

“DISTRICT-BOOST” (VIENNA)



Summary of the project

The Wien Energie GmbH operates the district heating and cooling networks in Vienna. The district heating network consists of a primary district heating network with a pipe length of about 550 km and several secondary district heating networks with a total pipe length of about 600 km. The current all-time high of produced heating capacity is about 2 400 MW.

The flow temperature of the primary district heating network varies according to the ambient temperature between 80 °C and 145°C. The return temperature of the primary district heating network is about 60 °C and varies with the ambient temperature. The various secondary district heating networks are mainly used to connect a large amount of consumers. The heat for the secondary district heating networks is supplied by the primary district heating network with heat exchange stations. The flow temperature of the secondary district heating networks varies according to the ambient temperature between 63 °C and 90 °C.

In the year 2014 the Wien Energie GmbH decided to test the installation of a heat pump as a heat exchange station. This project has been called “District-Boost”. The heat source of the heat pump is

”THE UTILIZATION OF A HEAT PUMP AS HEAT EXCHANGE STATION BETWEEN TWO DISTRICT HEATING NETWORKS IS AN OPPORTUNITY TO REDUCE THE RETURN TEMPERATURE WITHIN THE PRIMARY DISTRICT HEATING NETWORK”

connected with the in- and outlet to the return pipe of the primary district heating network via an additional hydraulic circuit. The inlet of the heat sink is connected to the return pipe of the secondary district heating network and the outlet of the heat sink is connected to the supply pipe of the secondary district heating network. This configuration enables heat supply from the primary district heating network into the supply pipe of the secondary district heating network. To guarantee that the outlet temperature of the heat sink reaches the required flow temperature of the secondary district heating network an admix-



ing circuit is used which is hydraulically separated from the district heating network with a thermal storage.

Within the project "District-Boost" the compression heat pump (IWHS 240 R3) manufactured by the company Ochsner is used. The nominal heating capacity is about 255 kW and the efficiency at a heat source temperature of 45/35 °C and a heat sink temperature of 63/75 °C is about COPH=5.3. This heat pump uses the refrigerant ÖKO1 and is equipped with a screw compressor.

Results

- The installed compression heat pump is sensitive to fluctuations of volume flow and temperature, some parameters of the internal control have been adapted and an external control of the inlet temperatures of the sink and source was necessary
- Part load behavior is only in steps of 50 %, 75 % and 100 % possible

References

Höller, 2016 Höller, M., 2016, Einsatz von Wärmepumpen im Wiener Fernwärmenetz, 2. Praxis- und Wissensforum Fernwärme/Fernkälte, Präsentation, 15.11.2016

Ochsner, 2015 Ochsner, K., 2015, Energieeffizienz mit Hochtemperatur-Wärmepumpen in der Prozess-Industrie, European Heat Pump Summit, Nürnberg

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FACTS ABOUT THIS PROJECT

Building type: Residential buildings

Installed heat capacity [kW]: heat exchanger 2 x 1000 kW, heat pump 255 kW

Heat source: Return pipe of the primary district heating network

Investment cost: -

Participating countries: Austria

Time frame: In operation since 2014

Project organisation: Wien Energie GmbH, Wiener Stadtwerke (FTI-Fonds), Austrian Institut of Technology (AIT)

Link to web page or report:

https://www.ait.ac.at/fileadmin/mc/energy/downloads/News_and_Events/2016_11_15_2.Praxis_und_Wissensforum_FWK/C1a_Hoeller_WE_district-boost_Vortrag_AIT_2_Praxis_und_Wissensforum_Fernwaerme_Fernkaelte_161115.pdf

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