



SOLSTICE® ZE DECARBONIZING HEAT FOR RINGSTED, DENMARK

CASE STUDY



When Ringsted District Heating Utility (DHU) wanted to achieve 95% carbon-free heat without significantly increasing the cost to its customers, it brought in Danfoss Climate Solutions to replace its legacy, fossil fuel-powered heat plant with a sustainable solution. In collaboration with Solstice and other partners, Danfoss modified the facility to run on its cutting-edge Turbocor compressor technology and energy preserving ultra-low global warming potential (GWP) **Solstice® ze (R-1234ze)** refrigerant from Solstice Advanced Materials.

BACKGROUND

Located in the center of the Danish island of Zealand, the busy transit city of Ringsted connects the southern parts of Zealand, Funen, and Jutland with the Copenhagen area. Through its 124-km district heating network, Ringsted DHU supplies heat to over 7,000 buildings in the area, from commercial premises and schools to sports facilities and private residences. The utility strives to provide a safe, reliable source of heat that is cost-competitive with other solutions, such as heat pumps in individual homes.

Seeking to reduce the environmental impact of its operations, Ringsted DHU made a pledge to the municipality that it would achieve 95% carbon-free heat by 2020 without significantly increasing the cost of heat to its customers. To achieve this goal, however, the utility needed to redesign its heat plant, which was powered by fossil fuel sources. To design and implement the changes, Ringsted DHU brought in Danfoss Climate Solutions, an existing technology supplier that had recently demonstrated its promising, oil-free Turbocor heat pump compressor to representatives of the utility at an industry event.



Danfoss Turbocor high-lift compressor utilized on Ringsted Geoclima heat pumps with Solstice® ze (R-1234ze) refrigerant. Image courtesy of Danfoss.



Ringsted installation of Geoclima heat pumps utilizing Danfoss Turbocor oil-free compressors with Solstice® (R-1234ze) refrigerant. Image courtesy of Danfoss.

SOLUTION

In collaboration with its partners Solstice, Geoclima, and Unicoool, Danfoss designed a more modern heat plant utilizing its award-winning Turbocor water-water heat pumps. Notably, the plant featured the capability to recover and recycle waste heat to improve efficiency and reduce costs.

Danfoss selected Solstice® ze because its global warming potential (GWP) of less than 1 made it the only hydrofluoroolefin (HFO) solution compliant with Danish regulations. Furthermore, Danfoss saw how the efficiency of Solstice® ze could help drive quick payback.

The updates to the heat plant, including the fitment of the new heat pump designs, took approximately six months for Danfoss to complete.

After just one year in operation, Ringsted DHU had already met its energy, cost reduction, and emissions reduction goals. For example, the heat pumps had increased the capacity and efficiency

of the heat plant by approximately 30% and 20%, respectively. Additionally, Ringsted DHU had exceeded its target of achieving 95% carbon-free heat – demonstrating 97% instead. Finally, Ringsted DHU used its reserves for the new technology investment, ensuring the cost of heat to customers remained stable.

Senior stakeholders across the utility have been impressed by the efficiency, low sound levels, and reliability of the Turbocor-driven heat plant updates.

Based on the positive results, Ringsted DHU is considering partnering with Danfoss to expand into a nearby industrial park that is currently served by boilers. For Danfoss, meanwhile, the success of the Ringsted DHU installation has encouraged the company to put more emphasis on distributed heat recovery heat pump applications.



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