

Energy optimization in a supermarket in Høruphav, Denmark

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

Heat source: Heat from cooling in supermarkets
Heat delivery: 16 standard households of 130 m²
Energy optimization: Heat recovery system, PV-system installed on roof, LED-lighting
Investment costs: € 7400 (Heat recovery system only)
Annual savings: € 27,000
Payback period: Less than one year

Period: Finished in 2015
Link to web page:
<http://www.sonderborg-fjernvarme.dk/>
<http://refrigerationandairconditioning.danfoss.com>
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Source: Danfoss^[1]

Description

A fire at the local supermarket in Høruphav on the island of Als near Sønderborg forced subsequent renovations. Multiple energy optimization potentials were found, including a low-temperature heat recovery system. Since 2015, excess heat from the supermarket refrigeration system has been delivered to the local district heating company, Sønderborg Fjernvarme. The new refrigeration system has been installed at the local supermarket SuperBrugsen in

cooperation with Danfoss and Sønderborg Fjernvarme. Heat recovery from the cooling system is capable of supplying the entire store with space heating and hot water. The cooling system is a CO₂-refrigeration unit. Hereby, gas cooling temperatures are increased compared to traditional refrigeration systems, and excess heat can be utilized directly in the district heating network. There is accordingly no need for additional heat pumps to increase the temperature. As a supplement to the refrigeration system a 1.8m³ hot water storage tank with a reference temperature of 65 degrees Celsius has been installed. CO₂-emission are reduced by 34 % by utilizing excess heat from the refrigeration system compared to the previous gas-based system.

As the supermarket heating system is designed for low-temperature operation, the payback period of the total investment is below 12 months. Hereby lower temperatures are required to heat the store and less energy is consumed in the refrigeration system. When the refrigeration system is paid for, excess heat can be sold to the local district heating company with economic benefits for SuperBrugsen in Høruphav. The heat recovery system investment was approximately EUR 7400 including the necessary piping but without the refrigeration system and the new low-temperate heating system. The annual saving is approximately EUR 27,000 depending on the actual cooling needs.

There is a large potential in not only Denmark, but worldwide, for supermarkets to become an integrated part of district heating. Excess heat can be used both internally in the supermarket and delivered to the district heating network consumers, resulting in large energy savings. SuperBrugsen in Høruphav can supply approximately 16 standard households of 130m² annually.

In addition to the heat recovery system, the supermarket installed a 50 kW PV-system that covers approximately 5% of the annual in-store electricity consumption. The investment costs for the PV-system was approximately EUR 54,000 with a payback period below 10 years. Super-Brugsen replaced their old lighting system with LED lighting resulting in annual electricity saving of approximately EUR 2700. The LED lighting further reduce the cooling demand in the hottest months, as lighting temperatures are lowered.^[2]

References

1. [Danfoss](#)
2. Handbook - 25 cases of urban waste heat recovery