ENGINEERING
TOMORROW

Case Story I Sector Coupling

Sector coupling helps **Sønderborg Hospital** reach its decarbonization goals

***Sygehus Sønderjylland*, a hospital located in Sønderborg, Denmark, has partnered with Danfoss Sector Coupling Solutions and the district heating utility company, Sønderborg Varme, to reduce its CO_2 emissions.**

Sectorcoupling.danfoss.com

The challenge

Since the start of the energy crisis in 2022, companies across Europe have been looking for ways to reduce their reliance on fossil fuels and find more efficient ways of heating and cooling their buildings. Hospitals are no exception. However, unlike corporate entities, hotels or restaurants, hospitals can't simply increase the price of their products to offset energy price increases. They must find a way to improve their buildings' energy efficiency and identify sustainable energy sources.

For Sygehus Sønderjylland, the drive to decarbonize was about more than just financial savings. The hospital aimed to achieve carbon neutrality, and its management recognized the potential of combining heat recovery with district heating to reach that goal. Therefore, the hospital partnered with Danfoss and the local heating utility to explore ways to reduce both their energy bill and carbon emissions simultaneously.

The expectations are that the hospital's annual energy consumption will be reduced by around

12.500 MWh.

The Solution: Unlock the potential of excess heat

The hospital installed two new energy-efficient heat pumps and an updated hydronic heating and cooling system to replace its gas- and oil-based heating system and accompanying boilers. The heat pumps, powered by Energy Machines™, provide the hospital with cooling through an integrated critical equipment and comfort cooling system. Each pump is equipped with four Danfoss oil-free Turbocor® compressors, which provide exceptional efficiency, particularly for cooling applications, and are an ideal fit for cases with high cooling demand, such as hospitals.
The expectations are that the hospital's annual energy consumption will be reduced by around 12.500 MWh. This equals the total heat consumption of around 740 average Danish households.

The hospital uses the heat recovered from the cooling system to meet its process and comfort heat loads. When the system generates more heat than the hospital needs, the heating utility – Sønderborg Varme – transfers the excess heat to the district energy grid for use in heating private homes. In the cold months, where the cooling load is low and the heating demand is high, the hospital can use the bi-directional heat exchanger to supplement the heating delivered to the hospital through the grid. Once the system is fully implemented the hospital expects to sell back 15.800 MWh excess heat to the grid, which could cover the heat consumption of more than 930 average Danish households.

This not only helps the hospital lower its carbon footprint, but it also creates a more comfortable indoor climate for patients, staff, and the surroundings.

The Results: From energy consumer to energy provider

According to **Martin Brander**, Senior Business Development Manager, Sector Coupling Solutions, Danfoss, this case is an excellent example of how communities can create sustainable energy systems.

> **By capturing heat from the hospital's cooling system and channeling it into the local district heating network, the hospital transforms into an energy provider. It illustrates how we can design energy systems that meet both heating and cooling needs in a sustainable way.**

The experiences gained from this project will also benefit other hospitals within the region, as **Jesper Møller Iversen**, Head of Finance and Planning at Sygehus Sønderjylland, points out.

> **With great pleasure, we wave goodbye to fossil fuels at the hospital in Sønderborg and welcome the green transition. As a large organization, we are pleased to be able to make our contribution to this important transition. We expect to gain a lot of valuable experiences, which can also benefit other hospitals in the region and throughout Europe.**

About the installation

- Two Energy Machines™ heat pumps with a combined **capacity of 2.6 MW**
- Cooling load in summer: **2 MW**
- Cooling load in winter: peak **1MW + 578kW, 1MW base load**
- Chilled water loop: **15°C/10-8°C**
- Hot water loop: **45°C/65-75°C**

About the Danfoss components

Electric expansion valves

ETS
ICM Flexline™ motor valves

Sensors & System protection

Pressure Transmitters
Pressure switches

Heat exchanger

Microplate heat exchangers
Gasketed heat exchangers

Check & Ball valves

Check valves
Shut-off ball valves

Solenoid valve

EVR solenoid valves

Filter Drier / Sight glass

Filter driers
Sight glasses

Liquid level sensors

AKS 4100

Electronic controls

Electronic temperature controls
Programmable controllers – MCX

VLT Inverter Drives

Turbocor© oil-free compressors

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