DISTRICT HEATING NETWORK TAMSWEG - AUSTRIA
Fernwärmenetz Tamsweg

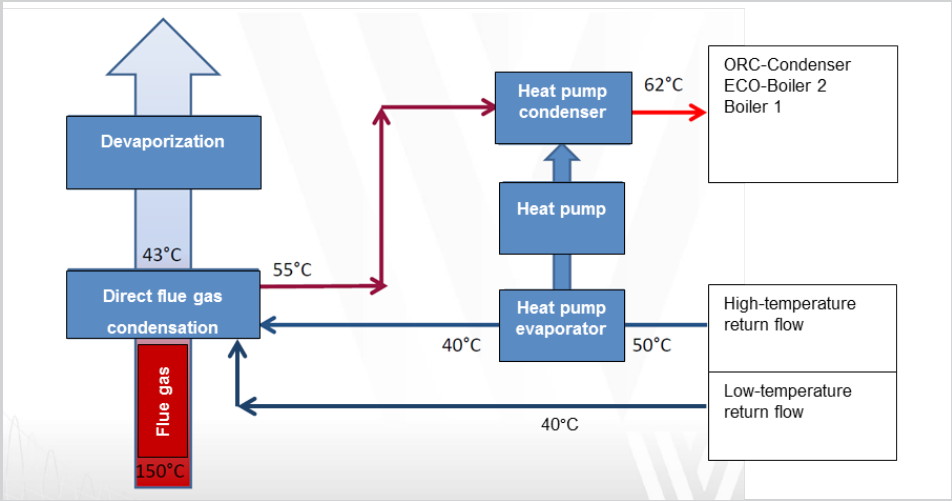

Fig 1: Hydraulic connections of the heat pump with typical temperatures [Kronberger, 2015].

Summary of the project

The district heating network in Tamsweg is operated by the Fernwärmeversorgungs GmbH. The district heating network has a pipe length of at least 22 km with about 480 connections. The flow temperature varies in dependence of the ambient temperature between 90 °C und 100 °C. The district heating network has two return pipes as some customers (hospital, retirement home, indoor swimming pool,...) are able to use heat at lower temperature as in residential buildings. The return temperature of the low temperature return flow is about 40 °C and the return temperature of the high temperature return flow is about 50 °C.

The district heating network in Tamsweg started with heat supply in the year 1996 with a biomass heating boiler with a heating capacity of 5 MW. They installed another biomass heating boiler with 3 MW in 2016. Furthermore, there is an ORC-cycle (thermo-oil) with a heating capacity of 3 MW and an electrical power output of 600 kW installed. Since 2012 a heat pump with 0.9 MW heating capacity is used. Furthermore 3 thermal storages with a volume of 210 m^3 are used within the district heating network to compensate load fluctuations.

The use of flue gas condensation was already possible before the installation of the heat pump with the

" A HEAT PUMP USING THE RETURN FLOW OF A DISTRICT HEATING SYSTEM AS HEAT SOURCE AND HEAT SINK ALLOWS AN INCREASE OF WASTE HEAT RECOVERY WITHOUT ANY CHANGES AT THE EXISTING FLUE GAS CONDENSATION HEAT EXCHANGERS "

low-temperature return flow of the district heating network. At that time the amount of flue gas condensation was limited by the low-temperature return flow rate.

Due to the installation of the heat pump the amount of flue gas condensation has been increased. For this the high-temperature return flow is cooled by the evaporator of the heat pump to or below the temperature of the low-temperature return flow depending on the high-temperature return flow rate. Thus a higher return flow rate at a lower temperature level can be used for flue gas condensation. After the flue gas condensation heat exchanger the return flow is fur-

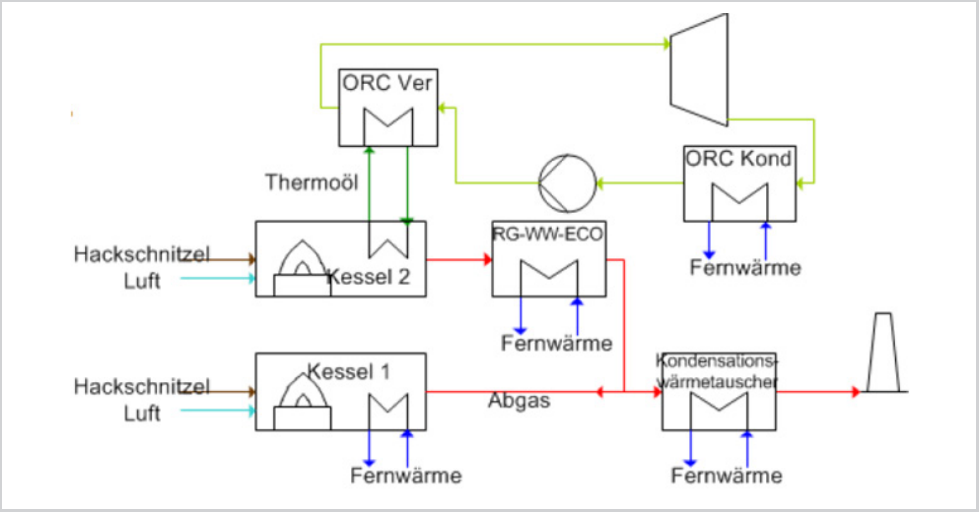

Fig 2: Heat generators in the district heating network Tamsweg without the heat pump [Hebenstreit and Höftberger, 2015].

ther heated with the condenser of the heat pump, the condenser of the ORC-process, the economizer of the second biomass boiler and finally the first biomass boiler.

The heat pump was manufactured by the company Frigopol with a heating capacity of about 0.9 MW and a COP_H of about 6 at an evaporator inlet/outlet temperature of 45/40 °C and a condenser inlet temperature of 58 °C. The heat is used to raise the return flow of the district heating network. The heat of the heat source is taken from the return flow before the heat exchanger for direct flue gas condensation. The heat pump uses R 236fa as refrigerant with 8 compressors (semi-hermetic piston compressor) for continuously heating capacity control between 20-100 %.

Results

- Due to the installation of the heat pump the heating capacity generated by flue gas condensation is doubled and thus the overall heating capacity of the district heating network is increased.
- The efficiency is increased and the costs of the heat production are reduced.

References

Kronberger, 2015

Kronberger, B., 2015, Wärmepumpeneinbindung und Gesamtanlagenoptimierung am Beispiel des FHKW Tamsweg, Voigt+Wipp Engineers GmbH, Toblach.

Hebenstreit and Höftberger, 2015

Hebenstreit, B., Höftberger, E., 2015, Einbindung von Wärmepumpen in Rauchgaskondensationsanlagen, BioEnergy2020+, Gleisdorf

File compiled by Arnitz, A., Rieberer, R., Institute of Thermal Engineering, Graz University of Technology, 18.12.2017

FACTS ABOUT THIS PROJECT

Building type: Residential, commercial and tourism buildings

Installed heat capacity [kW]: 48 900 (900 heat pump)

District heating network: 480 connected customers

Heat source: Return flow of the district heating grid

Investment cost: 300 000 EUR (heat pump, hydraulic connections)

Participating countries: Austria

Time frame: In operation since 2012

Project organisation: Fernwärmeversorgungs GmbH Tamsweg, BIOENERGY2020+ GmbH, Frigopol Energieanlagen GmbH, VOIGT+WIPP Engineers GmbH

Link to web page or report: http://www.seegen.at/uploads/media/Einbindung_von_Waermepumpen_in_Rauchgaskondensationsanlagen_BE2020.pdf (in German)

Contact information

Rainer Richard, Fernwärmeversorgungs GmbH Tamsweg
☎ +43 6474 2929
fhw.tamsweg@sbg.at