

GÖTEBORG ENERGI SEES THE BIGGER PICTURE

Gothenburg is a port city with a strategic location between Oslo and Copenhagen. With a population of approximately 530,000 it is Sweden's second largest city. As Western Sweden's leading energy company, Göteborgs Energi has been supplying the city with district heating since 1952. However, the company does not just supply residential and commercial buildings. By adding a car manufacturer plant and a ferry to the grid, energy utilization is optimized.

The heat has its source in the excess heat from the process at a midsize hydroskimming refinery in Gothenburg. The refinery has a capacity of six million cubic meters of crude oil annually and the excess heat generates approximately 400 GWh. Three quarters of this energy goes to residential and commercial buildings in the area, approximately one quarter to a nearby car manufacturer plant.

The heat recovery block station at the car manufacturer plant replaced an outdated technical setup: Large shell & tube heat exchangers with a total capacity of 36MW, but where 18MW was for redundancy purposes only. SWEP came up with the solution: three 6MW brazed plate heat exchangers (BPHEs). The space required for the BPHEs was less than half the size of the previous heat exchanger, lowering it from 36m² to 14m². The system redundancy was within requirements and it was possible to lower the primary return temperature by 20°C. With this highly efficient heat exchange the supply temperature from the refinery no longer needed to be additionally heated. The result was more than satisfactory. Substantial reductions in the CO₂ footprint, combined with cost savings, have turned this project into a success story. The estimated Return On Investment (ROI) is less than five months.

The story does not end there. Since Gothenburg is a port city, many major ships pass and anchor there. One is the Stena Danica that anchors up at the quay in Gothenburg city center every night. The large ferry needs to run its diesel generators onboard to keep compartments and vital systems warm while at quay, emitting particles, Nitrogen oxides (NOx), carbon monoxide (CO) etc. The solution? Adding the ferry to the district heating grid while in the harbor.

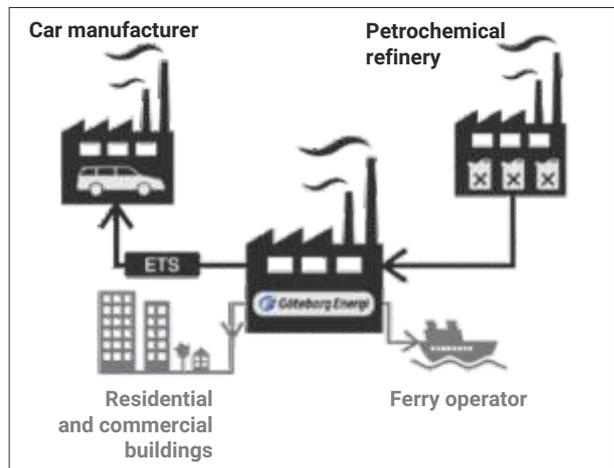
Containerized Energy Transfer Stations (ETS) with a capacity of 1.200 kW have been installed at the quay. The connection between quay and ship is made via flexible hoses with quick couplings. BPHEs for space and oil heating onboard have been installed and an ETS controller that is connected to a SCADA system enables easy remote monitoring and control. The solution has a calculated Return On Investment (ROI) of three years and will be able to meet coming laws and regulations for ships in Sweden. The complete shutdown of the engines while at quay reduces the noise level of the Gothenburg city center and reduces CO₂ emissions with a calculated 500 tons annually, which equals the emissions from 256 cars in a year.



SWEP's ETS: 3x6MW units connected in parallel.



The energy utilization at the car manufacturer plant needed to be improved. Installed: Large shell & tube heat exchanger of totally 36MW (18MW for redundancy purposes only).



¹ Supervisory Control And Data Acquisition