Electricity grid tariffs as a tool for flexible energy systems: A Danish case study

Electricity grid tariffs are a lever for reinforcing the coupling of district heating systems to the electricity system and for activating flexibility from power-to-heat (P2H) technologies and storage capacities. This study assesses three tariffs that permit a flexible use of electric boilers in a representative district heating system in Denmark. A mixed integer programming model is developed to evaluate the impact of each tariff on district heating flexibility quantitatively. The tariffs are then discussed in the light of the regulatory requirements that network tariffs must comply with. We show that alternative tariffs enhance the business case for P2H technologies to run flexibly, support the replacement of fossil fuels by green electricity and lower the overall cost of supplying heat. The attributes of each tariff create significant trade-offs between simplicity of implementation, cost efficiency at the distribution-grid level and cost-recovery for distribution system operators. Ultimately, new tariffs should be designed based on the characteristics of their respective groups of users in acknowledging features such as flexibility potential, substitutability between energy sources and captivity.

General information
Publication status: Published
Organisations: Energy Economics and Regulation, Sustainability, Department of Technology, Management and Economics, Energy Systems Analysis
Corresponding author: Bergaentzlé, C.
Contributors: Bergaentzlé, C., Jensen, I. G., Skytte, K., Olsen, O. J.
Pages: 12-21
Publication date: 2019
Peer-reviewed: Yes

Publication information
Journal: Energy Policy
Volume: 126
ISSN (Print): 0301-4215
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
Original language: English
Keywords: Flexibility, Dynamic grid tariff, District heating, Regulatory principles, Electrification
DOIs: 10.1016/j.enpol.2018.11.021
Source: FindIt
Source ID: 2441661433
Research output: Contribution to journal › Journal article – Annual report year: 2019 › Research › peer-review