

New sustainable campus heating system

Delft University of Technology partners with Danfoss to create a sustainable heating system

Delft University of Technology (TU Delft) aims to achieve a carbon neutral, circular and climate adaptive campus by 2030. One of the keys to realizing this ambitious goal is the university's geothermal project, which will provide sustainable heating to both the campus and approximately 6,000 households in Delft. The project has been linked to a scientific research program, studying the use of geothermal energy in an urban environment. TU Delft partnered with Danfoss to prepare the campus' infrastructure for the transition by installing new, efficient heat substations.



Transition to geothermal energy

TU Delft uses a combined heat and power plant (CHP) to heat approximately 430,000 m² of buildings on campus. Heat is generated using gas-fired boilers and CHPs, with temperatures ranging from 80 to 130°C. Many of the campus' buildings are designed for a supply/return temperature of 90/70°C. However, if the buildings are to use geothermal energy optimally, this temperature range needs to be lowered to 78/53°C.

To facilitate this, TU Delft decided to replace the existing tube heat exchangers with more efficient heat substations with plate exchangers. These allow for a smaller temperature difference and lower the required supply temperature from the distribution network. The university chose to partner with Danfoss for the design and delivery of its new substations.

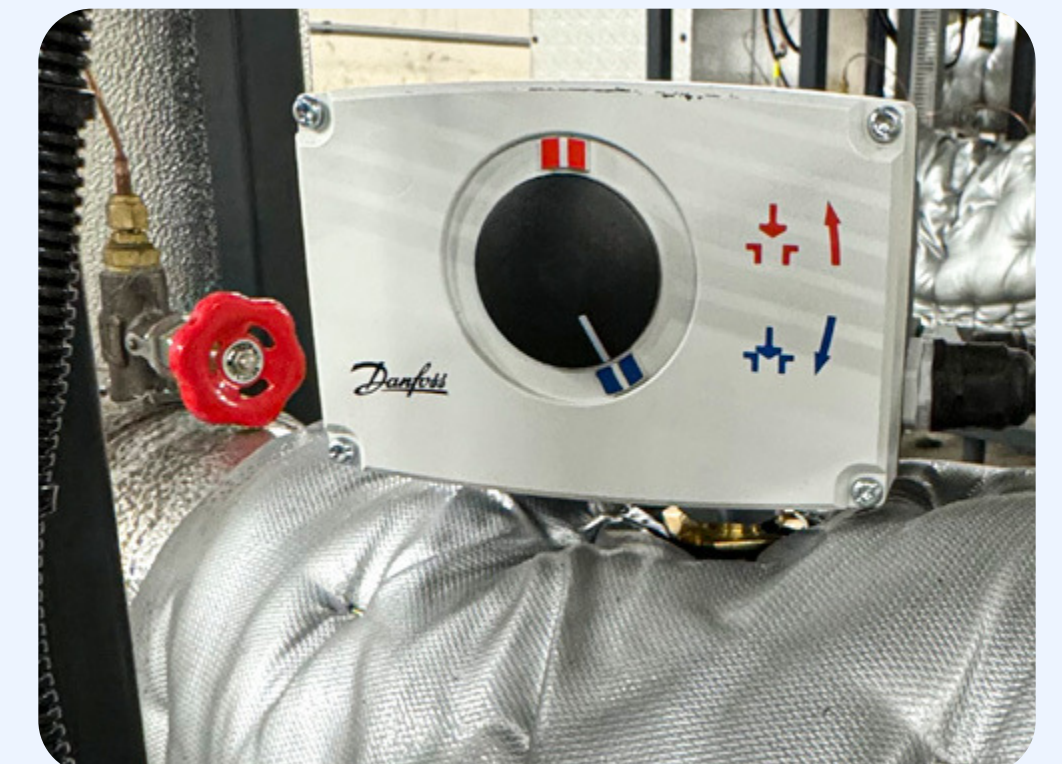
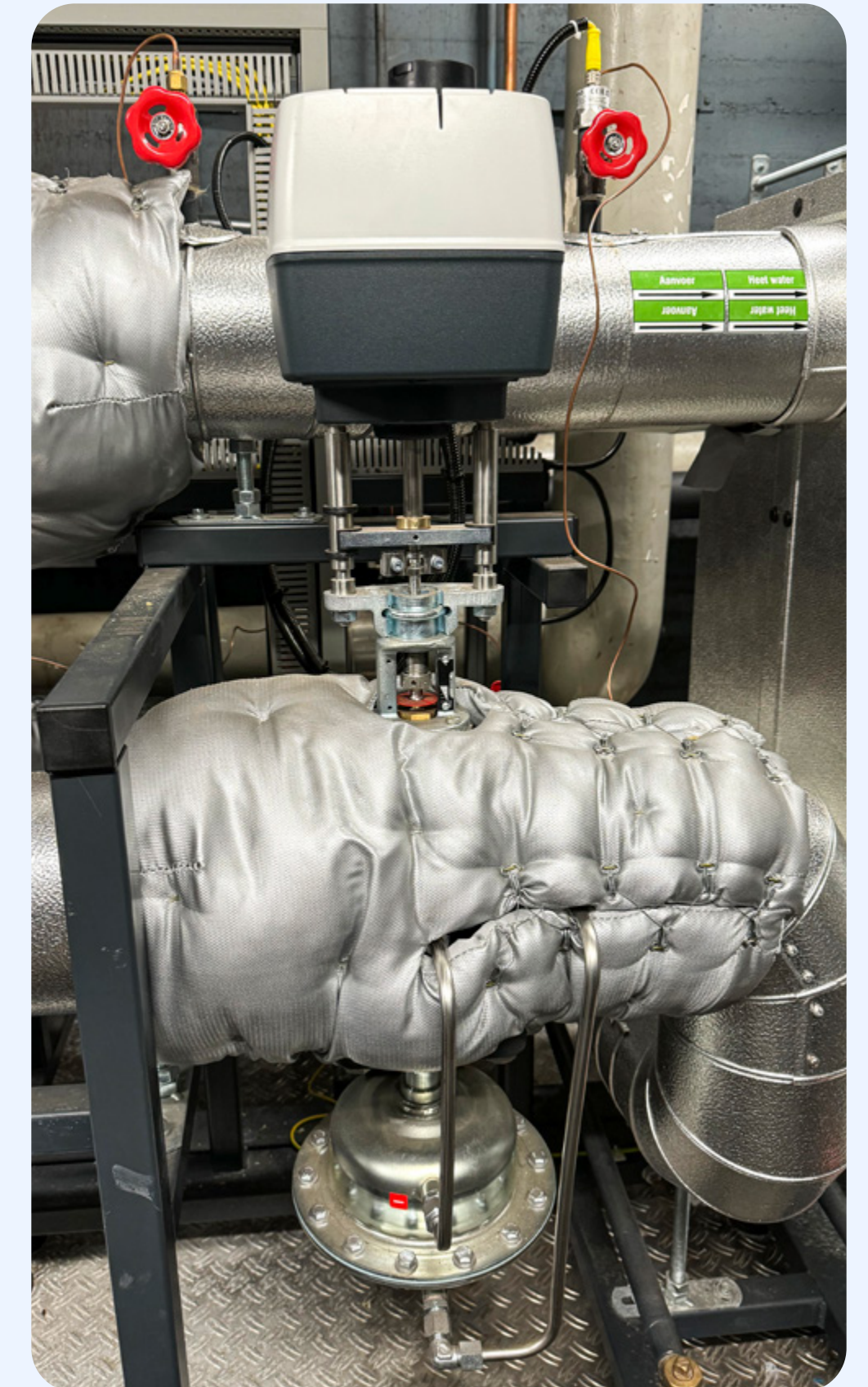


Customised substations

TU Delft has installed 48 Danfoss substations with capacities ranging from 100kW to 2.5 MW. The university has also installed four extra substations to replace indoor gas boilers in buildings that will be connected to the heat network and geothermal heat source. The Danfoss team of district heating specialists designed and built the heat substations based on a standard solution, which they adapted to meet TU Delft's specific requirements, which included:

- The heat exchangers must guarantee optimal output, both at a supply temperature of 100°C and at 80°C, to accommodate the coming shift to a geothermal heating source.
- The station design needed to be flexible to accommodate the wide range of buildings on campus.
- The station frames (skids) needed to be modular, so they could be transported by elevators and through narrow passages.
- The substations needed to be delivered within a relatively short timeframe.

Installers used 3D scans to make sure the substation design was compatible with the university's installation requirements. Danfoss developed and produced the stations and all key components in-house according to the European Pressure Directive PED 97/23/EC – an important requirement for TU Delft. The AFQM 2, the pressure-compensated control valve in Danfoss' stations, was also an important factor in the university's selecting Danfoss. The AFQM 2 ensures precise power regulation and protects the system against pressure spikes, fluctuations, cavitation and noise.



Results

On the way to carbon neutral

The utilisation of the geothermal source is expected to save 85% of the annual gas consumption of the TU Delft, saving almost 4 million m³ of gas per year – a significant step towards a CO₂-neutral campus. The combination of the AFQM 2, Danfoss heat plate exchangers and building automation ensures optimal heat transfer without energy waste.



Further information
available on
Danfoss' website:
danfoss.com

“ Danfoss’ prefabricated heat substations gave us a high-quality standardized solution, while still allowing us to customize specific aspects of the installation. Their professional implementation ensured that we could complete the installation process within the specified timeframe.”

— Lennart Burg
Senior Project Manager, TU Delft/
Campus Real Estate & Facility Management



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Danfoss B.V.
Climate Solutions
Fascinatio Boulevard 236
3065 WB Rotterdam
cs@danfoss.nl
+31 10 80 82 222

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