



Cooley Dickinson

500-kW Biomass CHP System



New 600HP AFS Boiler

Quick Facts

LOCATION: Northampton, MA
FUEL: Virgin Wood Chips
MAX CAPACITY: 500 kW
POLLUTION CONTROLS: Multiclone separator and baghouse
ENVIRONMENTAL BENEFITS: 99.5% particulate removal
AVERAGE CAPACITY FACTOR: 90%
IN OPERATION SINCE: 2006
EQUIPMENT: AFS - 600 HP Water/Fire Tube Boiler with 2, 250KW Carrier Energent Micro Steam Turbines
USE OF ELECTRICAL NEEDS: Displaces loads previously supplied by the local utility

Site Description

Cooley Dickinson Hospital in Northampton, MA is a 600,000 square-foot hospital with 140 in-patient beds that has been in operation for 125 years. The facility has a central energy plant which provides electricity, heat and cooling for the hospital campus. The hospital facility has a 12 month consistent heat load for heating, absorption chilled water, food preparation and centralized sterilization. Cooley Dickinson has operated a Zurn - 550 HP biomass boiler with wet scrubber emissions control since 1984. In 2006, an AFS - 600 HP Water/Fire Tube high pressure boiler was installed. To take advantage of the higher pressure steam supply, two 250KW Carrier Energent Micro Steam Turbines and a 680 Ton Absorption Chiller were added to the energy plant in 2009. One of the turbines reduces the steam pressure from 250 psig to 75 psig for distribution throughout the hospital. The second turbine reduces the steam pressure from 75 psig to 15 psig for use in the absorption chiller.

Reasons for Installing CHP

The motivation for installing the second Wood Chip plant in 2006 was a 120,000 sq ft hospital expansion project and to improve reliability and add redundancy to the existing 20 year old wood boiler. The second wood boiler also eliminated the need to burn oil during the 1-2 months of maintenance downtime each year. In 2009, The hospital implemented a formal energy conservation program which included the installation of the turbines to lower their operating costs. The CHP plant is equipped with emissions controls meeting state requirements in accordance with the issued Air Permit. The two micro-steam turbines reduce the hospital's 2,000 KW peak load by 350 KW (17.5%) and produce approximately

2,000,000 KWH of electricity per year (12.5%). The plant has a utility approved electrical interconnect allowing power generation in parallel with the electrical grid.

Prior to the installation of a biomass boiler, the hospital relied on two (2) oil/natural gas fired boilers to generate steam for use in the HVAC systems for space heating in the winter and to provide domestic hot water year round. In the summer, the heat is used to generate chilled water through the use of a steam powered absorption chiller. The two boilers now only provide backup and can be used if price or demand warrants. As Cooley Dickinson continued to implement its master plan, the hospital needed to increase its capacity to support a facility expansion. The

Northeast Clean Energy Center provided a prescreening study that recommended adding CHP to the second biomass boiler installation. The Hospital's energy conservation program also included the installation of variable frequency drives on an existing 600-ton Carrier electric centrifugal chiller, chilled water, condenser water and cooling tower pumps. Going from a constant volume system to a variable one allowed the conversion of three way valves on 10 air handlers to a demand flow system. Cooley Dickinson was the 2011 Recipient of VHA Leadership Sustainability Excellence Award for best in class program in energy management with a Cogeneration Plant.



Loading and Screening Equipment



680 Ton Absorption Chiller and Chiller Turbine

Lessons to Share

Wood burning process involves:

- Large amounts of space are required for storage and handling equipment
- Access for tractor trailers (1-2 loads per day)
- Labor to manage plant operations
- Noise control
- A well-wooded geographic location for fuel supply

Future Plans

Replacement of the new 680 ton chiller by the vendor, due to an inability to make rated tonnage

For More Information

U.S. DOE NORTHEAST CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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More CHP Project Profiles: northeastchptap.org

The Northeast CHP TAP is a U.S. DOE sponsored program managed by the Pace Energy & Climate Center located at Elizabeth Haub School of Law and by the Center for Energy Efficiency and Renewable Energy located at the University of Massachusetts Amherst

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