



Conference report

6th Dubrovnik Conference on Sustainable Development of Energy, Water and Environment Systems

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ABSTRACT

The 6th Dubrovnik Conference was held on September 25–29, 2011 at the University of Dubrovnik, Croatia. It was dedicated to the improvement and dissemination of knowledge on methods, policies and technologies for increasing the sustainability of development of energy, transport, water and environment systems.

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Held on September 25–29, 2011 at the University of Dubrovnik, Croatia, the conference was dedicated to 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 energy, transport, water and environment systems and their many combinations. Similar to the 5th Dubrovnik Conference held in 2009 (Urbaniec, 2010), the event was coorganized by the University of Zagreb, Croatia and Instituto Superior Técnico of Lisbon, Portugal, in cooperation with 12 universities and other organizations from Croatia, Colombia, Denmark, France, Germany, Hungary, Macedonia, Serbia, Slovenia, Spain, The Netherlands and USA. The organizing committee headed by Prof. Neven Duić of the University of Zagreb received advice and support from the International Scientific Committee chaired by Prof. Noam Lior, Univ. of Pennsylvania, Philadelphia, USA, and the Scientific Advisory Board chaired by Prof. Ivo Šlaus, Ruder Bošković Institute, Zagreb, Croatia.

The conference was attended by 415 participants coming from 51 countries of all continents. Out of a total of 446 contributions, six invited papers were presented as plenaries, 383 regular papers were presented in a number of parallel sessions, and 57 posters were displayed in three poster sessions. The range of topics can be divided into four areas:

- Energy (policy, planning, markets, fossil and renewable resources, hydrogen as energy carrier, conversion systems, cogeneration, efficiency, storage etc.).
- Water (policy, resources, management, wastewater treatment),
- Environment (climate change, emission trading, air and water pollution, land management, waste treatment and recycling, transport policy and management, social aspects),
- Scientific and practical aspects of sustainability (metrics and indices, multi-criteria analysis, external costs, footprint methods, decarbonization, governance, Green New Deal, political aspects of sustainable development).

In addition, to stimulate interdisciplinary thinking and exchange of ideas, two panel discussions were held on “Water sustainability” and “Sustainable development and jobs”.

Fifteen special sessions, organized by scientists of international standing, included dozens of papers and gathered large groups of participants. As examples, the following successful sessions can be named:

- The Interaction between Heating Technologies and Renewable Energy Systems, chaired by Prof. Brian V. Mathiesen of Aalborg University, Denmark;
- Energy and Water Efficiency for Sustainable Future, chaired by Prof. Jiri Klemeš and Dr. Petar Varbanov, University of Pannonia, Veszprem, Hungary;
- Biofuels Sustainability, chaired by Prof. Viatcheslav Kafarov, Industrial University of Santander, Santander, Colombia;

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- Energy and Buildings Efficiency for Sustainable Future, chaired by Prof. Mireille Jacomino, Grenoble Institute of Technology, France;
- Utilization of Industrial Byproducts toward Sustainability, chaired by Prof. Stamatis Tsimas of National Technical University of Athens, Greece;
- Geopolitics of Climate Change, chaired by Prof. Branko Bosnjakovic, University of Rijeka, Croatia;
- Research and Governance for Sustainability – New Approaches, chaired by Prof. Aleksander Zidanšek and Prof. Robert Blinc, Institute Jozef Stefan, Ljubljana, Slovenia.

A complete set of conference papers on a CD (Ban et al., 2011) was made available to each conference participant. After the event, the organizers recommended 209 papers for publication in nine international journals including Applied Energy, Energy – The Int. J., Int. J. of Hydrogen Energy, Int. J. of Sustainable Water and Environment Systems, Management of Environmental Quality – An Int. J., Strojarstvo – J. for Theory and Applications in Mechanical Engineering, Thermal Science, Utilities Policy, Waste Management and Research.

Apart from the regular sessions, on the last day of the conference two technical visits were organized to hydro power plants in the basin of the Trebišnjica River. The Trebinje power plant rated 180 MW is situated in Bosnia and Herzegovina, and the Croatian power plant of Dubrovnik, rated 210 MW and located at the Adriatic coast, is the last step of this hydroelectric system.

A substantial part of the conference programme reflected recent developments and concerns of importance to the future of sustainable development. In the lecture “Sustainable Energy Development – the Present (2011) Situation and Possible Paths in the Future”, Prof. Noam Lior surveyed recent estimates and forecasts of the oil, gas, coal resources and their reserve/production ratio, nuclear and renewable energy potential, and energy uses. Beyond the general review, the speaker pointed out three important areas that deserve more attention: (1) the recently emerging game-changing developments of postponement of “peak oil”, nuclear power future following the disaster in Japan, and effects of the recent global economy downturn on global sustainability, (2) the potential and impacts of electricity-driven cars, (3) the energy status and promising potential of Africa.

Prof. Henrik Lund of Aalborg University, Denmark delivered a lecture titled “The Economic Crisis and Sustainable Development”. He took a historical point of departure in the economic crisis of the 1970’s and 80’s, in which countries like Denmark experienced massive unemployment in combination with severe balance of payments deficits. However, an active Danish energy policy with a focus on sustainable energy and employment did succeed in stabilizing the primary energy supply while maintaining economic growth and developing growth in exports related to sustainable energy. The Danish policy was based on active strategies of job creation, technological innovation, and concerns for the balance of payment. From being a burden to the Danish economy, the energy sector today makes a positive contribution to the GDP. It seems that the same type of strategies may be applied again today in Denmark as well as in similar countries. According to the results of a recent study entitled “Heating Plan Denmark 2010”, over the next 20 years fossil fuels can be replaced with biomass, solar, wind and geothermal energy meaning that Denmark will be able to heat its homes, institutions and commercial buildings without any CO₂ impacts on the climate. The conversion to renewable energy sources is projected to cost around DKK 70 billion over 10 years, but

it will result in the creation of about 8000 additional jobs in Denmark, and it is therefore expected to give positive returns on the governmental expenditures.

Prof. Ingo Stadler of Cologne University of Applied Sciences, Germany, discussed “The Three Pillars for a 100% Electricity Supply with Renewable Energies”. Scientific studies on electricity supply by renewable energies exist for many countries or even transnational regions like e.g. EU-Middle East-North Africa combining the electricity markets by large so-called overlay-grids. Today, it is not any more questioned whether it is possible to have a 100% renewable supply or not but the controversial issue is the best future system configuration. It is widely recognized that renewable resources have the big advantage that they are widely distributed and that electricity could be produced by small and decentralized converters. On the other hand, centralized systems are also of interest as some locations in the world have better renewable resources than other locations and it is proposed to interconnect even continents via grids. Bearing in mind the intermittent nature of most renewables, three ways to stabilize the electricity systems are considered: storing renewable electricity in times of overproduction in order to use it during times of underproduction, interconnecting renewable converters in order to better balance weather dependent generation, or simply maintaining surplus capacity of renewable generation. Regarding the requirement for seasonal storage of large amounts of energy, the production and storage of hydrogen or renewable methane are proposed. The latter option opens the opportunity to mesh electricity system with supplies for heat and cold using the current infrastructures.

It may be appropriate to recall that Dubrovnik Conferences on Sustainable Development of Energy, Water and Environment Systems were started in 2002. Confirming their importance to the integration of the international community of sustainability scientists and practitioners, the 6th event in 2011 was combined with the Assembly of the International Centre for Sustainable Development of Energy, Water and Environment Systems (SDEWES Centre, www.sdewes.org). The SDEWES Centre is a non-governmental and a non-profit organization established with the purpose to provide a wider platform for communication and exchange of ideas between scientists and researchers that promotes multidisciplinary approaches to sustainability. The main goals of the Centre are: (i) general promotion of sustainable development of energy, water and environmental systems through organization of courses, summer schools, public lectures, seminars and workshops, (ii) providing professional opinion on important issues of sustainability. Initially it was assumed that the Centre would be involved in the organization of international SDEWES conferences every two years. However, following the success of the last two events, a decision was made to organize the 7th Conference on Sustainable Development of Energy, Water and Environment Systems in Ohrid, Macedonia next year (July 1–6, 2012). The responsibility for local arrangements rests with the Macedonian Academy of Sciences and Arts, Research Center for Energy, Informatics and Materials in Skopje in collaboration with the University of Zagreb and Instituto Superior Técnico of Lisbon.

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