Energy 77 (2014) 1–5

Contents lists available at ScienceDirect

Energy

journal homepage: www.elsevier.com/locate/energy

Editorial

100% sustainable energy

A B S T R A C T

Sustainable energy has been defined as energy sources that are expected to be depleted in a time frame relevant to the human race [1]. Many investigations have been carried out toward 100% renewable and sustainable energy [2–5]. Mathiesen et al. [6] have studied an integrated transport and renewable energy systems, they concluded that a 100 per cent renewable energy transport development for Denmark is possible without affecting the production of food if biofuels are combined with other technologies. These include savings and efficiency improvements, intermittent resources, electric trains and vehicles, hydrogen technologies and more. It is, however, connected to large challenges in the process towards this goal, requiring multiple measures and integrating transport with the remaining energy system. These challenges can only be met by combining planning for this long term goal, in the shorter term solutions. The 50 per cent energy system for 2030 is a shorter term proposal that enables the transport sector to reach the long term goal. The short-term 2030 energy system enables the later process towards 100 per cent renewable energy and has substantial economic benefits. Blarke and Lund [7] have studied the effectiveness of storage and relocation options in renewable energy systems, they described the future third generation integrated energy systems and how by increasing levels of flexibility will be reached by incorporating the demand for mobility, as well as the expansion of co-generation or tri-generation into quad-generation, for example by adding the facility to produce and store secondary fuels, such as hydrogen or ethanol, from primarily fuels, mainly electricity or waste.

This editorial presents the latest developments in sustainable energy and environment. This issue will cover topics such as; Wind, solar, Wave, Bioenergy, Hydrogen and Fuel Cell, also different aspects on environment and energy which would lead to 100% sustainable energy.

1. Introduction

The series of SEEP Conferences have been established in 2004 by Prof A.G.Olabi, during the last years four special issues has been published [8–11], the conference editor has contributed in many publications related to Hydrogen and Fuel Cell [12–15], Biofuel [16–18] and Air Pollution and Environmental issues [19,20]. Previous special issues of SEEP conferences have discussed and contributed to many themes related to sustainable energy and environmental protection. The state of the art of Hydrogen and Fuel Cell presented in different papers [21–25], Electric Vehicles [26–28], Wind and planning issues [29–32], PV and Solar Energy [33–41], Bio-Energy [42–49], Alternative Energy and Environmental Issues [50–58], Pipe Heat Exchanger and related Fuel Efficiency and Environmental Protection [59–63].

This special issue presents some selected and peer reviewed papers from the 6th International Conference on Sustainable Energy and Environmental Protection SEEP2013 which was held in Maribor (Slovenia) between 20th and 23rd August 2013. In SEEP2013, about 140 papers were presented, 70 papers were invited to submit an extended version to the Energy Journal. After peer review, 30 papers were selected to be published as a special issue in this journal.

These articles can be described as:

- Biomass Gasification Integrated with a Solid Oxide Fuel Cell and Stirling Engine [64].
- The effect of hemicelluloses and lignin on acid hydrolysis of cellulose [65].
- The Progressive Development of Turbulence Statistics And Its Impact On Wind Power Predictability [66].
- Impact of Energy Saving Cultivations on Soil Parameters In Northern Kazakhstan [67].
- Investigation of indoor and outdoor air quality of the classrooms at a school in Serbia [68].
- Water footprint for energy production and supply in Thailand [68].
- Economical Optimization of Energy-Efficient Timber Buildings: Case Study for Single Family Timber House in Slovenia [70].
- Modelling And Optimization Of Energy-Efficient Procedures For Removing Lead (II) and Zinc (II) Ions From aqueous solutions using the central composite design [71].

http://dx.doi.org/10.1016/j.energy.2014.10.083
0360-5442/

- Challenges and Prospects Of Electricity Production From Renewable Energy Sources in Slovenia [72].
- Experimental and Analytical Performance Investigation of Air to Air Two Phase Closed Thermosyphon based Heat Exchangers [73].
- Study of Mixture Formation and Early Flame Development in A Research GDI Engine Through Numerical Simulation and UV-Digital Imaging [74].
- Optimization of Hydro Energy Storage Plants by Using Differential Evolution Algorithm [75].
- Enhanced lubricant management to reduce costs and minimize environmental impact [76].
- Development of EU Energy Market Agenda and Security of Supply [77].
- Production of methanol from a mixture of torrefied biomass and coal [78].
- Domestic distributed power generation: effect of sizing and energy management strategy on the environmental efficiency of a photovoltaic-battery-fuel cell system [79].
- A multi-objective genetic approach to domestic load scheduling in an energy management system [80].
- Towards Measurement and Verification of Energy Performance Under the Framework of the European Directive for Energy Performance of Buildings [81].
- Stand-alone renewable combined heat and power system with hydrogen technologies for household application [82].
- Decomposition analysis of the change of energy intensity of manufacturing industries in Thailand [83].
- Energy Retrofit of Residential Building Envelopes in Israel: A Cost-Benefit Analysis [84].
- Using Electric Vehicles for Energy Services: Industry Perspectives [85].
- Thermal Management of Fuel in Advanced Aeroengine in View of Chemical Recuperation [86].
- Exploitation of the waste-heat from hydro power plants [87].
- Photosynthetic Complex LH2 — Absorption and Steady State Fluorescence Spectra [88].
- Microturbine combustion and emission characterization of waste polymer-derived fuels [89].
- Industrial Applications of Supercritical Fluids: A Review [90].
- Engineering bed models for solid fuel conversion process in grate-fired boilers [91].
- Design Procedure of an Innovative Turbine With Rotors Rotating in Opposite Directions for the Exploitation of the Tidal Currents [92].
- An experimentally evaluated magnetic device's efficiency for water-scale reduction on electric heaters [93].
- Heat pipe based thermal management systems for energy-efficient data centres [94].

2. Content details

The first paper [64], an integrated gasification SOFC (solid oxide fuel cell) and Stirling engine for combined heat and power application is analyzed. The target for electricity production is 120 kW. Woodchips are used as gasification feedstock to produce syngas, which is then used to feed the SOFC stacks for electricity production.

Unreacted hydrocarbons remaining after the SOFC are burned in a catalytic burner, and the hot off-gases from the burner are recovered in a Stirling engine for electricity and heat production. Domestic hot water is used as a heat sink for the Stirling engine. A complete balance-of-plant is designed and suggested.

Ref [65], the author showed that, in acid hydrolysis of plant biomass, polysaccharides are converted to monosaccharides, which is basic raw material for biorefinery for fermentation based process. These monosaccharides, however, are not stable in acidic reaction medium, and are converted to organic acids via furans. Impact of hemicelluloses and lignin on acid hydrolysis of cellulose was investigated to focus on monosaccharide production with different degrees of cellulose purity.

In the third paper [66], this paper presents three aspects of turbulence assessment within the built environment. Firstly, an analysis of how turbulence is currently quantified is considered. The industry standard, TI (Turbulence Intensity) is compared with a proposed alternative metric described as TFD modelling (Turbulent Fourier Dimension). Secondly, the application of the turbulence assessment is considered with respect to how TI affects the productivity of small/micro wind turbines in complex environments though Gaussian distribution analysis. Finally, an extended discussion on current developments such as the concept of a turbulence rose and the ongoing development of statistical modelling is presented.

Ref [67] studied methods of soil tillage that would help stabilize the yield of crops while maintaining soil fertility and saving energy and labour at the same time. Three types of crop cultivation experiments were studied: 1) cultivation intensity (simplified ST, common CT, and intensive IT); 2) tillage depth (shallow S, and deep D subsoil till), and 3) minimum MT, and zero till ZT. The results showed that under ST the soil biological parameters were more favourable than under CT and IT. Shallow subsoil till maintained higher levels of soil nutrients, and reduced CO_2 emission compared with the deep subsoil till. The minimum and zero tills positively influenced soil physical and biological properties through improvement in soil aggregate stability and soil enzymatic activity.

Paper [68] presented a study to investigate the air quality in primary school placed in town at the east of Serbia. The characterization of air pollution concentration was performed with main goal to determine relationship between indoor and outdoor air pollution within five classrooms.

Next paper [69] aimed to evaluate the water footprints of energy production and supply in Thailand by applying standard water footprint analysis methods based on bottom-up approaches, which define separate footprints based on production and consumption perspectives.

Paper [70] presents an approach in the determination of the most economically efficient building from the viewpoint of the costs of envelope's composition, the present value of heating costs and the costs incurred in fitting out the boiler room (hereinafter: the costs of the boiler room).

The objective of paper [71] was to model and optimize the adsorption procedures for the removal of lead (II), i.e. zinc (II) ions from the aqueous solutions using bentonite clay as an efficient and low cost adsorbent.

Paper [72] concluded that the long-term transition towards a low-carbon society requires exploitation of renewable energy sources to a considerably greater extent, and conditions for this must be provided by a comprehensive and adaptive energy policy.

In ref [73], a tool to predict the performance of an air to air thermosyphon based heat exchanger using the ε-NTU method is explored. This tool allows the predetermination of variables such as the overall heat transfer coefficient, effectiveness, pressure drop and heat exchanger duty according to the flow characteristics and the thermosyphons configuration within the heat exchanger.

Paper [74] concluded that dilute combustion in advanced gasoline SI engines offers an interesting solution for reducing the dependence upon fossil fuels. Maximize efficiency benefits and minimize NOx after-treatment needs of lean burn GDI engines are of paramount importance in the current research scenario. Provide robust modelling tools for rapidly screening proposed designs