

Popular science summary of the PhD thesis

PhD student	Kyriaki Foteinaki
Title of the PhD thesis	Models for flexible building operation in the Nordhavn district energy system
PhD school/Department	Civil Engineering

Science summary

* Please give a short popular summary in Danish or English (approximately half a page) suited for the publication of the title, main content, results and innovations of the PhD thesis also including prospective utilizations hereof. The summary should be written for the general public interested in science and technology:

Energy flexibility is proposed as a way to facilitate the management of the energy system while integrating a large proportion of renewable energy sources. The residential building sector has a great potential for flexibility, as it is responsible for a very large share of all energy consumption, and part of this energy demand can, with appropriate control, be shifted in time, in order to increase the flexibility of the demand side. This thesis forms part of the “EnergyLab Nordhavn ” project, which is a smart city research and demonstration project based on the newly developed Nordhavn district in Copenhagen, Denmark. The aim of the thesis was to investigate the physical potential of low-energy buildings to facilitate flexible heating operation by using the thermal mass of the buildings as heat storage, while maintaining thermal comfort. The thermal behaviour of low-energy buildings was analysed in detail and the physical potential for energy flexibility was determined, identifying the influential factors. The operational flexibility potential of low-energy buildings investigated and methodologies were proposed that made it possible for the heating system to be operated in such a way as to meet the flexibility requirements of the local district heating system. In addition, creating realistic daily household electricity demand profiles was undertaken as the basis for flexibility modelling of electricity household loads, i.e. rescheduling the use of domestic appliances and electricity-based heating systems.

The thermal behaviour of low-energy buildings, their physical and operational potential for energy flexibility, taking into consideration the relation of the building with the energy system and the occupants’ activities, are considered to be a step forward in the use of low-energy buildings in future energy systems.

Please email the summary to the PhD secretary at the department