



» Oslo – Fornebu: Sustainable development with a district heating/cooling system using a Unitop® 28/22CY

Client

Baerum Fjernvarme AS
1338 Sandvika, Norway

Baerum Fjernvarme

Located in the vicinity of Oslo, Baerum Fjernvarme AS is selling district heating and district cooling. The company is owned by the Finnish Forum group.

IT Fornebu

Norwegian Investors launched an industry policy initiative in 1995 which included the establishment of an IT and knowledge centre at Oslo's former Fornebu airport.

In the following year the IT Fornebu vision company was established. The Baerum community approved a master plan for Fornebu, which specified that the area should accommodate a knowledge-oriented centre for high-tech industrial activity at international level.

From airport to sustainable community

The 340-hectare Fornebu site is situated 10 kilometres from downtown Oslo with its strong commercial and financial community.

The development plan for the area includes housing for a population of 5,000 and 15,000 work places in an area of 1,350,000 m².

The Fornebu development site is equipped with a district heating/cooling system.

District heating...

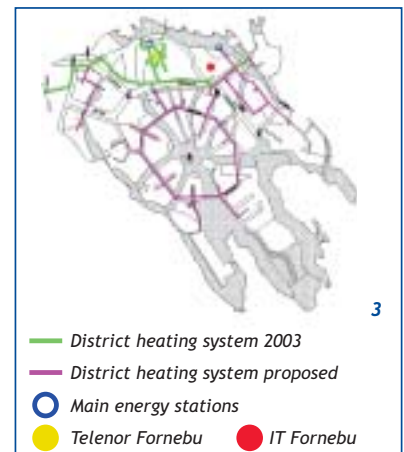
Baerum Fjernvarme estimates a total heating demand of 57,300 kW of which heat pumps shall generate 26,000 kW. 21,300 kW heating capacity depends on electricity and oil but is required only during the coldest period of the year. The main distribution lines for district heating will have a length of 8 km and a main diameter of 400 mm.

...and district cooling

Cooling is required by the commercial sector with a capacity of 23,500 kW. Cold sea water is used as source during spring and autumn. In summer, the Unitop® 28/22CY is also used as chiller. For district cooling, the main distribution lines have a length of 4 km, the diameter of the headers is 500 mm.

The Unitop® 28/22CY was installed in the new head office building of Telenor Fornebu, which is operating since autumn 2002.

In order to enhance operating flexibility and security even further, Baerum Fjernvarme linked Fornebu's district heating/cooling system with the systems of neighbouring Lysaker, where



another Unitop® 28/22CY of similar capacity is installed.

Heating and cooling – the natural way

80 percent of the total capacity required for heating and cooling of the Fornebu development site has its origin in renewable sources. Sea water from the Oslo fjord is exploited for the heat pump during the cold period of the year. It is also used for cooling purposes in summer.

Therefore, Fornebu's district heating system is preventing emissions from conventional heating installations to a large extent.





A major step in minimising the release of artificial refrigerant to the atmosphere has been accomplished by implementation of the district cooling system, with centralised generation of the refrigeration capacity required.

Unitop® 28/22CY for heating and cooling

The Unitop® 28/22CY is equipped with shell and tube type heat exchangers for evaporation and condensation of the Refrigerant R134a. It allows for various modes:

Summer Cooling mode

28 or 22 CY supporting natural cooling
28 or 22 CY “stand alone” cooling unit

Winter Heat pump mode

28 and 22 CY in series

Main features of the Unitop® 28/22CY

- Open-type single stage compressor
- Refrigerants: halocarbon/hydrocarbon
- Integrated planetary type gears
- Heavy industrial design with vertically split casing for easy maintenance
- Multiple compressor units available
- Suited for all drive systems

- Large capacity, small floor space
- High efficiency over the entire range
- Operating temperatures
-40°C/+80°C

Plant control system

A SattCon type PLC control system supplied by Friotherm is used for local supervision. It is connected to the central building control system.

Service and maintenance

Maintenance and Service works on the Unitop® 28/22CY is done on demand by specialists of Friotherm.

Legend

- 1 The main runway of the former airport. © Fjellanger Widerøe AS
- 2 Birds view of IT Fornebu's project. © IT Fornebu AS
- 3 Fornebu district heating/cooling system network. © Baerum Fjernvarme AS
- 4 Unitop® 28/22CY unit, assembled in the works of Friotherm. On top the condenser, bottom right the evaporator, left the sub cooler.
- 5 Main entrance to the Telenor head office, where the Unitop® 28/22CY is installed. © Telenor AS

Technical Data

Summer, cooling with Unitop® 22

Cooling capacity	2650 kW
Power absorbed	515 kW
COP	5.14
Cold water temp. in	+7.5 °C
Cold water temp. out	+5.0 °C
Cooling water temp. in	+25 °C
Cooling water temp out	+31.5 °C

Summer, cooling with Unitop® 28

Cooling capacity	4100 kW
Power absorbed	797 kW
COP	5.14
Cold water temp. in	+7.7 °C
Cold water temp. out	+5.0 °C
Cooling water temp. in	+25 °C
Cooling water temp out	+35 °C

Winter, heating with Unitop® 28/22

Heating capacity	5400 kW
Power absorbed	1795 kW
COP	3.0
Cold water temp. in	+5.0 °C
Cold water temp. out	+2.5 °C
Heating water temp. in	+50 °C
Heating water temp. out	+75 °C
Capacity control	10-100%

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