



Aalborg Universitet

**AALBORG
UNIVERSITY**

Smart energy systems and 4th generation district heating systems

Østergaard, Poul Alberg; Lund, Henrik; Mathiesen, Brian Vad

Published in:
International Journal of Sustainable Energy Planning and Management

DOI (link to publication from Publisher):
[10.5278/ijsepm.2018.16.1](https://doi.org/10.5278/ijsepm.2018.16.1)

Creative Commons License
CC BY-NC-ND 3.0

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

[Link to publication from Aalborg University](#)

Citation for published version (APA):
Østergaard, P. A., Lund, H., & Mathiesen, B. V. (2018). Smart energy systems and 4th generation district heating systems. *International Journal of Sustainable Energy Planning and Management*, 16, 1-2.
<https://doi.org/10.5278/ijsepm.2018.16.1>

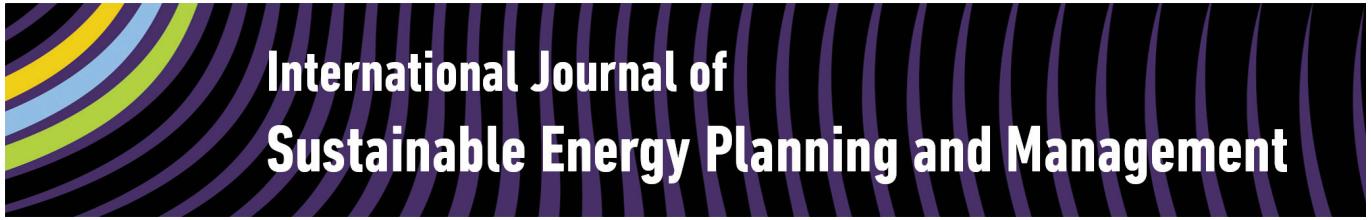
General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal -

Take down policy

If you believe that this document breaches copyright please contact us at vbn@aub.aau.dk providing details, and we will remove access to the work immediately and investigate your claim.



International Journal of Sustainable Energy Planning and Management

Editorial — smart energy systems and 4th generation district heating systems

Poul Alberg Østergaard^{*a}, Henrik Lund^a and Brian Vad Mathiesen^b

^aDepartment of Planning, Aalborg University, Rendsburggade 14, 9000 Aalborg, Denmark

^bDepartment of Planning, Aalborg University, A.C. Meyers Vænge 15, 2450 Copenhagen SV, Denmark

ABSTRACT

This editorial introduces the 16th volume of the International Journal of Sustainable Energy Planning and Management, which addresses different angles of district heating ranging from the planning of district heating systems and economic incentives for flexible district heating plants to comparisons between low and ultra-low-temperature district heating systems and methods for determining thermal conductivity in district heating pipes.

Keywords:

4th Generation district heating;
Spatial analyses;
Economics of district heating;
District heating pipes;

URL:

[dx.doi.org/10.5278/ijsepm.2018.16.1](https://doi.org/10.5278/ijsepm.2018.16.1)

1. Introduction

This editorial introduces the 16th volume of the International Journal of Sustainable Energy Planning and Management. This volume is a special issue from the *3rd International Conference on Smart Energy Systems and 4th Generation District Heating*, held in Copenhagen, Denmark in September 2017. Papers from previous conferences have been published in three previous special issues in this journal [1–3] as well as in the Elsevier journal Energy [4].

The conference series *International Conference on Smart Energy Systems and 4th Generation District Heating* is organized as an annual joint effort between the 4DH Strategic Research Centre in collaboration with Aalborg University, Denmark, with venues alternating between Aalborg and Copenhagen.

2. District heating and smart energy systems

In this volume, Knies [5] explores the dichotomy between individual buildings and over-all energy systems development from a planning perspective. Based on spatial data and fuzzy logic, Knies develops *suitability areas* that may be used in the process of planning for instance district heating systems.

Sneum & Sandberg [6] investigate economic incentives for flexible district heating in Denmark, Norway, Sweden and Finland. Using energyPRO simulations and energy market optimisation, they determined that cogeneration of heat and power (CHP) plants combined with electric boilers were preferable in the Norwegian, Swedish and Finish energy systems. In Denmark however, framework conditions are so that biomass boilers are preferable.

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

Best et al. [7] compare low-temperature (forward 70°C – return 40°C) and ultra-low-temperature district heating (forward 40°C – return 25°C) for the specific case *Zum Feldlager* in Germany. With half the ΔT for ultra-low-temperature district heating than for low-temperature district heating, flows increase calling for twice the pumping power and slightly larger pipe dimensions. Investments costs change marginally and the added auxiliary energy demand is small compared to the reduced district heating pipe losses and the improved operation of heat pumps supplying district heating.

Finally, Schuchardt et al. [8] investigate methods for determining the thermal conductivity of district heating pipes including both experimental work and numerical simulations of losses in their work.

Acknowledgements

The work presented in this volume of The International Journal on Sustainable Energy Planning and Management stems from the *International Conference on Smart Energy Systems and 4th Generation District Heating*. This conference is organised as an activity in the *Strategic Research Centre for 4th Generation District Heating (4DH)*, which has received funding from Innovation Fund Denmark (0603-00498B). As editors of the journal and as organisers of the conference, we acknowledge and appreciate the contributions from the reviewers that have assisted in improving the articles to the standard they have today.

References

- [1] Østergaard PA, Lund H. Smart district heating and electrification. *Int J Sustain Energy Plan Manag* 2017;12. <http://dx.doi.org/10.5278/ijsepm.2017.12.1>.
- [2] Østergaard PA, Lund H. Editorial - Smart district heating and energy system analyses. *Int J Sustain Energy Plan Manag* 2017;13. <http://dx.doi.org/10.5278/ijsepm.2017.13.1>.
- [3] Østergaard PA, Lund H, Mathiesen BV. Smart energy systems and 4th generation district heating. *Int J Sustain Energy Plan Manag* 2016;10:1–2. <http://dx.doi.org/10.5278/ijsepm.2016.10.1>.
- [4] Lund H, Duic N, Østergaard PA, Mathiesen BV. Smart energy systems and 4th generation district heating. *Energy* 2016;110. <http://dx.doi.org/10.1016/j.energy.2016.07.105>.
- [5] Knies J. A spatial approach for future-oriented heat planning in urban areas. *Int J Sustain Energy Plan Manag* 2018. <http://dx.doi.org/10.5278/ijsepm.2018.16.2>.
- [6] Sneum DM, Sandberg E. Economic incentives for flexible district heating in the Nordic countries. *Int J Sustain Energy Plan Manag* 2018;16. <http://dx.doi.org/10.5278/ijsepm.2018.16.3>.
- [7] Best I, Orozaliev J, Vajen K. Economic comparison of low-temperature and ultra-low-temperature district heating for new building developments with low heat demand densities in Germany. *Int J Sustain Energy Plan Manag* 2018;16. <http://dx.doi.org/10.5278/ijsepm.2018.16.4>.
- [8] Schuchardt GK, Kraft S, Narften M, Bagusche O. Development of an empirical method for determination of thermal conductivity and heat loss for pre-insulated plastic bonded twin pipe systems. *Int J Sustain Energy Plan Manag* 2018;16. <http://dx.doi.org/10.5278/ijsepm.2018.16.5>.