Case Studies

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ANNEX 57

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

IKEA Aalborg, Aalborg Denmark

"To have a CO2 neutral cooling production for the warehouse and use of excess heat from the cooling production in the district heating system."

KEY FACTS

RD&D Status:
Large-scale demonstration

Type of heat pump:
Decentralized HP with district heating-system 1,2MW and 750 kW cooling

Building description:
Warehouse

Mix of new and existing.

Energy distribution System:
District heating / District Cooling. Electricaal connected to the grid.

Energy Storage:
Distrinct heating grid

Control for the flexible heat pump operation:
Predictive control

General description:
Number of heat pumps:
1 W/W + 1 A/W

Total capacity 1.2 MW Heating and 750 kW cooling

Heat Source:
Excess heat/Ground/Air

Air

Source temperature:

? to -2/3 °C

Summary of the project:

IKEA Aalborg and Aalborg Forsyning's CO2 emissions will be reduced when the department store replaces its traditional cooling system with remote cooling from Aalborg Forsyning. District cooling is both cheaper and more climatefriendly than traditional cooling, and thus completely in line with IKEA's focus on sustainability.

"The climate benefits have been decisive for our choice of the new district cooling system from Aalborg Forsyning. The facility will be a step on the way to 2030, when IKEA must be a climate-positive, circular business," says thewarehouse manager at IKEA Aalborg.

Expected results:

- Technical capacity of approx. 1MW with the option to expand if more customers are interested.
- The plant has a total CO2 saving of between 1120-1950 tons in the period 2022-2028.
- The excess heat from the system can annually heat up what corresponds to approx. 480 ordinary houses.

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Energy supply scheme:

The heat pump is a water-to-water heat pump and is built into a sound box completely assembled from the factory. The heat pump extracts heat through 56 x 330 meter geothermal wells. In interaction with the electric and oil boiler, this setup gives the customer the opportunity to produce hot water with a heat pump solution with CO_2 as coolant. The plant is equipped with ejector technology and controlled by Fenagy's PLC, which can control both the capacity and the evaporators.

There are four outdoor air energy collectors, developed in collaboration with Güntner and set up on 2 m legs mounted on point foundations with fascine for defrosting water. The heat pump supplies 750 kW refrigeration capacity to the warehouse four months a year, and heat production is supplied to the district heating network.

The heat pump has been delivered and commissioned in February 2022.
1 water/water heat pump, 1 Air/water Heat Pump

Flexibility – scheme and control strategy of the system:

The alborg Forsyning (District heating) has built a local energy center on the IKEA site with an electric heat pump, which initially has a cooling effect of just under 1 MW. The heat pump produces district cooling for IKEA, and at the same time the excess heat from the process is utilized. The heat produced at the plant is fully utilized by Aalborg Forsyning, which uses the heat directly in the district heating system to heat buildings in Aalborg. Compared to conventional cooling, the system is very efficient, as the excess heat is used as district heating.

FACTS ABOUT THE PROJECT

Place: Denmark/Aalborg

Time Frame: Start 2022

Project owner/leader:

Aalborg District Heating

Project partners:

Owner: Aalborg District Heating,

(Design/production): Fenagy A/S,

Installation: Krebs A/S

Contact Information/Links

Aalborg Forsyning

Aalborg Fjernvarme:

https//:aalborgforsyning.dk

Published articles:

N/A

IEA Technology Collaboration Programme on Heat Pumping Technologies (HPT TCP)

Delivered by:

Team Denmark