



# International Journal of Sustainable Energy Planning and Management

## Editorial - International Journal of Sustainable Energy Planning and Management Vol 9

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### ABSTRACT

This editorial introduces the ninth volume of the International Journal of Sustainable Energy Planning and Management. The volume addresses alternative ways of providing diesel fuel through emulsification of waste cooking oil and fat, estimation of global solar energy potentials based on publically available data, and a large review of global grid connected electricity storage systems. Finally, an article applies stochastic programming to analyse optimal district heating expansion scenarios with particular focus on the phasing issue of investments in district heating grids.

### Keywords:

Biodiesel;  
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### 1. Biodiesel potential from waste oil and fat

In the first article of this volume, Melo-Espinosa et al. [1] look into the emulsification of waste cooking oils and fat with the view to providing a renewable transportation fuel while at the same time solving a potential environmental problem in terms of dealing with a waste product. They reference a yearly quantity of 20 million tonnes of oils and fats that are used for cooking each year, and while this does not necessarily correspond to the potential waste of these products, it does indicate a potential worth investigating as well as a potential worth harvesting. For comparison, Denmark has an energy demand for road transport of 156.5 PJ [2] corresponding to approximately 3.7 million ton of diesel, if it was all diesel. In their findings, the authors conclude that “*emulsification method applied to WCO [waste cooking oils] and FAD [fatty acid distillates] is a suitable alternative to diesel fuel without modifying the diesel engine*”.

### 2. Solar potential

Korfi et al. [3] seek to estimate the potential for another renewable energy source; solar energy. In their work, they apply publically available data to try to assess solar potentials on a global scale. Apart from solar influx, they also assess temperature, which lowers the efficiency of photo voltaic panels. In addition to these more geographic factors, they also seek to assess potential surface areas for implementing photo voltaic panels. Based on their work, the authors established a web platform presenting data for each country in the world at <http://solarpotential.ethz.ch/>

### 3. Electricity storage systems

Increasing amounts of fluctuating renewable energy sources into the energy system creates potential imbalances, that need to be handled through flexible demand, interconnections to other areas with other

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demand variations, through flexibility in the conversion system or through actual energy storages. Flexible demand has shown limited capacity for integrating renewables [4], interconnections are costly and do not necessarily provide the required flexibility or are at odds with smart grids [5]. Smart energy systems utilizing the flexibility across sectors are being considered, and shape some visions of energy systems [6,7], however looking at it historically, there has been a large focus on electricity storage systems in e.g. mountainous countries like Norway and Switzerland to assist in the integration of either fluctuating power or base-load production. Thus, there is a large present stock of electricity storage systems worldwide and also a strong development in the field. In this volume, Buß et al. [8] review all grid-connected electricity storage systems world-wide, finding systems with a total capacity of 154 MW (power – not storage contents). The largest fraction of this is in the form of pumped hydro storage, however over the more recent decades, the strongest growth has been in electro-chemical storages.

#### 4. District heating expansion analyses

As Zhang & Lucia [9] states it based on experience from China, “*Unlike the electricity and transportation sectors, the heating sector has received little attention from policy makers and researchers*”, but that situation is changing at least in Europe. District heating is becoming a core element of many analyses of the transition to renewable energy systems [10,11], however there is always the issue of when to apply district heating and when to apply individual solutions, as well as the extent to which savings should be carried out versus the extent to which the supply systems should be optimised [12]. In this volume, Lambert et al. [13] address the “*sequential problem faced by a decision-maker in the phasing of long-term investments into district heating networks and their expansions*”. This they do through analyses based on stochastic programming. The article is mainly about development of a modelling approach to address this relevant issue.

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