

Smart Thinking: Vertiv™ Cooling Technology Cuts University's Data Centre Energy Costs



A Vertiv Case Study



Background

When H.C. Ørsted — the father of electromagnetism — founded the Technical University of Denmark (DTU) in 1829, its objectives included creating value using the natural sciences and the technical sciences to benefit society.

Today, DTU is a well-respected technical university which is recognised for its high level of international research and its sought-after graduates.

Its original vision has expanded to include technology and helping the environment. The university says that the United Nation's [17 goals for sustainable development](#) are a platform for its activities.

Challenge

When the university decided to modernise the data centre it shares with Danish e-infrastructure Cooperation (DeiC), which coordinates the national digital research infrastructure for Danish universities, the energy efficiency of new data centre products was a key consideration, as well as equipment cost and performance.

There was room for improvement in the energy efficiency of the data centre's server rooms which were cooled to approximately 20 degrees Celsius all year round. Fans in the data centre ran at either full capacity or were off. The university wanted to make better use of outside water and air to optimise the data centre's air flow and temperature.

Spacing between server racks was not optimised for energy efficiency. The university also wanted to improve the computing capacity of its data centre.

The revamped data centre also had to support data-intensive computing such as the systematic analysis of extremely large data sets used for better understanding of patterns and trends (i.e., big data).



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**- Ole Kjærgaard,
Data Centre Manager,
Danish e-infrastructure Cooperation**

Solution

DTU picked the [Vertiv™ Liebert® PCW](#) chilled water indoor cooling unit, which was installed by Wexøe Solutions, a provider of data centre products and services.

Rather than cooling the entire server room, the unique floor-level air discharge feature of the Vertiv solution enabled a hot-aisle/cold-aisle configuration as did the improved spacing of server racks in the room. This is more energy efficient and cost effective than the previous technology as it allows for higher temperatures. The new architecture means that the cooling unit can run in freecooling mode many more days every year. It also increases the cooling capacity inside each server rack due to the right amount of cool air at a constant temperature.

"Cubes" (cold aisle containment) are now used to separate cold and hot zones in each server room. The configuration provides much better control of airflow, allowing 10 kW of power output from individual server racks — double the output seen with the previous, unoptimized design.

The air temperature can be controlled better as can the air flow to the servers. When the air outside the data centre is very cold, it can be used to cool the servers (freecooling) instead of using the compressors, which reduce the temperature in the circulating cooling water to around 15 C.

"We are feeling the consequences of global warming compared to when the building originated in the 1980s," said Ole Kjærgaard, who is responsible for the data centre's daily operation. "The goal is to achieve as many freecooling days as possible, and the Vertiv cooling machines in combination with the cubes help."

The aim is to achieve the largest possible temperature difference between the cold and hot zone in each server room. Even a one degree fluctuation can increase the air temperature, which can mean 20 extra freecooling days.

Results

The two-year project, which began in 2018 and finished in 2020, has reduced the university's data centre energy costs significantly. The capacity of the Vertiv cooling units are approximately 50% more powerful than the old cooling technology in the data centre.

Based on total cost of ownership calculations, the project investment is expected to be recouped within 5-10 years through energy efficiency savings and other benefits.



Vertiv™ Liebert® PCW chilled water unit



Go online to learn more about the [Vertiv™ cooling solutions](#) used by Danish Technical University.

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