International Journal of
Sustainable Energy Planning and Management

Editorial - International Journal of Sustainable Energy Planning and Management Volume 23

Rasmus Magni Johannsen and Poul Alberg Østergaard*

Department of Planning, Aalborg University, Rendsburggade 14, 9000 Aalborg, Denmark

ABSTRACT

This editorial introduces the 23rd volume of the International Journal of Sustainable Energy Planning and Management. This volume presents research on the robustness of energy modelling, firstly through an assessment of the accuracy of heat demand estimations compared to measured data, followed by an examination of assessment of the robustness of energy modelling relative to the results' dependency on input time series. Subsequently, challenges to the integration of renewable energy are reviewed, followed by a case from Iran investigating a 100% renewable energy system for desalination. Finally, the issues of technology prioritization for energy efficiency purposes and the development of energy indicators are tackled.

Keywords;

Heat atlas;
Energy system modelling;
Hybrid renewable energy systems;
Energy efficiency;
Energy indicators;

URL: http://doi.org/10.5278/ijsepm.3466

1. Robustness of energy modelling

Two articles of this issue tackle the challenge of ensuring accurate inputs for energy system modelling such as energy demands and weather resources. Grundahl & Nielsen [1] build on previous work on heat atlases, where GIS and building information is used to assess heat demands with the prospects of e.g. assessing potentials of model shifts in heating technology. In this work, the authors correlate such more general data with actual metered data to assess the accuracy of the assessment methods. Based on statistical analysis, the results indicate that the atlas is mainly accurate for single-family buildings while larger discrepancies exist for other building types. See also [2–5] for further analyses on the use of heat atlasses.

To examine the robustness of simulations of 100% renewable energy scenarios, Meschede et al. [6] use the Spanish island La Gomera as a case to analyse the impacts on energy systems scenario performance with different time series reflecting variance in e.g. resource availability. The island energy system is modelled with the EnergyPLAN simulation tool, analysing the impact of probabilistic weather data on the design of renewable energy systems. In their work, the authors argue that it is not sufficient to base simulations on empirical data for one year, but rather, it is required for more time series to be applied. In their own work, this is done in the form of synthetic time series.

2. Renewable energy systems

In a review of the challenges related to the integration of renewable energy sources into the power system, Sarkar & Odyuo [7] address the most pressing issues, as well as techniques presently applied to negate these. The study considers key issues to be related to the typically geographically distributed nature of renewable energy technologies, which coupled with the variability and uncertainty of renewable energy production challenges the matching of energy supply and demand.

Caldera et al. [8] investigate the feasibility of 100% renewable desalination systems for water supply in Iran as a solution to the severe current and future water

*Corresponding author - e-mail: poul@plan.aau.dk

stress caused by a combination of water resource mismanagement and climate change. Energy system modelling is applied to determine optimal system configurations and the economic impact of transitioning to 100% renewable energy-based seawater desalination solutions relative to conventional fossil fuel-powered solutions.

3. Benchmarking and technology prioritization

Singh et al. [9] address how to implement energy-efficient technologies with a starting point in economic input-output lifecycle assessment with multi-objective interval portfolio theory. Based on their analyses, the authors find that incentives targeting switches to fluorescent tubes are feasible while the same is not the case for incentives targeting efficient refrigerators and television sets. In their analyses, the authors also assess the impact of conservative compared to aggressive investment strategies.

Establishing appropriate indicators can be beneficial to the monitoring and measurement of energy performance. It is however as argued by Jemmad et al. [10] difficult to establish universal indicators due to differences in units of physical indicators. Jemmad et al. propose an aggregated dimensionless indicator for energy benchmarking; a tool that in the future can be incorporated as a part of energy management and efficiency standards. The authors apply the energy indicator to two central departments of two Moroccan hospitals, enabling identification of processes increasing energy consumption the most, and thus aiding the prioritization of energy savings actions.

References

[1] Grundahl L, Nielsen S. Heat atlas accuracy compared to metered data. Int J Sustain Energy Plan Manag 2019;23. http://doi.org/10.5278/ijsepm.3174.

[2] Möller B, Nielsen S. High resolution heat atlases for demand and supply mapping. Int J Sustain Energy Plan Manag 2014;1:41–58. http://doi.org/10.5278/ijsepm.2014.1.4.

[3] Nielsen S. A geographic method for high resolution spatial heat planning. Energy 2014;67:351–62. http://doi.org/10.1016/j.energy.2013.12.011.

[4] Grundahl L, Nielsen S, Lund H, Möller B. Comparison of district heating expansion potential based on consumer-economy or socio-economy. Energy 2016;115:1771–8. http://doi.org/10.1016/j.energy.2016.05.094.

[5] Nielsen S, Grundahl L. District heating expansion potential with low-temperature and end-use heat savings. Energies 2018;11. http://doi.org/10.3390/en11020277.

[6] Meschede H, Hesselbach J, Child M, Breyer C. On the impact of probabilistic weather data on the economically optimal design of renewable energy systems – a case study on La Gomera island. Int J Sustain Energy Plan Manag 2019;23. http://doi.org/10.5278/ijsepm.3142.

[7] Sarkar D, Odyuo Y. An ab initio issues on renewable energy system integration to grid. Int J Sustain Energy Plan Manag 2019;23. http://doi.org/10.5278/ijsepm.2802.

[8] Caldera U, Bogdanov D, Fasihi M, Aghahosseini A. Securing future water supply for Iran through 100% renewable energy powered desalination. Int J Sustain Energy Plan Manag 2019;23. http://doi.org/10.5278/ijsepm.3305.

[9] Singh VK, Henriques CO, Martins AG. A multiobjective optimization approach to support end-use energy efficiency policy design – the case-study of India. Int J Sustain Energy Plan Manag 2019;23. http://doi.org/10.5278/ijsepm.2408.

[10] Jemmad K, Hmidat A, Saad A. Developing an aggregate metric to measure and benchmarking energy performance. Int J Sustain Energy Plan Manag 2019;23. http://doi.org/10.5278/ijsepm.3383.