Case study | Ringsted DHC

97% Renewable Ringsted DHC's heat recovery kickstarts a new era of **greener district heating**

Ringsted District Heating Company (DHC)—a large district heating utility in Denmark—has reduced its reliance on fossil fuels by 97% after Unicool installed an innovative heat recovery system using Geoclima heat pumps built with Danfoss Turbocor® oil-free compressor technology.

With increasingly strict environmental regulations and growing costs, district heat plants are moving away from fossil fuels and turning to renewable energy—and innovative technology such as electric heat pumps and heat recovery—to reduce their environmental impact and maintain affordable heating.

Read more on the following pages >>

Keeping Ringsted warm—and hitting decarbonization goals

In the past, Ringsted DHC—a centralized heating station delivering heat to the equivalent of 7,000 single-family homes across a 124km district heating network—generated 75% of its heat from renewable sources using two straw-fuelled biomass boilers, a gas-powered Combined Heating and Power (CHP) plant, and a heat accumulator.

However, the DHC had two major challenges to address:

- A commitment to 95% CO_2-free heat production by 2020
- A need to remove 97% of harmful sulphur dioxide (SO2) emitted by exhaust gas

Three new heat pumps—and two exciting ways to use Turbocor®

In 2020, the DHC introduced four new electric heat pumps—three of which use Turbocor® oil-free technology—and a new scrubber to remove SO_2 from the straw boilers' flue gas.

The new pumps help capture what would otherwise be wasted heat and put it to good use, increasing COP, maximizing heat capacity, and further reducing its environmental impact.

Plus, the heat pumps perform two important duties resulting in cost-effective efficiency:

- Heat pump **HP01** recovers heat from the outside air to redistribute via the district heating network

- Two Turbocor®-powered Geoclima heat pumps **HP02** and **HP03** cool the flue gas to ensure the new scrubber's efficiency—and eliminate the need to provide the scrubber with an expensive external water supply. These heat pumps also cool the variable speed drives powering HP01 and the mechanical equipment room, recovering the heat from cooling these sources to the district heating system.

By making smart use of heat pumps, Ringsted DHC has met its decarbonization goals while keeping consumer prices low.

Higher heat recovery temperature and lower heat supply temperature result in **higher heat capacity and efficiency**

To achieve the highest heat pump efficiency while lowering the price of heating, Ringsted DHC recovers heat at the highest possible temperature.

- The **HP02** heat pumps operate at a high heat recovery temperature—51°C> 28°C surplus heat from the straw boiler scrubber—resulting in a high heat capacity of 962kW and a COP of 7.1.
- **HP03**—which uses wasted heat from **HP01,** the CHP, and cooling the heat plant room—also runs at a high heat recovery temperature resulting in a heat capacity of 310kW and a COP of 6.2.
- The final supply heat temperature is 58°C—low enough to enable the high efficiency of all three units.

The heat recovery methodology behind the Geoclima heat pumps using Turbocor® compressor technology improves the heat plant COP by up to 21% and the plant's heat capacity by up to 31%.

Plus, the consistently balanced temperature and heat recovery technology has made the DHC's equipment more reliable.