



Bridgewater Correctional Complex CHP System Upgrade

The Problem

The Massachusetts Department of Correction's Division of Resource Management wanted to increase the amount of electricity produced by its combined heat and power (CHP) system and the amount of recoverable heat output of the system during warm weather at the Bridgewater Correctional Complex. Pre-retrofit, the CHP output during warm weather was not enough to offset the summer hot water demand, requiring the boilers to run inefficiently throughout the summer. The facility wanted to see how retrofitting the CHP air intake with chilled water coils would affect steam production. They also hoped to qualify for utility incentives under the CHP program by performing the system upgrade.

The Solution

DMI was contacted by the utility company in 2010 to provide energy modeling services for the facility. DMI reviewed trend data from the site and created a PowerMap analysis of utility data to determine areas of high energy use. The chilled water coils retrofit would pre-cool the intake air entering the CHP generator and increase both heat and electric output during warm weather so the boiler could be turned off. Without the retrofit, the CHP system could not produce enough useful heat to meet the heating loads of the facility during times of high ambient temperatures. A boiler was required to provide the facility's steam needs.

An 8,760-hour spreadsheet analysis comparing this proposed case to the existing system operation was then used to predict the energy and cost impacts of the upgrade.

Project Background

In 2006, the 785,000 square foot campus began operating its CHP system, which consisted of a 1.4 MW, natural gas-fired combustion engine. CHP systems generate electricity for on-site use and recover the waste heat from the electricity generation process for use in the facility. The system supplied about 80% of the campus' annual electricity demand for a population of over 2,000.

The Result

DMI's energy model predicted annual electrical savings of 290,492 kWh. Also, over 50,000 extra kWh per year would be generated by the CHP system that could be sold back to the electrical grid. Modeling also predicted that the increased heat output would offset 43,000 therms of natural gas heating from the steam boilers. The combined electrical and gas benefits from the measure amount to over \$100,000 per year and a simple payback period (before incentives) of 3.1 years. The incentives for the upgrade from the utility have not yet been determined.

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Gas turbine generator at the facility.



Facility Overview

- Hospital/ correctional facility
- 785,000 ft²
- Existing CHP system (1.4 MW capacity)

Services Provided

- System energy model
- PowerMap analysis
- Energy savings analysis

Results

- >\$100,000 annual energy cost savings
- 3-year payback before incentives

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