



Sustainable energy, water and environmental systems

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ABSTRACT

This editorial presents research results from the 8th Conference on Sustainable Development of Energy, Water and Environment Systems – SDEWES - held in Dubrovnik, Croatia in 2013. Topics covered here include the energy situation in the Middle East with a focus in Cyprus and Israel, energy planning methodology with Ireland as a case and the applicability of energy scenarios modelling tools as a main focus, evaluation of energy demands in Italy and finally evaluation of underground cables vs overhead lines and lacking public acceptance of incurring additional costs for the added benefit of having transmission beyond sight.

Keywords:

Natural gas use in Israel and Cyprus
Regional energy planning in Ireland
Contingent evaluation of underground cables
Energy performance requirements in Italy
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1. Sustainable development of energy water and environmental systems

The 8th Conference on Sustainable Development of Energy, Water and Environment Systems – SDEWES Conference, held in Dubrovnik in 2013, was dedicated to the improvement and dissemination of knowledge on methods, policies and technologies for increasing the sustainability of development by decoupling 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 sustainability of development, regarding energy, transport, water, environment and food production systems and their many combinations. Sustainability being also a perfect field for interdisciplinary and multi-cultural evaluation of complex system, the SDEWES Conference has at the beginning of the 21st century become a significant

venue for researchers in those areas to meet, and originate, discuss, share, and disseminate new ideas.

The event was organized by University of Zagreb, Croatia and Instituto Superior Tecnico, Lisbon, Portugal in cooperation with the University of Dubrovnik, Croatia; Aalborg University, Denmark; Institute National Polytechnique de Grenoble, France; Cologne University of Applied Sciences, Germany; University of Pannonia, Veszprém, Hungary; Macedonian Academy of Sciences and Arts, Skopje; Delft University of Technology, the Netherlands; Vinča Institute of Nuclear Sciences, Belgrade, Serbia; Jozef Stefan International Postgraduate School, Ljubljana Slovenia and the Industrial University of Santander, Colombia.

The eighth SDEWES Conference was the most successful up to date attracting authors from 63 countries with 554 presented papers at 61 regular sessions, ten special sessions and five poster sessions, seven invited lectures and two panels.

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2. National energy systems

While the world is on the one hand required to turn towards the use of renewable energy sources not least due to climate change issues [1], individual nations also have a pronounced self-interest in exploiting locally available fossil energy resources where market prices exceed extraction costs or where societal benefits such as self-sufficiency and security of supply are factored in. Such factors are thus also criteria applied when assessing the appropriateness of different energy futures [2].

Natural gas use is experiencing a growth both as conventional natural gas and as methane from fracking – for economic, resource availability reason as well as for greenhouse gas emission reductions reasons. Taliotis *et al.* [3] have investigated energy security prospects in Cyprus and Israel in the light of recent off-shore discoveries, and based on scenario development, analysed the potential export of liquefied natural gas (LNG) and electricity. Significant energy savings of US\$ 182 billion may be realized, with the highest benefits being if the resource is used for export in the form of LNG in spite of initial investments for processing plants.

Waenn *et al.* [4] put forward the hypothesis, that it is required moving from the national level to the regional level when addressing energy system scenario design and energy system analyses with the goal of achieving sustainable energy systems. From this starting point they address the South West Region of Ireland and develop one reference and three alternative high-RES scenarios for the region. Secondly, the authors investigate the applicability of a certain computer energy system's simulation model – the EnergyPLAN model – in performing such analyses. In conclusion, the said region may be converted to 100% RES supply – and the model was also found to be an adequate tool for performing such analyses.

3. Electricity systems

Transmission systems are a focal point for public debate in several countries, and in Denmark, analyses have investigated the possibility of replacing above-ground transmission lines with underground cables or better local integration of RES-based electricity [5, 6] – while other analyses have addressed the policy implication of a so-called supergrid vs smart grid [7].

Menges & Beyer [8] have conducted an extensive investigation of underground cables versus overhead lines based on a contingent valuation survey in Germany. In a survey, 60% of respondents favour undergrounds cables, but nearly half of those favouring undergrounds cables are not willing to pay a premium for that treat. Surprisingly, the authors conclude, that the “thesis that cables increase acceptance of grid development has to be rejected” – though also drawing attention to a low response rate of the survey.

4. Optimisation of energy systems

Buildings account for a very large part of the global energy consumption, and in the European Union (EU), the EU Energy Performance of Buildings Directive targets savings within the building sector. Based on this, Tronchin *et al* [9] analyses the cost-optimal level of energy performance improvement in an Italian case – as well the applicability of using the cost optimal levels as metrics for comparing scenarios for energy renovation of buildings.

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