

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 the help of 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 surplus heat and surplus 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 surplus 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 surplus 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 recove-

red 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 data centres:

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

PHOTOGRAPHY: KRISTINA SAHLÉN

Next generation
energy company



Öppen
Fjärrvärme

Bahnhof Thule

Profitable recovery with Open District Heating

Next generation
energy company





Bahnhof Thule

Data centre optimized for capital-efficient cooling and efficient heat recovery

The Internet supplier Bahnhof's Thule facility in central Stockholm is probably Sweden's most energy-efficient data centre. With a cooling system that has been linked both to Fortum Värme's district heating network and district cooling network, Bahnhof has created a technical solution that combines financial benefit with sustainability and very high operational reliability. The excess heat is recovered. At the same time the facility's excess cooling capacity is used to meet the needs of other district cooling customers whenever Thule does not need the capacity.

» The fact that we are based in the city means we are close to district heating and district cooling networks, which has opened for a new way of thinking about cooling, sustainability and solutions that are unbeatable financially.

Gustaf Bergquist,
Chief Technology Officer, Bahnhof

Bahnhof Thule's premises were initially built to house the insurance company Skandia's data centre. The place is the same, but the circumstances have changed a lot. The new data centre requires far more energy than the facility that previously occupied the premises. Thule comprises three separate halls that have been built with energy efficiency and recovery as primary considerations.

Bahnhof has taken a conscious decision to build up expertise on how to design and build data centres, based on several new ideas concerning IT operations. One philosophy that is unusual in the industry is that Bahnhof likes to be close to its customers physically, with facilities in central locations in the middle of the city.

The heart of the cooling system at Thule is three heat pumps which are connected in series both on the cold and warm side. During normal operation the heat pumps produce both district heating and district cooling at the same time.

The compensation for the energy supplied to the district heating network varies according to the outdoor temperature. Deliveries to the district heating network therefore primarily take place when the outdoor temperature is less than 7 degrees Celsius, which in Stockholm is the case for around half the year.

The Thule facility has been dimensioned to take into account the long-term maximum need for cooling from the start. But the heat pumps can nevertheless be fully utilized from day one as the surplus capacity can be used for supplying cooling to the district cooling network. As the centres fill up with new customers and more equipment adds to the heat load, an ever increasing part of capacity will be used by Thule itself.

An important added value is that the district cooling network, together with the heat pump facility, act as two independent systems for cooling of Thule. The installation of the heat pumps has been made so that in an emergency they can be run in "island mode", without connection to the district cooling system.

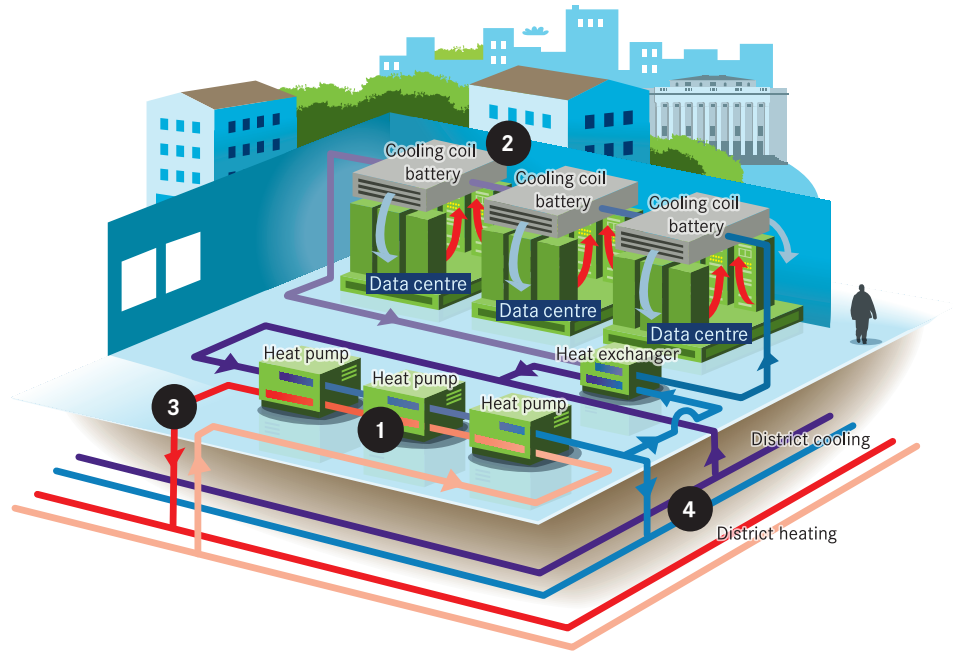
» Because the data centre will be expanded in coming years, it was important to Bahnhof to invest in a system solution for both cooling and recovery of excess heat that is technically well designed and sustainable in the long term.

Jan Lindfors, Fortum Värme



Facts

Open District Heating for Bahnhof Thule



- 1 3 series connected Carrier heat pumps. Cooling output 1,189 kW. Heat output 1,583 kW when producing district heating and district cooling.
- 2 3 data halls with cooling coil batteries.
- 3 Heat delivery to the district heating network.
- 4 Surplus cooling capacity utilized in the district cooling network.

Installation

- Bahnhof's Thule facility in central Stockholm is situated in Brunkebergsåsen and comprises three modern data halls. With access to both district heating and district cooling, Bahnhof, together with Fortum Värme, have created a new, highly flexible energy and cooling system that allows for recovery and utilisation of surplus capacity in cooling production.
- The plant comprises three series connected cooling machines/heat pumps (Carrier 30XWH 802-HT).
- The heat pumps' full capacity for heat production can be utilised from the start due to the fact that energy is taken both from the data halls and from the district cooling network return pipeline.
- The heat pumps have overcapacity for cooling production which can be utilised in the district cooling system.

Operation

- During normal operation the heat pumps take their cooling energy from the district cooling network's return pipeline and deliver heat to the district heating supply pipeline. The total cooling output during normal operation is

1,189 kW, when producing district cooling of 5.5 degrees Celsius and district heating of 68 degrees Celsius. The corresponding heat output is around 1,583 kW.

- An added value is that the heat pump facility can operate as a wholly independent system and thus as a backup system for the district cooling network that the data halls are connected to, which is an important reason for the investment.
- Deliveries of heat to the district heating network using the heat pump facility primarily take place at periods when the outdoor temperature is below 7 degrees Celsius. When the outdoor temperature is at least 20 degrees Celsius, the plant produces district cooling at full capacity for the district cooling system.

Finance

- Bahnhof has invested a total of SEK 5.3 million in the cooling system at Thule. It includes three heat pumps, pipe installations, electrical work and control equipment, data collection and construction.
- Fortum Värme has invested SEK 2.6 million in the new delivery pipeline for district heating and district cooling.