Case Studies

https://heatpumpingtechnologies.org/annex57/

ANNEX 57

Flexibility by implementation of heat pumps in multi-vector energy systems and thermal networks

Demo No.: D-006	Location/City: Eskilstuna	Country: Sweden

Project name (short and full title): Flexi-Sync (Flexible energy system integration using concept development, demonstration and replication)
WP4: Implementation of flexibility at the demo sites

Quotation: Flexi-Sync aims to optimize the flexibility in the district energy sector, a sector with untapped potential to balance the energy system.

Schedule of the demo project (research study): 2019-2022, live test at demo site performed during 2022	Year of realisation:

Leader organisation (owner, constructor, solution developer, research inst., etc.):
IVL Svenska Miljöinstitutet, for the Flexi-Sync project
Utilifeed, for WP4

Participating organisations – demonstration project part (involved other organisations):
Eskilstuna Energi, Eskilstuna kommunfastigheter, NODA Intelligent Systems, Utilifeed (involved in the Eskilstuna demo site, for all project partners in the project, see https://www.ivl.se/projektwebbar/flexi-sync.html)

Budget of the demo (invest/monitoring etc.):

Summary of the project:

Flexi-Sync
The Flexi-Sync project has gathered academics and industry representatives with a shared vision to increase and optimize the use of both demand and supply side flexibility in district heating and cooling systems – an invaluable asset to attain energy system decarbonization. The types of flexibility considered in the project are:
i) combined heat and power plants, heat pumps, the district heating network, and centralized thermal energy storages on the supply side, and
ii) individual heat pumps and thermal inertia of buildings serving as storage on the demand side.

WP4
The goal of the work package was to demonstrate implementations of optimized flexibility at the demo sites in the project. The primary method for achieving this has been to develop a cloud-based solution that handles the end-to-end (end-user to energy company) optimisation and utilise it in the tests at the demo sites. The work was mainly performed by project partners Utilifeed and NODA in close collaboration with the demo site partners.

Demonstration in Eskilstuna
One of the demo sites in the project was two buildings in Eskilstuna that have both district heating and individual heat pumps. These buildings were equipped with Noda's control system and through that, connected to Utilifeed's platform. The heat pumps in

the buildings could then be turned on or off, based on if the marginal production cost of district heating was cheaper than producing heat with the heat pumps or not. This calculation was performed as a part of Utilifeed's optimization software that was developed within the project, which aims to lower the operational costs from a system perspective. The actual optimizations were performed by the Eskilstuna Energi in Utilifeed's platform, and the control of the heat pumps was made automatically.

Results
(the project has finished)
- Operational optimisation with demand flexibility is proven to work in practice, it is economically viable and can significantly reduce CO2 emissions.
- **Easy control of building heat pumps by the energy company, with a connection to the flexibility provider**
- **Lower total production cost, due to increased flexibility in the heating system**
- **An optimization software that can handle demand side flexibility (like building heat pumps)**

Published articles (paper, article etc.):
https://www.sciencedirect.com/science/article/pii/S2352484721007484

Contact information

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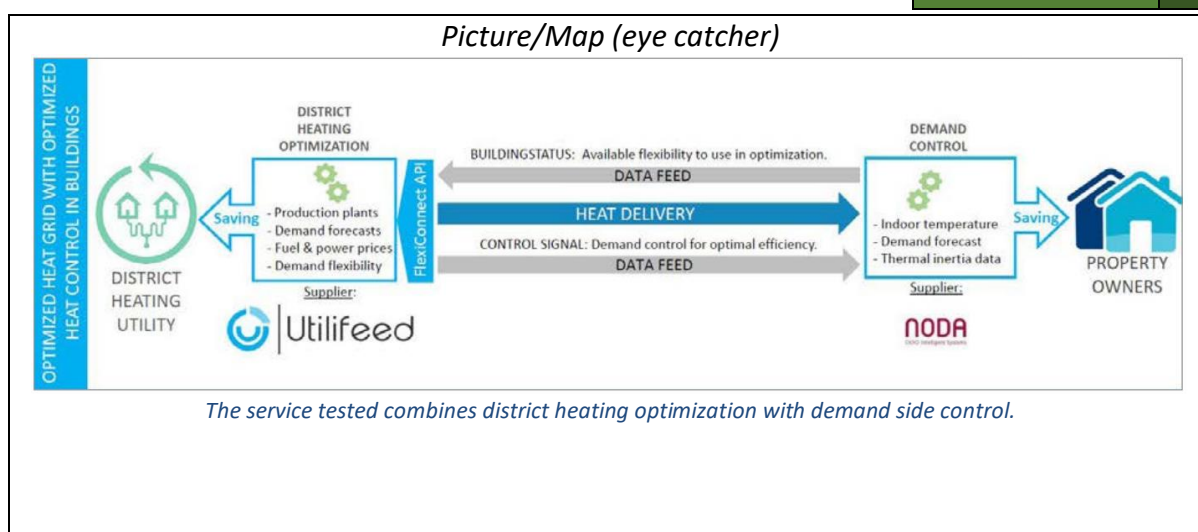
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Picture/Map (eye catcher)

The service tested combines district heating optimization with demand side control.

Homepage address: https://www.ivl.se/projektwebbar/flexi-sync.html

https://www.utilifeed.com/

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