



## Sustainable development of energy, water and environment systems<sup>☆</sup>



Energy journal and Applied Energy journal continue their cooperation with the Conference on Sustainable Development of Energy, Water and Environment Systems (SDEWES), this time launching their special issues dedicated to the eighth one, held the last week of September 2013 and organised by University of Zagreb and Instituto Superior Tecnico, Lisbon in cooperation with the University of Dubrovnik, Dubrovnik; Aalborg University, Aalborg; Institut National Polytechnique de Grenoble, Grenoble; Cologne University of Applied Sciences, Cologne; University of Pannonia, Veszprem; Macedonian Academy of Sciences and Arts, Skopje; Delft University of Technology, Delft; Vinča Institute of Nuclear Sciences, Belgrade; Jozef Stefan International Postgraduate School, Ljubljana and Industrial University of Santander, Bucaramanga.

The SDEWES conference serves as a venue for world-wide scientists and specialists and those interested in learning about sustainability to present research progress and to discuss the state of the art, the future directions and priorities in the various areas of sustainable development. It is aimed at 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, as well as methods for assessing and measuring the sustainability of development, regarding energy, transport, water, environment and food production systems and their many combinations.

Coming back to Dubrovnik, the 8th SDEWES Conference peaked its success, attracting authors from 63 countries with 554 presented papers at 61 regular sessions, 10 special sessions and 5 poster sessions, 7 invited lectures and 2 panels.

Two special issues of the 8th SDEWES are going to be published in the journals of Energy and Applied Energy.

The *Energy* special issue includes 24 selected SDEWES papers which cover a variety of energy issues, starting from biomass, biofuels, wind and solar, geothermal energy, natural gas, synthetic fuels, through alternative energy conversion systems, storage and power system operation at energy supply side, as well as, heat engines, absorption refrigerators and heat exchanger networks, desalination units, modelling and greenhouse gases emissions reduction at energy demand side.

Hence, the impact of subsidies on the wood biomass use for energy production in the EU is analysed in Moiseyev et al. [1], while on the Latvian case, different policy strategies for promotion

of wood fuel use specifically in district heating systems are evaluated in Romagnoli et al. [2].

Two papers deal with ethanol production – Ortiz and Oliveira [3] conduct exergy analyses of pretreatment processes of ethanol production based on sugar cane bagasse and highlight the relevance of such process in the overall exergy efficiency of second-generation ethanol production routes, whereas Yang et al. [4] investigate the potential of bioethanol production from endemic Taiwanese chenopod with strong productivity and great adeptness.

As far as wind and solar are concerned, Andersen et al. [5] conduct analysis of large-scale and high-resolution weather data and detailed historical consumption data in order to arbitrage wind and solar surplus power in Denmark. Furthermore, Higgins and Foley [6] study the impacts of offshore wind forecasting error on the operation and management of the Irish pool-based electricity market. Regarding penetration of these energy sources, the influence of reverse osmosis desalination in a combination with pump storage is analysed in Novosel et al. [7], while Azzopardi and Gabriel [8] use net demand planning as a basis for feasibility assessment of high penetration of distributed PV systems. Specific applications are also dealt with, like optimal management of a small PV-pump hydro energy storage in a rural dry area [9].

As to the other fuel types, the geothermal power plant Velika Ciglena is taken as a case to assess comparatively a basic and a dual-pressure Organic Rankine Cycle [10], the thermoecological cost assigned to the electricity production in the process of natural gas transmission at pressure reduction stations is determined [11], as well as an overview is provided of fuel production cost for two types of synthetic fuels – methanol and methane, and comparable costs of biodiesel, bioethanol and biogas [12].

Besides fuels, the covered energy demand side issues include analyses of some alternative energy conversion systems, such as combined hybrid power plants consisting of gasification plant, solid oxide fuel cell plant and a retrofitted gas turbine with steam injection [13] and small-scale integrated gasification, solid oxide fuel cell and Stirling engine for combined heat and power generation [14].

Furthermore, the energy storage technologies are also considered in light of their capacity to manage the variable renewable generation and to align non-dispatchable renewable energy generation with load demands. Hence, Pavkovic et al. [15] focus on the sizing of typical low-to-medium scale energy storage systems for airborne wind energy applications, including those based on flywheels, hydro-pneumatic accumulators, batteries and ultracapacitors, taking into account the intermittent power production cycle, airborne module altitude range and ground-station generator power ratings. In addition, Baeyens et al. [16] summarise the required properties of

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phase change materials (PCMs) with their respective advantages and disadvantages, the current state of development and manufacturing, the development of PCM applications, including their incorporation into heat exchangers, insertion of a metal matrix into the PCM, the use of PCM dispersed with high conductivity particles, and illustrate the PCM uses through some case-studies.

Lastly, regarding power system operation, in Ravindra and Iyer [17], the application of community microgrids and consumer demand response is considered for decentralized demand – supply matching, while Praktiknjo [18] estimates power interruption costs in private households on the basis of stated preferences.

Energy efficiency remained the topical issue at the energy demand side, particularly in industry sector. Hence, Lira et al. [19] deal with the problem of synthesising sustainable process energy systems consisting of heat engines, absorption refrigeration subsystems and heat exchanger networks, while Stanek and Gazda [20] propose a method of exergetic evaluation of the adsorption refrigerators, which are often applied in many technological processes, especially in food industry.

Furthermore, the impacts of various energy policies and corresponding greenhouse gases emission reductions are analysed in Puksec et al. [21] by bottom-up modelling of energy demand of six sectors in the case of Croatia.

Two papers are focused on desalination – Blanco-Marigorta et al. [22] conduct exergoenvironmental analysis of a reverse osmosis desalination plant in Gran Canaria, and Hamid et al. [23] propose a mathematical study on the heat exchanger optimization using field synergy principle in a solar-assisted multiple-effect desalination unit.

Finally, Cohen et al. [24] present a unified conceptual framework and definition of the term social acceptance of energy infrastructure and identified relevant factors for social acceptance of wind farms, transmission lines, and pump hydro-storage infrastructures.

The *Applied Energy* special issue includes 19 selected SDEWES papers which cover a number of issues, including integration of increased penetration of renewables, energy planning, energy efficiency and some economic considerations.

Welsch [25] discusses incorporating flexibility requirements into long-term energy system models on a case study of high levels of renewable electricity penetration in Ireland. Ferreira [26] calculates carbon footprint of thermal energy storage systems using phase change materials for industrial energy recovery to reduce the fossil fuel consumption. Bardow et al. [27] propose a hybrid approach for the efficient synthesis of renewable energy systems. Waite and Modi [28] discuss the potential for increased wind-generated electricity utilisation using heat pumps in urban areas, while Ćosić et al. [29] propose how to improve wind energy integration into the future energy systems based on the case study of Croatia. Walmsley et al. [30] discuss minimisation of carbon emissions and energy use for electricity generation in New Zealand until 2050. Da Fonseca et al. [31] perform environmental and economic analysis of SolComBio concept for sustainable energy supply in remote regions, while Calise et al. [32] propose a novel renewable polygeneration system for a small Mediterranean volcanic island for the combined production of energy and water. Kazagic et al. [33] provide guidelines and principles for power utilities to reach specific renewable and decarbonisation targets.

Pietzcker [34] shows the economic potential of photovoltaics and concentrating solar power, while Desideri and Antonelli [35] analyse do feed-in tariffs drive PV Cost or vice versa. Ajanović and Haas [36] discuss the future prospects and limits of biofuels in Brazil, the US and EU. Keskin Citiroglu and Okur [37] propose a novel approach to wave energy converter applications in Eregli on the Western Black Sea coast of Turkey.

Wang et al. [38] discuss recent development and application of several high-efficiency surface heat exchangers for energy conversion and utilization. Liew et al. [39] propose a retrofit framework for total site heat recovery systems while Ahmetović et al. [40] suggest an optimal design for heat-integrated water-using and wastewater treatment networks.

Terrapon-Pfaff et al. [41] discuss how effective are small-scale energy interventions in developing countries while Moreno et al. [42] propose a general maximum entropy econometric approach to model industrial electricity prices in Spain. Filogamo et al. [43] discuss the classification of large residential buildings stocks by sample typologies for energy planning purposes while Ardito [44] applies patent analysis to understand the development trends of low-carbon energy technologies.

## Conclusions and acknowledgements

These special issues, devoted to the energy theme of the Conference on Sustainable Development of Energy Water and Environmental Systems – SDEWES 2013, provided an overview of several topics related to sustainable development. The guest editors do believe that the SDEWES 2013 papers would make considerable contribution to the knowledge body published in Energy journal and Applied Energy journal and would be of interest for their readers.

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