Case Studies

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ANNEX 57

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

Hallein, Austria

"Investigate and demonstrate the integration of an absorption heat in a biomass cogeneration plant for waste heat utilization"

KEY FACTS

RD&D Status:
Large-scale demonstration

Type of heat pump:
Centralized HP with district heating-system for heating

Building description:
mixed of residential and non-residential.

Mix of new and existing buildings

Energy distribution System:
District heating

Energy Storage:
Centralized Thermal (in heat distribution network)

Control for the flexible heat pump operation:
Rule based control.

General description:
Number of heat pumps:

Absorption HP: 8 MW

Sink temperature: 90/63°C.

Heat Source:
Flue gas condensation
Source temperature: 60/30 °C

Summary of the project:

Salzburg AG operates district heating networks (DHNs) in Hallein and Salzburg. The city centres of Hallein and Salzurg are ≈20km away from each other. Since the capacity of the heat generation plats and the waste heat potential in Hallein is higher, than the demand, the two DHNs were connected in Elsbethen (between Hallein and Salzburg). Therefore, it is possible to transfer heat from Hallein to Salzburg to reduce the load on the plants supplying Salzburg and to increase the flexibility of the heat supply.

One of the flexibility measures in the district heating network in Hallein covers the implementation of an absorption heat pump (AHP) to increase the waste heat utilisation of unusable waste heat of a largescale waste heat source at the cellulose manufacturer AustroCel. As the low-temperature heat source for the AHP the flue gas of a biomass cogeneration plant is used.

Result of the project:

Reductions: For an annually delivered heat of ≈51.5 GWh (2021) to the heat distribution network the emission would have been ≈**10300 tCO2** due to a standard CO2-emission of the average Austria district heating networks. It's reduced to ≈**200 tCO2**,äq, by integrating the AHP.

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Energy supply scheme:

The heat supply in the district heating network in Salzburg is supplied by 9 cogeneration plants which are powered by natural gas, oil and biomass. In the last years the amount of natural gas an oil was reduced and of biomass increased. Furthermore, waste heat potentials are located and if possible integrated into the district heating network. Therefore, the share of renewable sources should be significantly increased in the coming years.

Flexibility – scheme and control strategy of the system:

Various heat generation plants, which are partially cogeneration plants, supply the DHNs of Hallein and Salzburg. Biomass, waste heat, natural gas and fuel oil are used as energy sources. Due to optimisations in the last years, the use of fuel oil has been reduced to a minimum. The plants are selected for operation are chosen based on a superordinate operation strategy. This strategy includes, among others, the operating costs of the plant and the fuel, the current load and the expected load profile as well as the CO_2emissions related to the operation of the plant.

FACTS ABOUT THE PROJECT

Place: Austria / Hallein (Salzburg)

Time Frame: Start 2020

Project organisation:

Owner/leader:

Salzburg AG

Project partners:

Salzburg AG, Graz University of Technology.

Contact Information/Links

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Published articles:

Absorptionswärmepumpe zur Abwärmenutzung - Modellierung einer Anlage zur Rauchgaskondensation in einem Biomasseheizkraftwerk / Philipp Wagner, Christoph Astl, René Rieberer / Deutsche Kälte- und Klimatagung 2022 / 2022 / Magdeburg / Deutsch / 14 Seiten

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