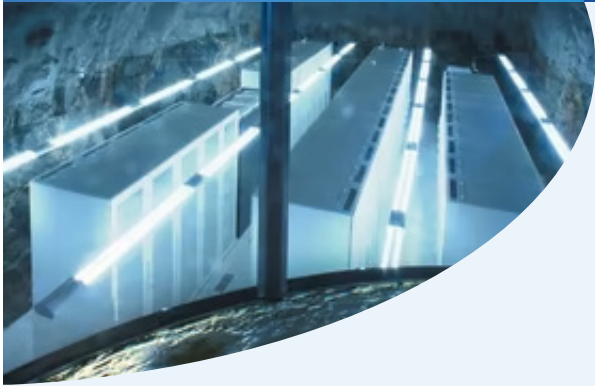




CASE STUDY



Bahnhof Data Centers

INNOVATIVE HVAC SOLUTION TURNS DATA CENTERS INTO DISTRICT HEATING SOURCES

AdvanTEC SOLUTIONS CENTER

The AdvanTEC Solutions Center gathers experts in global energy efficiency and environment protection who are dedicated to developing sustainable building solutions.

Based on Carrier's core value of innovation, the Center offers clients in Asia and around the world solutions capable of achieving higher energy efficiency, greater system performance and more environmental benefits in applications ranging from hotels to data centers.

Bahnhof Data Centers
Stockholm, Sweden



Project Objectives

The ultra-secure Pionen Data Center is housed in a disused nuclear bunker deep beneath the bedrock of the Vitaberg's park in Stockholm. The project's goals included; reuse of data center energy as a heating source for local districts, reduce CO₂ emissions, eliminate unsightly street level fog from existing cooling towers, develop a controls solution that enabled the system to remain operational despite rapid pressure fluctuations and temperature changes that occurred in district heating system applications, provide the data center with 100% system redundancy for server cooling, contribute to the building's sustainability initiatives and have an ROI of less than 3 years.

Carrier's AdvanTEC engineers, a group of experts in efficiency and environment, developed an innovative solution that turns the data center waste heat energy into a district heating energy source.

The Solution

This project was the first in a series of successes for Carrier in Sweden using the innovative waste heat recovery solution and has been up and running at Bahnhof Data Centers since January 2014. AdvanTEC engineers developed a state-of-the-art system solution which included a Carrier® ChillerVu™ controller based Plant System Manager. This solution delivers fully optimized control for chiller plant operations from a sophisticated, scalable native BACnet® control solution.

To meet Bahnhof's requirements for heat recovery, two AquaForce® chillers were installed. These units have heat reclaim capabilities which produce chilled water controlled to the necessary temperature while generating hot water as a by-product of the refrigeration cycle. This hot water is then used for as a heating source for local districts.



Synopsis

The Bahnhof Data Center is a futuristic-style Swedish data center housed within in a former nuclear bunker, deep in the bedrock beneath the city of Stockholm. The building has a total area of 1,000 m² (10,764 ft²), with 500 m² (5,382 ft²) of hosting area and 200 m² (2,153 ft²) for back-of-house systems.

AdvanTEC Solutions Center engineers were called upon to resolve a variety of challenges presented by Bahnhof. Their resulting solutions:

- Reused Bahnhof's Data Center energy as a heating source for local districts by installing two Carrier® AquaForce® chillers—which have heat reclaim capabilities
- Delivered fully optimized control for chiller plant operations from a sophisticated, scalable native BACnet® control solution with a Carrier® ChillerVu™ controller based Plant System Manager. ChillerVu quickly responds to the needs of the Data Center by automatically starting or stopping the plant, optimizing plant water temperatures, and matching the tonnage produced to the tonnage required by the building

- Eliminated the use of the existing cooling towers and thus avoiding the occasional production of 'fog' at street level
- Developed a controls solution that combined with modification of the pipework design enabling the system to remain operational despite rapid pressure fluctuations and temperature changes that occur in the district heating system application
- Provided the Data Center with 100% system redundancy for server cooling, due to two existing Carrier AquaSnap® water-cooled chillers, which remain as back-up for the new system
- Achieved a "theoretical" Power Usage Effectiveness (PUE) score below 1.0 if the hot water produced from the waste heat is taken into account as part of the PUE calculation

Through the AdvanTEC Solutions Center, Carrier was able to offer Bahnhof Data Centers tailored, innovative solutions to meet all their specific requirements.



Project Summary

LOCATION: Stockholm, Sweden

PROJECT TYPE: New construction

BUILDING SIZE: 17,000 m² (~183,000 ft²)

OBJECTIVES: Reuse Data Center energy as heating source, eliminate unsightly fog, provide system redundancy for server cooling, reduce CO₂ emissions, contribute to green building design, 3-year return on investment

FACILITY USAGE: Data Center

UNIQUE FEATURES: Data Center is housed in a disused nuclear bunker deep beneath the bedrock of Stockholm

MAJOR DECISION DRIVERS: Carrier's AdvanTEC engineers developed integrated solutions that solved the unique issues facing the Bahnhof Data Centers by offering tailored, innovative solutions including heat recovery chillers and ChillerVu™ controller based Plant System Manager

HVAC EQUIPMENT: Two Carrier AquaForce® 61XW water-source heat pump chillers: <70°C (158°F) hot water

CONTROLS: Carrier® ChillerVu™ Plant System Manager

INSTALLATION DATE: 2014

For more information, contact your Carrier representative or visit carrier.com/commercial/en/eu/about/carrier-europe/

