Case Studies

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ANNEX 57

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

DACS-HW, the Netherlands

Digital aggregation and flexible control of hybrid heat pumps in a district

Key Facts

RD&D Status: applied research on Large-scale demonstration

Type of heat pump:
Decentralized flexible hybrid heat pumps

Building description:
Residental

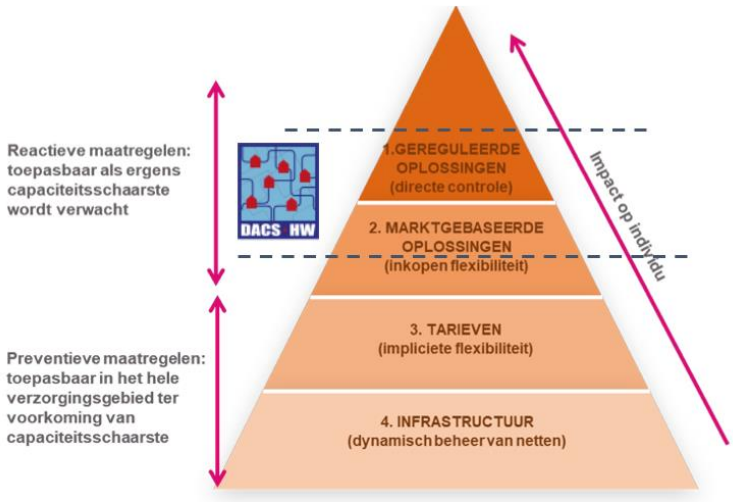
Energy distribution System:
Electric and gas infrastructure

Energy Storage:

Control for the flexible heat pump operation:
Algorithm that can control GOPACS call, from group bidding to implementation of flex capacity at LS level.

General description:
Number of heat pumps:
Up to 100 Hybrid heat pumps behind one district transformer

Heat Source:



Summary of the project:

Due to the high energy prices and the government's push of hybrid heat pumps, it is expected that around 2030, more than 300,000 households per year will purchase a hybrid heat pump. It is expected that congestion will occur on the low-voltage grid (LS-grid) (both supply and demand). This problem is only getting worse given the sustainability and further electrification. Congestion on the LS network is mainly caused by small consumers (KV) = households. Challenges are: large numbers of customers with multiform energy profiles and relative unpredictability and the (legally) very limited possibilities for grid operators to take control. ACM recently introduced the congestion management code decree. Which leads to a new role; congestion service provider (CSP), which aims to involve the KV segment in congestion management. This project responds to this.

The aim of this project is to develop a technology for hybrid heat pumps based on an open standard, whereby a collective of small consumers can contribute to congestion management by means of a CSP via a market platform (GOPACS). Aim is to control up to 100 HWPs behind one district transformer to prevent congestion on the LS network. Aggregation of a collective of small consumers to contribute to GOPACS through a CSP.

The philosophy is that (A) the rate must first apply as an incentive (dynamic rates), then (B) a request for flex can be made and if that is not sufficient, (C) the use of an emergency measure (power limitation) is used.

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This is done by focusing on the following aspects:

Technical: measurement and control technology, firmware of heat pumps, development of open communication protocol, collective cloud platform for handling transactions, data aggregation and dashboarding, link with GOPACS

Financial-economic: avoided costs for network operator, financial incentive and attractiveness for residents, coherence with other (financial) incentives and the revenue model and organisational interpretation of the CSP as a new aggregator role.

This project yields the following:

1. Instrument (new generation of hybrid heat pumps) to prevent congestion on LS-net in neighbourhoods that fits within the congestion management system recently set up by ACM.

2. Additional price instrument for residents (in addition to gaining benefits via current routes that are "behind the meter", such as dynamic rates, flex services and/or soon bandwidth model). Fulfilling the role of CSP.

3. Standard (open) protocol for controlling heat pumps (**brand and type independent**) with which remote collective control is possible.

4. Interface for residents in which resident parameters (app) are linked to device (firmware manufacturer) and made dynamically controllable.

5. Algorithm that can control GOPACS call, from group bidding to implementation of flex capacity at LS level.

Unique to this project is the extent to which residents themselves influence the "flex capacity" in relation to their desired comfort profile. The resident parameters form the basis of the development activities.

FACTS ABOUT THE PROJECT

Place: the Netherlands/Dalen

Time Frame: 2023-2025

Project owner/ leader:
Enablemi, Enexis, Intergas

Project partners:
Enablemi, Enexis, Intergas, Inversable, SamenEnergie, TUE, Voorstroom

Contact Information/Links

Dacs-HW.nl

Published articles:

Digitale Aggregatie en Collectieve Sturing van Hybride Warmtepompen - Topsector Energie

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