



14TH CONFERENCE ON
SUSTAINABLE DEVELOPMENT
OF ENERGY, WATER AND
ENVIRONMENT SYSTEMS



October 1-6,
2019,
Dubrovnik,
Croatia



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BOOK OF ABSTRACTS

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*„Those who seek paradise on Earth
should come to Dubrovnik and see Dubrovnik.“*

Oscar Wilde



Dubrovnik is situated in the southernmost part of the Republic of Croatia. Founded in the 7th century, Dubrovnik is rich with cultural and historical monuments and is included in the UNESCO World Heritage list. The city is surrounded with the walls built between the 11th and 17th century. Its cultural and scientific institutions include Museum at Rector's Palace, Cathedral Treasury, Pinacotheca, Franciscan monastery and cloister, with one of three oldest pharmacies in Europe (14th c.), the Cathedral (initial funds given by King Richard the Lionheart), one of the European oldest Synagogues, Marin Drzic Theatre, Dubrovnik Symphony Orchestra, Interuniversity Center. Nature lovers can find here true Mediterranean landscape, and "enjoy the cleanest sea in the Mediterranean" (Jean Jacques Cousteau). Dubrovnik International Airport is situated 22 km from the city center.

Scope and Objectives

The 14th Conference on Sustainable Development of Energy, Water and Environment Systems - SDEWES Conference, to be held in Dubrovnik in 2019, is dedicated to the improvement and dissemination of knowledge on methods, policies and technologies for increasing the sustainability of development by de-coupling growth from natural resources and replacing them with knowledge-based economy, taking into account its economic, environmental and social pillars.

One of the main issues of the coming decades is to improve efficiencies by integrating various life-supporting systems, using excess from one, as resource in other, and in the exact moment when it is beneficial to all, integrating electricity, heating, cooling, transport, water, buildings, waste, wastewater, industry, forestry and agriculture systems. Sustainability being also a perfect field for interdisciplinary and multi-cultural evaluation of complex system, the SDEWES Conference has become a significant venue for researchers in those areas to meet, and originate, discuss, share, and disseminate new ideas within:

"History teaches us that men and nations behave wisely once they have exhausted all other alternatives"

Abba Eban

- Sustainability comparisons and measurements (metrics and indices; multi-criteria analysis; external costs; exergy analysis; footprint methods; emergy; life cycle analysis)
- Green economy and better governance (circular economy; low carbon development/economy; resource efficiency; water reuse; jobs and regional development; macroeconomic analysis; financial and regulatory mechanisms; models and tools; rebound effect; energy economics; environmental economics; development economics; sustainability economics)
- Smart energy systems (markets; demand response; integration of power, heating/cooling, transport, water and waste sectors; smart grids; dynamic electricity pricing, microgrids)
- Energy policy (security of supply; climate change mitigation; energy transition; renewable energy support schemes; energy efficiency policy; employment creation; carbon pricing; markets; fossil fuel subsidies)
- Smart transport systems and policy (fuel/carbon economy; transport electrification; congestion and road pricing; multimodal management; alternative fuels; social aspects; autonomous mobility; railways; shipping; aviation)
- Water-energy nexus (water management; water system analysis; water pricing; water desalination; hydro energy; water-renewables integration, water resources; river basin management; arid areas)

- Environmental policy and management (waste management; wastewater management; climate change mitigation; climate change adaptation; air pollution policy; water pollution policy; land management; biomass management; rewilding; social aspects; strategic environmental impact assessment, environment and corporate social responsibility, quality management systems; environment management systems; eco management and audit schemes; occupational health and safety assessment systems; hazard analysis and critical control point; integrated management systems)
- Agricultural policy (energy and water use in agriculture and food processing; food vs. biofuels; sustainability of biofuels production)
- Social acceptance (reform; NIMBY; nuclear; wind; biofuels; hydrogen; hidden and special interests; cost based pricing; inclusion; fossil fuel subsidy; green economy and employment; gender issues; energy poverty; energy affordability)
- Sustainable resilience of systems (resilience of energy systems; resilience of water systems; resilience of environmental systems; resilience of agricultural systems; resilience of social systems; resilience of engineering systems)
- Sustainable tourism (green hotels; certification)
- Urbanism (smart cities; urban planning; zoning; transport; zero energy buildings/districts; sustainable energy action plans; district heating/cooling)
- Regional planning and cooperation (sustainable islands; regions and cities; 100% renewable regions)
- Research, innovation and development (industry-academia partnership; quadruple helix; knowledge based society; knowledge management; learning curve; technology foresight; science diplomacy)
- Education in sustainable development (governance; environmental awareness; higher education; engineering education)
- Energy system analysis (energy planning; power system planning; smart energy systems; smart energy networks; natural gas system planning; 100% renewable energy systems; high penetration of renewables; island energy systems; development of energy planning tools; internalizing environmental externalities; electrification of transport; storage vs. grids vs. demand management; long term demand planning; integration of power and district heating systems; integration of power and water systems; integration of power and transport systems; power to gas)
- Transport management (transport system analysis, dynamic road pricing; electrification of transport)
- Renewable energy resources (biomass; hydro; wind; solar; geothermal; wave and ocean; technical and economic potentials; barriers; cost and benefits; integration)
- Primary energy resources (oil peaking; gas; coal peaking; nuclear fuels)
- Renewable electricity generation systems (biomass; hydro; wind; offshore wind; high altitude wind; photovoltaic; concentrated solar thermal power; geothermal; wave; tide; ocean thermal)
- Thermal power plants (clean coal; combined cycles; advanced cycles; flexible operation and cycling; carbon capture and storage/sequestration/reuse; nuclear)
- District heating and/or cooling in smart energy systems (integration of renewable heat; cogeneration; industrial waste/excess heat; waste to energy and CHP; power to heat; electric boilers; heat pumps; integration of CHP with district heating and electricity markets; heat maps; distribution)

"You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete."

Buckminster Fuller, philosopher, futurist and global thinker (1895 - 1983)

- Nano and micro technologies and science for sustainable development of energy, water, and environment systems
- Advanced sustainable energy conversion systems (fuel cells; thermoelectric; thermionic; organic; ORC; waste/excess heat recycling; thermoacoustic; piezoelectric)
- Renewable heat systems (biomass; biofuels; biogas; solar; geothermal)
- Biofuels and biorefineries (biodiesel; bioethanol; biogas; second and third generation biofuels; waste to biofuels; algae; anaerobic digestion; BTL; biorefineries; alternative fuel vehicles; infrastructure; sustainability assessment; pyrolysis; torrefaction; coproduction)

"If there are to be problems, may they come during my life-time so that I can resolve them and give my children the chance of a good life."

Kenyan proverb

- Alternative fuels (hydrogen; electro-fuels; power to gas; synthetic fuels; BTL; DME; CNG; resources; production; vehicles; infrastructure)
- Hybrid and electric vehicles (first generation hybrid; plug in hybrid; charging; batteries; infrastructure)
- Water treatment for drinking water
- Water desalination (distillation; reverse and forward osmosis; electrodialysis; energy recovery; discharge management)
- Waste and wastewater treatment and reuse (avoiding waste; composting; recycling; waste to energy; anaerobic digestion; gasification; mechanical biological treatment; mechanical heat treatment; plasma arc waste disposal; pyrolysis; RDF/SRF; combustion modelling)
- Modelling for pollution avoidance and energy efficiency (CFD models; air pollution spreading; water pollution spreading; heat and mass transfer modelling combustion modelling)
- Cogeneration, trigeneration, polygeneration (heat/cold and power; water and power; biofuels and power; transport and energy; food and energy; applications and operation strategies)
- Storage (heat/cold storage; hydrogen storage; hydropower as storage; pump storage; compressed air storage; batteries; water storage; biofuels storage; storage optimisation modelling; financial support mechanisms; power market arbitrage)
- Electricity transmission and distribution (grid extension and robustness; long distance transmission; power quality)
- Gas security of supply (diversification; shale gas; extension of transmission pipelines; LNG; Southern Corridor)
- Energy and water efficiency in industry and mining (cement and lime; construction materials; glass; pulp and paper; food industry; metallurgy; chemical industry; process optimisation; kilns; boilers; heat exchange networks; pinch analysis; exergy and exergoeconomic analysis; energy audits; water use and waste minimisation; eco-innovation; total site integration; life cycle assessment; eco-design and eco-labelling; product cycle assessment; cleaner production, environmental impact assessment)
- Energy efficient appliances (smart appliances; labelling and standards; user behaviour)
- Buildings (nearly zero energy buildings; passive buildings; smart buildings; smart metering; ICT; load and demand side management; green buildings; building codes and standards; buildings certification; HVAC; insulation; renewables integration; heat pumps; storage; sustainable architecture)

- Energy markets (market/price coupling; liberalisation/deregulation; modelling; demand response; role of district heating; desalination and water pumping; storage; retail markets; grid parity; net metering)
- Emission markets (emission trading system; cap and trade; transport participation)
- Political aspects of sustainable development (long term planning; sustainable development goals; the role of political leaders and of voters; international conflict vs. sustainable development; security and sustainability; resource and political security)

"Then I say the Earth belongs to each generation during its course, fully and in its right no generation can contract debts greater than may be paid during the course of its existence"

Thomas Jefferson, September 6, 1789

Preface

The objective of the series of conferences on Sustainable Development of Energy, Water and Environment Systems (SDEWES) is to provide a forum for world-wide specialists and those interested in learning about the sustainability of development, to present research progress and to discuss the state of the art, the future directions and priorities in the various areas of sustainable development. This includes the improvement and dissemination of knowledge on methods, policies and technologies for increasing the sustainability of development, taking into account its economic, environmental and social pillars, as well as methods for assessing and measuring sustainability of development, regarding climate, energy, transport, agriculture, water and environment systems and their many combinations. The reason for the forum having such a wide scope is due to the need for holistic integrated solutions encompassing several or all sectors.

Prof. Maria da Graça Carvalho

Chair of the International Scientific Committee

Prof. Ivo Šlaus

Chair of the Scientific Advisory Board

Prof. Neven Duić

Chair of the Local Organising Committee

SDEWES Centre President

Prof. Zvonimir Guzović

Conference Secretary

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Estimation of Power Production of Wind Potential

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Abstract

Estimating the wind potential for a particular micro location (siting) involves detailed analysis of the possibility of annual electricity production at that location. Based on the assumption of installed capacity, area and number of hours constant load, it is possible to obtain annual theoretical production of electricity according to expression . The wind atlas for target location contains data onto 5 reference roughness lengths (0.000 m , 0.030 m , 0.100 m , 0.400 m , 1.500 m) and 5 reference heights (10 m , 25 m , 50 m , 100 m , 200 m) above ground level . This paper have measured data onto site at target location, and base of that there was modeled digital model of location and wind power model for elevation at 110m. There was estimation of 20 GE (2,78 MW) installing capacity for target location.