MID-ATLANTIC CHP APPLICATION CENTER

combined heat & power in universities

University of Maryland

25.9 MW CHP Application

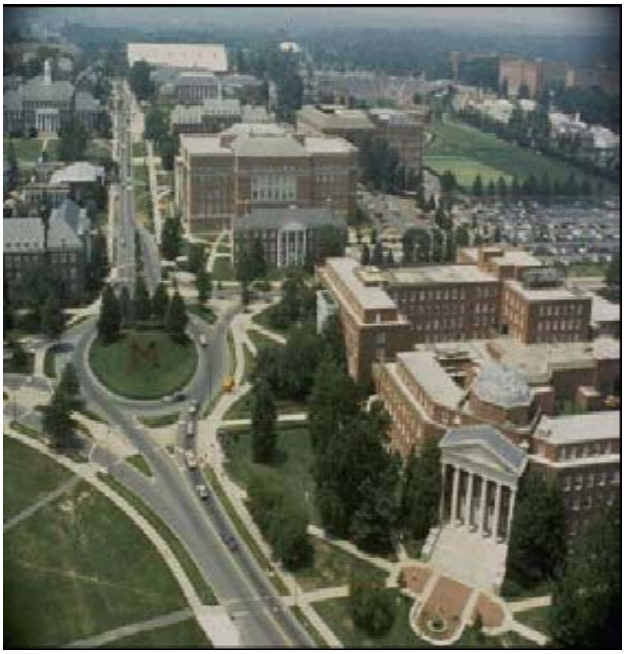
Project Profile

Quick Facts

Location:
College Park, MD
Campus Size:
262 buildings totaling 12 MM sq.ft.
Student population over 35,000
Campus Loads:
245,000 MWh per yr
40 MW peak demand (approximate)
900 MM lbs per yr steam
Prime Movers:
Two 10.5 MW CTs
One 4.9MW BPST
Annual Energy Savings:
$6MM (projected) / 32%
Installed System Cost:
$71MM
Began Operation:
Commissioned 2002

Reasons for Installing CHP

In 1996, the University of Maryland faced an aged utility infrastructure that was unable to provide adequate and reliable service to existing buildings and could not accommodate planned expansion. The steam, electric distribution systems, and multiple chilled water loops needed to be upgraded. In addition, there was a desire to replace old boilers (coal boilers that had been converted to #6 fuel oil) to reduce emissions and help alleviate periodic regional air quality problems. The systems obviously needed to be upgraded, but the University was hesitant to take on the financial burden that replacement would entail.



Project Overview

A public-private partnership was formed by Maryland Economic Development Company (MEDCO) and Trigen-Cinergy Solutions (TCS) to shift business risk away from the school, and provide operating guarantees to ensure that the renewal could be funded from existing annual allocations for utility and energy services. The total cost of the upgrades was $71 million.

The project included installing a 25 MW dual-fuel Combined Heat & Power plant; upgrades of the steam, electricity and chilled water distribution systems; new steam turbine chillers in satellite central utility buildings (SCUBs); a low NOx retrofit of existing oil-fired steam boilers (which now serve as backup boilers); and other improvements that reduced energy consumption by 32%. Projected savings of $120M will be used to fund other school improvements and debt service. Trigen (now Suez, NA) has been contracted to operate and maintain the power plant, new chillers, and the electricity, steam, and chilled water distribution systems.

CHP Central Plant Equipment:

Electric Power Production Units:

- Two GE 10B Dual Fuel (natural gas and No.2 fuel oil) combustion turbines. Each unit producing 10,500 kW at ISO conditions
- One Back pressure Steam Turbine (BPST) reduces 600 psi / 750°F steam to 125psi / 500F steam and produces 4,900 kW at ISO conditions

Steam Production Units:

- Two Deltak Heat Recovery Steam Generators (HRSG) with supplemental duct burners producing 280,000 lbs/hr of steam capacity (600psi /750°F)
- Two conventional steam boilers burning natural gas or No.2 fuel oil can produce 180,000 lbs/hr (125 psi / 353°F) used for backup during cold weather.

CHP Plant

SCUB

Satellite Central Utility Building (SCUB) 4

SCUB 4, which serves 21 lab and classroom buildings, contains:

- Two steam-driven York chillers producing 39,750 lbs/hr of additional summer steam load and 3,800 tons of cooling
- One 2,300-ton Trane Electric Chiller designed at 0.625 kW/ton

In addition, old chillers in buildings served by SCUB 4 which were retained as backup can generate an additional 3,900 tons of cooling during summer peaks

Fuel Efficiency:

- Combustion Turbine: 11,600 BTU/kWh LHV at ISO conditions
- BPST: 5,500 BTU/kWh at 600 psig and 750°F
- HRSG: 120 MM BTU/hr LHV (duct firing)
- Boilers: 80% HHV at 100% Load

Mid-Atlantic CHP Application Center

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Additional Facts:

- This facility is not permitted to export electricity, so several hundred kW are purchased continuously.
- Emissions reductions: 9,800 tons/yr NOx, 175,000 tons/yr CO_2.
- HRSGs replaced high-emissions boilers burning #6 fuel oil.
- System is capable of operation independent of local electric Energy provider in case of emergencies.

Obsolete steam plant replaced without using valuable capital funds

Estimated savings of $120 MM over 20 yr life of project

CO_2 emissions reduced by 175,000 tons per year

NOx emissions reduced by 9,800 tons per year