Waste water as heat source

This case study is part of a project catalogue produced by ReUseHeat to provide inspiration on how to utilize excess heat from urban sources for heating and cooling purposes. The catalogue contains 25 existing or planned projects out of which 12 cases are Danish and 13 cases are from other European countries[2].

Facts about this case

Installed heat capacity: 10,000 kW
Heat source: Waste water (20-25 °C)
Heat pump COP: 3.6-4.0
Annual operation hours: 8000 hours the first two years and 900 hours after 2019.
Investment cost: € 7.25 M
Savings: € 33,600 per week until 2019

Period: Finished in 2017
Organization: Kalundborg Forsyning A/S
District heating network: 5010 consumers
Link to web page: https://www.kalfor.dk/

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Source: Kalundborg Forsyning [1]

Description

In 2017 operation of a 10MW electric heat pump, utilizing heat from waste water to produce district heating, was initiated in Kalundborg. It is currently the largest heat pump facility in Denmark.

The heat pump has an important role in the city, as the nearby central power plant Asnæsværket, is set to convert from coal to biomass. During the conversion period, the heat pump will supply the local district heating network with 30% of the total heat production. Afterwards the heat

pump is supposed to cover 10% of the heat production and act as a peak- and reserve load. The conversion of Asnæsværket is expected to be finished at the outset of 2019. The heat pump utilizes heat from the nearby waste water treatment plant with waste water temperatures above average, due to the local industries Novo Nordisk and Novozymes. The heat pump is the final part of a setup, which utilizes the waste water three times:

- Firstly, it is utilized at Novozymes, where organic content is withdrawn from the waste water and used for biogas production.
- Secondly, the waste water treatment plant utilizes the temperatures between 20-35 degrees Celsius to accelerate biological processes.
- Thirdly, the waste water with a temperature between 20-25 degrees Celsius is recovered in the heat pump. The waste water is cooled approximately 10 degrees Celsius in the heat pump.

The heat pump facility is set to replace two obsolete oil-fired peak- and reserve load boilers of 5.1MW and 8.7MW from 1968 and 1975. By replacing natural gas from oil boilers, the heat pump contributes with energy and CO_2-savings, benefiting both consumers and the environment.[2]

References

1. Kalundborg Forsyning
2. Handbook - 25 cases of urban waste heat recovery