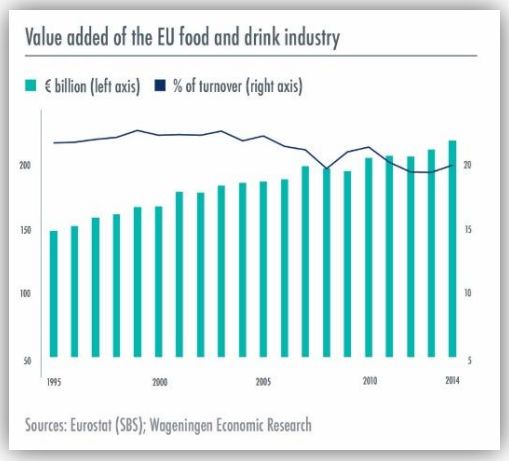
The only similarity is the fact that the tobacco industry is based on agricultural raw materials. But, this is not an argument, considering that all products of the bioeconomy are based on the processing of agricultural raw materials.

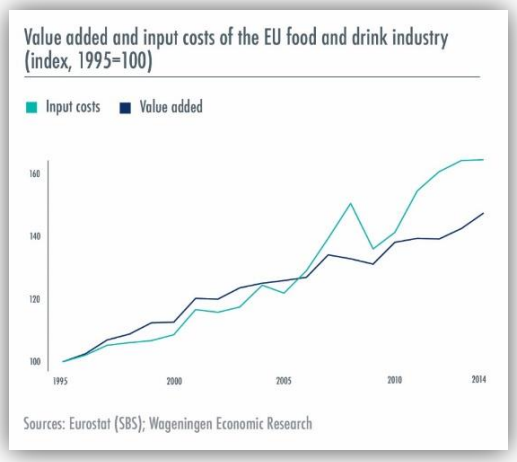
Input costs and value added

80% of the turnover is spent on input costs, or, in other words, input costs are 4 times higher than value added.

Between 2005 and 2014, value added has grown by 1.8% per year while input costs have grown by 3.4% per year. Value added is being outpaced by input costs.

Figure 15: Value added in the EU food and drink industry





2.7 Bioeconomy in Poland at Regional Level: Sectoral Impact Assessment Employing Input-Output Modelling.

Based on presentation by Piotr Jurga, BioEcon Project assistant (H2020), Institute of Soil Sciences and Plant Cultivation – State Research Institute, Poland

A tool that can identify with relevant accuracy the significance, interlinkages and impacts of a sector (such as bioeconomy) in an economy is Input-Output (I-O) analysis (see a case study on Ireland in Grealis & O'Donoghue, 2015). I-O and general equilibrium models offer a number of advantages compared to partial equilibrium analysis models. I-O models have the ability to examine the economy-wide effects of a sector and assess direct and indirect impacts due to exogenous changes. Thus, in order to examine the potential evolution and the role of bioeconomy in the Polish context, it is proposed to use I-O analysis. In order to do that, the bioeconomy sector(s), as they do not appear as separate sectors in the published I-O tables are identified and created, to weigh their importance separately and assess their direct and indirect impacts in the regional economy.

Activities related to the bioeconomy have an important regional dimension. Specific projects and voluntary actions and policy measures (such as incentives for bioenergy projects) are usually deployed within a region using biomass from the surrounding area. Bottom up and/or partial equilibrium models are often used to estimate their impacts, then, regional I-O models are required to identify the role of a sector at regional level and apply the above-mentioned analysis. I-O modelling is extensively used to estimate impacts of bioeconomy (Lehtonen & Okkonen, 2013) and especially bioenergy projects (Kulisic et al., 2007; Loizou et al., 2015) to an economy.

The problem usually faced in such cases is the non-existence of regional I-O tables, thus there is a need to construct a regional I-O table, a task that extensively appears in the international literature. The construction of a regional I-O table can be performed by applying a number of non-survey techniques. In the current case the GRIT technique (Generation of Regional Input-Output Tables) is used and was originally developed by Jensen et al., (1979). In Mattas et al. (2006) a modified version of the technique is developed and adopted. The GRIT technique is a partial survey hybrid technique that offers the user the ability to insert superior data for sectors with significance in the model. Thus a regional I-O table for the Polish Lubelskie region is being constructed using the National table and superior data (primary and secondary).

Another challenge is the identification and construction of the bioeconomy sectors in the regional I-O table, to study their importance and impacts in the local economy. Following I-O analysis principles, the non-existence of a sector requires its creation as a separate sector in the I-O table. This process of disaggregation is implemented in the current study to identify all bioeconomy sectors, following the techniques used in the literature (Miller and Blair, 2009; Mattas et al, 2005; Mattas et al, 2009; UN, 1999), with the assistance of the collection of primary and secondary (superior) data when considered necessary.

As soon as the bioeconomy sector(s) are identified and constructed, the new augmented I-O table forms a tool that can provide valuable information about the importance of the bioeconomy development in the economy. Using the I-O table and forming a model, the direct importance and interlinkages with other sectors in the economy can be quantified. Moreover, the I-O model has the ability to capture the indirect impacts throughout the whole economy (economy-wide impacts). This is done through mainly the calculation of the Leontief matrix and the various linkages coefficients (multipliers) and I-O elasticities. The calculation of the well-known I-O multipliers offers the ability to the user to identify the importance of investment projects or policy support measures to develop certain activities (biogas, biorefineries), in the economy under examination, and assess the impacts (direct and indirect) to all other sectors of the economy in terms of output,

household income and employment. Moreover, in the study an impact analysis is performed, employing various scenarios for the development of the bioeconomy, to capture in detail bioeconomy's interrelations. Such information may prove valuable for policy decision and strategies at the regional level.

3 Economic indicators of an emerging sector: bio-based chemicals

3.1 State of play of the bio-based industry

Based on presentation by Tomasz Calikowski, Policy officer at the EC, Research and Innovation, Directorate for Bioeconomy, Brussels

One critical point in the description of the bioeconomy is the determination of how much biomass is available and how much goes to different sectors. According to Cefic (European Chemical Industry Council), the share of raw renewable resources being used by the chemical industry is 10%, corresponding to 7.8 million tonnes per year. Projected market penetration of bio-based chemicals (pharmaceuticals excluded) in world chemical production shows that specialty and fine chemicals from raw renewable materials are expected to grow significantly (Source: IB 2025, BERR 2009).

COP21 calls for net zero emissions during 2nd half of 20th century, but "net zero emissions cannot be met by using fossil resources for materials" (OECD). Therefore, the substitution of fossil carbon is needed and thus the role of biomass is expected to be much stronger in the future, being the only source of renewable carbon present in vast quantities.

The service contract of DG-RTD called BIO-SPRI about Innovative bio-based products: Investment, Environmental Impacts and Future Perspectives is about to be finalised. A dedicated conference is taking place in Brussels on the 6th of June. The project is supposed to shed more light on the description of bio-based products and is composed by the following three tasks:

1. The Life Cycle Assessment (LCA) of 10 case studies including comparisons of bio-based with fossil based products.
2. 15 EU Commercial and Financial Success Stories, with insights on the bio-based sector and the investment potential it offers.
3. The top emerging 20 bio-based products with for highest potential for deployment in the short to medium term.

A forthcoming Horizon 2020 RIA project Biomonitor (Resulting from the topic BB-02-2017: Collection of statistical data on bio-based industries/products) is also expected to contribute a great deal to the monitoring of the bio-based sector. The project will start in June and lasts four years.

Finally, the Bio-Based Industries Joint Technology Initiative (BBI-JU) represents a key initiative of the EU Bioeconomy strategy related to market development. According to the mid-term evaluation of BBI-JU, most objectives are on track and the initiative is delivering by large on expectations. The evaluation was focused on key performance indicators including development of new value chains and new bio-based products and creation of new interconnections among different stakeholders, among others, while more specific indicators are more difficult to choose due to the very broad scope of the initiative. At the heart of the initiative we have the creation of new biorefineries, but several different sectors are involved.

3.2 Economic indicators of bio-based chemicals – preliminary results of a research study for EU-28

Based on a presentation by Claudia Parisi, Researcher from European Commission, JRC, Sustainable Resource department, Spain; and Jurjen Spekreijse, Consultant at Biomass Technology Group BV (BTG), Netherlands

As illustrated in the previous presentation by Tévécia Ronzon, the JRC is describing the status and evolution of the Bioeconomy and all its encompassing sectors. However, several obstacles are being encountered, especially related to data availability. This is particularly true in the case of the bio-based chemical sector. Due to the absence of official statistics on bio-based chemicals, the JRC dedicated specific studies on filling this data gap. A survey to EU companies producing bio-based chemicals and composites was conducted in 2015 and the outcome published in 2016 in a JRC report. The study represents an important first step in the description of this sector and allowed the description of trends, but unfortunately the survey response rate was not high enough to discover specific market indicators.

In 2017, the JRC launched a new study, of six months duration, with the objective to provide a detailed description of the EU bio-based chemical sector and its application markets. This study aims to better define its scope and value-chains, assess its dynamics, estimate its land footprint and analyse its potential development. The scope of the project is on bio-based chemicals, excluding food/feed applications, energy/fuels, pharmaceuticals and finished products derived from the analysed chemicals (e.g. a bottle derived from a bio-based polymer).

The study is performed by BTG (Biomass Technology Group), a consultancy group with 30 years' experience in biomass research.

The analysis of BTG is based on 10 categories of bio-based chemicals (based on NACE/CPA codes). For each category, a group of representative products (minimum three per category) have been selected, on which to base the market analysis. A total of 50 products have been chosen, based on four criteria: i) only products with TRL 8 or 9; ii) products covering a significant part of the market volume; iii) different chemical types (e.g. alcohols, acids) and different feedstock origin (e.g. sugar, veg. oil) and iv) in case of very diverse product categories, a range of representative products are chosen.

Economic indicators including production, turnover, price, consumption and trade, feedstock use and land use were collected for each product. Several sources of information were combined for data collection and each source was associated with an uncertainty indicator, to indicate the level of reliability of the information. Data from companies and trade organisations were classified with high reliability, followed by data from European statistics, market data suppliers and literature, by expert interviews and, finally, by BTG's own estimations in case of missing information.

According to data retrieved about production, it can be noted that the bio-based platform chemicals and solvents, which are generally produced in very large quantities, are not produced in such huge amounts in the EU. Whereas product categories that are closer to application such as cosmetics, surfactants and polymers for plastics do reach higher production numbers within the EU.

For the indicators consumption and trade, it is much more difficult to find publicly available reliable data, compared to production. A connection between production, consumption and trade was used to still enable realistic estimations. In terms of product categories, the largest data gaps can be found in the product categories surfactants, cosmetics and lubricants. The polymers used for plastics, solvents and plasticizers present the most complete data.

Feedstock use was determined by going up the value chain for each of the 50 products, including the intermediate products and conversion processes to establish the type and

amount of feedstock employed. The feedstock use is described in four main feedstock categories: sugar/starch, vegetable oil, wood and other, as within these categories feedstocks are to a large extent exchangeable. Land use was calculated based on average land use per feedstock. An allocation factor was applied in the calculation to take into account the actual amount of the feedstock unit that is used for the product (e.g. Glycerol is used to produce propylene glycol and typically represents 10% of the weight of the triglycerides in vegetable oil).

In conclusion, the European statistical information can rarely be used directly to obtain bio-based market data and the EU bio-based market is diverse with large differences between product categories. The overall bio-based market of chosen categories is still small and presents a bio-based share of 3%. The results of the BTG study will soon be published as JRC report.

3.3 Bio-based chemical sectors in Germany

Based on presentation by Susanne Iost, Researcher at the Thünen Institute of International Forestry and Forest Economics, Germany

Within its study for the monitoring of the bioeconomy in Germany, the Thünen Institute has compiled detailed data for the bio-based chemical sector (see Figure 16). Data is coming from questionnaires conducted every four years in Germany, causing a maximum time lag of four years. Current data proceed from the questionnaire 2014. A new round of questionnaire is being conducted this year and will feed next data update.

In the questionnaire, producers were asked the kind of raw material they use. Answers helped defining whether products on the German version of Prodcom (9 digit) were bio-based / partly bio-based / not bio-based and shares of production value were determined at 4 digits levels.

Following the same methodology as described in section 2.3, a minimum-maximum range is calculated for the quantification of jobs and turnover (see Figure 16).

Figure 16: Jobs and turnover generated by the German bio-based chemicals sector (2014)

Prodcom code	Description	Min	Max
20	Chemicals and chemical products	2.56	13.5*
201	Basic chemicals, fertilisers and nitrogen compunds, plastics in primary forms and synthetic rubber in primary forms	3.73	6.18
2011	Industrial gases	70.49	100.00
2012	Dyes and pigments	1.51	1.51
2013	Other inorganic basic chemicals	0.29	0.29
2014	Other organic basic chemicals	1.64	5.76
2015	Fertilisers and nitrogen compounds	2.33	2.33
2016	Plastics in primary forms	2.34	2.34
2017	Synthetic rubber in primary forms	48.35	69.01

NACE	Min	Max
2011	17.90	25.44
2012	1.27	2.10
2013	0.76	1.74
2014	2.30	4.66
2015	1.25	1.30
2016	2.94	5.82
2017	1.00	3.05
2020	4.36	9.34
2030	2.94	8.46
2041	5.48	9.81
2042	9.93	16.54

202	Pesticides and other agrochemical products	0	0	2051	1.92	4.58
203	Paints, varnishes and similar coatings, printing ink and mastics	2.56	13.5*	2052	5.54	11.56
204	Soap and detergents, cleaning and polishing preparations; perfumes and toilet preparations	2.56	13.5*	2053	15.92	19.41
205	Other chemicals	2.03	9.15	2059	9.93	12.08
206	Man-made fibres	0	13.5*	2060	17.35	19.00

VCI https://www.vci.de/langfassungen/langfassungen-pdf/2017-03-06-vci-posiiton-einsatz-nachwachsende-rohstoffe-massenbilanzierung.pdf

Rubber: fixed share of 40% bio-based (natural)

4 Main messages

Europe's Bioeconomy Strategy is currently being updated, with a Communication planned for October 2018. The updated strategy aims to move from aspiration to realization, roll-out a few but impactful actions, and support Europe as number one Bioeconomy leader.

The roadmap, published in early 2018, stresses the need for better monitoring and assessment frameworks. Indeed, many initiatives to define indicators are taking place on global, European, macro-region, EU Member State and even regional level. The present workshop focussed on socio-economic indicators.

In general, there is enough common ground to find compatible systems to monitor key socio-economic indicators (such as turnover, value added and jobs). Nevertheless, there remain differences concerning the scope of the bioeconomy sectors, in particular related to the bioeconomy services such as tourism, retail or restaurants. Also individual sector definitions or groupings following Eurostat classifications should be revised. For instance tobacco should be separated from the manufacturing of food and beverages.

The timeliness of indicators provided is very different from one country to the other, ranging from 2014 to 2017. This is also due to the various ways (from experts or production statistics) of deriving bio-based shares for the hybrid sectors.

A specific challenge is the scarcity of data availability in the bio-based chemical sector. Data on the EU bio-based market is diverse with large differences between product categories. As the data in some countries is collected from questionnaires conducted only every four years, it is causing important time lags. Given the high uncertainty of numbers, it is appropriate to provide a range with minimum and maximum estimates. The industry could be incentivised to share data through sustainability reporting of industry products, as such demonstrating the consumer the "green" origin of its products.

The European Bioeconomy strategy update will provide an adequate institutional set-up to increase cooperation and further alignment of the monitoring and assessment framework for the bioeconomy.

Annex: Agenda

Side-event 'Getting (some) numbers right – derived economic indicators for the bioeconomy'

Copenhagen, 15 May 2018, 15:15 – 18:30

Venue:

Organiser: Joint Research Centre

15:15 – 15:45	**Background of the workshop and introduction**	
each 5-10 min	Welcome and background of the workshop	Robert M'barek (JRC)
	State of play of the European Bioeconomy	Tomasz Calikowski (DG RTD)
	Which are the key economic indicators? EU perspective	Markus Lier (LUKE)
	The data requirements of the BIOEAST Initiative	Barna Kovacs (BIOEAST)
15:45 – 17:15	**Economic indicators of the EU bioeconomy** **Chair: Robert M'barek (JRC)**	
(15 min)	Economic indicators for 28 EU MS	Tevecia Ronzon (JRC)
each 5-10 min	Economic indicators for Finland	Markus Lier / Martti Aarne (LUKE)
	Economic indicators for Germany	Susanne Iost (Thuenen Institute)
	Economic indicators for the Netherlands	Kees Kwant (RVO)
	Economic indicators for Spain	Rocio Lansac (INIA)
	Industry viewpoint	Evelyne Dollet (FoodDrinkEurope)
(30 min)	Panel discussion. Possible topics How to harmonise data approaches on European level? Turnover and value added. How to regionalise data? With impulse presentation	all speakers Piotr Jurga (IUNG Pulawy)
17:15 – 18:30	**Economic indicators of an emerging sector: bio-based chemicals** **Chair: Robert M'barek (JRC)**	
5-10 min	State of play of the bio-based industry	Tomasz Calikowski (DG RTD)
(15 min)	Economic indicators of bio-based chemicals – preliminary results of a research study	Claudia Parisi (JRC) and Jurjen Spekreijse (BTG)
(15 min)	Examples from Member States	
(30 min)	Panel discussion	All speakers

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doi:10.2760/2037
ISBN 978-92-79-93907-5