# HIGH EFFICIENCY ENGINE HEATER Hotstart. Energy Analysis - Fredericia, Denmark

# Efficiency is Everything

Carbon footprint reduction is a key component of data center sustainability efforts. Engine heaters on standby generators are an untapped source for energy efficiency. With a retrofit of Hotstart's CVC High Efficiency Engine Heater, end-users can see reduction in energy draw by up to 75% through the use of variable speed air-source heat pump technology.

### CV/C

Sec. 10

Heat Capacity: Up to 10 kW GenSet: 1 MW and larger Refrigerant: HFC-32 Total FLA: Up to 20A

## **Existing Heaters**

Reliable redundancy is achieved by plumbing the CVC in series with the existing engine heaters installed by the genset OEM. These resistance heaters work in tandem with the CVC through fully integrated and programmed controls, assuring gensets are properly heated at any ambient temperature. The testing enclosure contained two Hotstart CSM 12kW forced circulation heaters.



## CSM

Wattage: 12,000 W (12 kW) **Circulation Method:** Forced Circulation Set Temperature: 38 °C (100 °F) [on] / 49 °C (120 °F) [off]

#### Testing

Five generators at the data center site were selected as test environments for data capture. Each contained a MTU Series 4000 12-cylinder engine coupled with a 1.5MW generator and two 12 kW forced circulation heaters for each engine.

The CVC was plumbed in series with the existing engine heaters and served as the primary heater for one out of five engines. Following a "whole facility" approach, hourly energy usage and coolant temperature was collected for all five engines at the site. Energy usage of the CVC was calculated based on the difference between 2023 enclosure energy usage and 2024 enclosure energy usage. Average hourly energy usage (kWh/hr) was modeled relative to the hourly weather temperatures from the local weather station.

# **Energy Analysis**

The CVC engine heater consumed 3.2 kWh/hr at 5 °C (41 °F) versus 6.5 kWh/hr for the existing heaters during the testing period. Based on the energy usage model of each heater and weather data for Børup Denmark, the CVC is expected to provide an estimated annual savings of 25,700 kWh or 53% reduction as compared to the existing engine heaters energy usage.



	Forced Circulation Engine Heater	Heat Pump Engine Heater	Savings
Model predicted kWh consumed	48,500 kWh	22,800 kWh	25,700kWh (53%)

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