

Open District Heating

Recover excess heat and sell it to Fortum Värme

There is a large amount of surplus heat in Stockholm that no one is making use of. With Open District Heating we can recover the heat instead of using fans to carry it away. Our innovative business model enables companies to convert costs into revenue. We offer long-term and transparent terms for trade in excess heat and capacity in heating and cooling systems.

Large as well as small companies and businesses, whatever their circumstances, can participate in the scheme to sell their excess heat to Open District Heating. The aim is always to achieve profitability and efficiency for both suppliers and Fortum Värme.

All companies and businesses which have excess heat and are located close to our district heating or district cooling networks are able to sell energy to us at the market price. While we have been

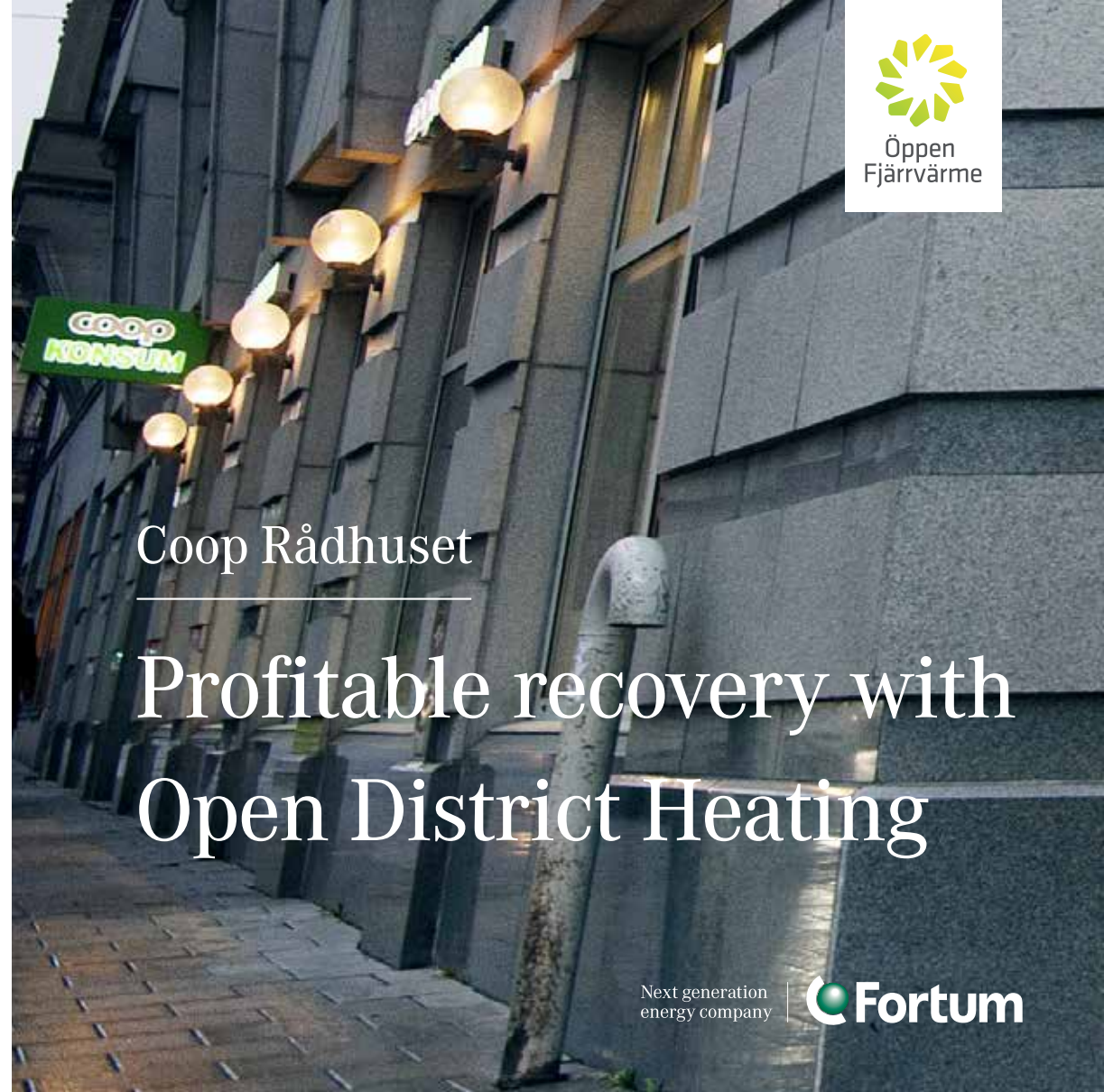
developing the new business model for recovered heat we have simultaneously been laying the foundations for the next generation of urban energy systems. We hope that Open District Heating will in future lead to more sustainable cities in Sweden and internationally.

Open District Heating has been developed by Fortum Värme together with, among others, the City of Stockholm, Bahnhof, Coop, ICA, Stiftelsen Stora Sköndal and Hemköp.

The value of Open District Heating to food companies:

- cost-effective solution for process cooling
- opportunity to create redundancy in the cooling system for increased reliability
- heat recovery forms part of sustainability efforts

PHOTOGRAPHY: KRISTINA SAHLÉN



Öppen
Fjärrvärme

Coop Rådhuset

Profitable recovery with Open District Heating

Next generation
energy company



Next generation
energy company





Coop Rådhuset

Recovery for the public good by environment friendly grocery store

Coop Rådhuset at Kungsholmen in Stockholm is the first grocery store to have a carbon dioxide based cooling system that delivers its excess energy to Fortum Värme through Open District Heating. The starting point is the store's modern cooling system for refrigerated display cabinets and freezers, which utilises carbon dioxide as the cooling medium – one of the natural substances taking over in the cooling sector as synthetic cooling mediums are being phased out on environmental and climate grounds.

The most important reason for Coop Fastigheters's participation in Open District Heating is the public benefit that is generated when energy which would otherwise be wasted is instead made available to others. Profitability was also a deciding factor, so that both financial and environmental rewards could be achieved in parallel.

For Coop Fastigheter, which manages the store property, it was somewhat a surprise that the existing cooling equipment turned out to be very suitable for heat recovery to the district heating

system. Only some minor work and a moderate investment were required for the adaptation.

The shop's cooling system is directly linked to the district heating network and via the secondary circuit also to the district cooling network in order to enable heat recovery of all condenser energy in two steps. In this way, 50% of the excess heat can be recovered to the district heating network, while 50% can be recovered as residual heat in the district cooling network. The residual heat is utilized in heat pumps in Fortum Värme's plants. Previously, the store has been using cooling medium chillers to allow the excess heat to escape into the open air. District cooling also improves the performance of the cooling plant – both the output and efficiency increases.

» The profitability of the heat recovery project has exceeded our expectations.

Lars Blom, Coop Fastigheter

Thanks to the connection to Open District Heating the cooling medium chillers on the roof have gone quiet, which is appreciated by the neighbours in nearby homes. An obvious added value of Open District Heating. One factor in the success of Coop Rådhuset's conversion to Open District Heating has been the relationship with the owner of the property.

» In addition to the environmental gains we have achieved by recovering waste energy, we can also see the practical advantage of using a technically superior method to dispose of surplus heat.

Lars Blom, Coop Fastigheter

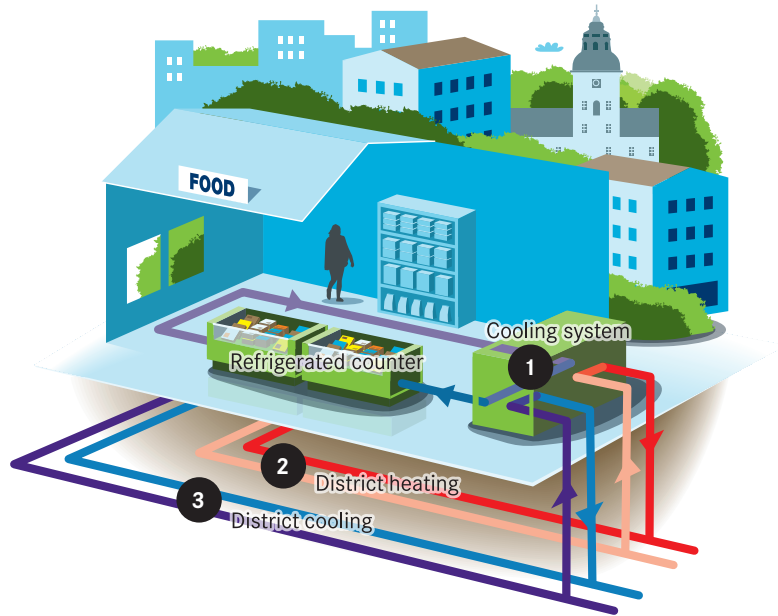
“The fact that we were able to involve them and get them to participate in the process turned out to be very important for the implementation. My advice to others in a similar position is to make contact with the property owner at an early stage,” said Lars Blom, project manager and controller at Coop Fastigheter.

For Coop Fastigheter, the Coop Rådhuset project is important in a larger context. Carbon dioxide machines, which are becoming increasingly common in the food industry, easily achieve high temperatures in the surplus heat they generate. The concept of energy recovery for the district heating network is therefore something that may be considered for many Coop stores in the future.



Facts

Open District Heating for Coop Rådhuset



❶ Refrigeration and freezing plant with CO₂ (R744) as cooling medium.

❷ Excess heat to the district heating network.

❸ Residual heat to the district cooling network.

Installation

- Coop Rådhuset's plant for shop cooling comprises three compressors for refrigerated display cabinets and three compressors for freezers in one cooling medium circuit. The cooling medium used is carbon dioxide (R744).
- The cooling unit delivers up to 50 kW cooling capacity and 20 kW freezing capacity for the store. On average, the plant supplies around 30 kW to the district heating network and approx 30 kW to the district cooling network.
- District cooling has been connected via the property's secondary side to the existing subcooler which originally used municipal water for cooling. The cooling medium cooler on the roof has been retained and connected to the same exchanger as the municipal water supply, which improves the redundancy of the cooling medium circuit.
- The system has a thermostat that ensures that the supply temperature does not fall below the temperature requirement in the district heating network.

Finance

- KF Fastigheter has invested SEK 405,000 in order to adapt the Coop Rådhuset store to Open District Heating. This includes the cost of replacing the heat exchanger and pump, rebuilding, control equipment, electrical work and valve installation.

- Fortum Värme has invested SEK 100,000 to connect the store to the district heating network. This cost includes pipes, valves and a measuring equipment needed to measure Coop Rådhuset's district heating deliveries.

Operation

- The combination of supplying heat to both the district heating and district cooling networks results not only in a high temperature in the district heating network but also in considerable cooling of the cooling medium. Subcooling causes the cooling output to increase and reduces electricity consumption in Coop's cooling plant.
- The cooling medium temperature is high after compression, around 100 degrees Celsius. The delivery temperature to the district heating network is around 85 degrees Celsius. Hence, the unit can provide energy to the district heating network, where the return line temperature is normally between 35 and 50 degrees Celsius. However, the cooling medium temperature needs to be even lower before the expansion valve, otherwise the cooling effect at the medium pressure level, for cold storage rooms, etc., is reduced. District cooling is a complement that improves the capacity at the medium pressure level relative to cooling with cooling medium chillers, which would be the alternative.