



PennMed Princeton Medical Center (formerly University Medical Center of Princeton)
Plainsboro, NJ
Design-Builder for CCHP Plant

ABOUT THE CLIENT

Designed by a team of internationally renowned architects and consultants, the new 636,000-sq-ft hospital will incorporate the latest green building technologies. Among its green features is an efficient on-site central energy plant that has the capacity to supply the facility with 100 percent of its heating, cooling and power. The project was developed by NRG Thermal LLC, a wholly owned subsidiary of Princeton-based NRG Energy Inc., which will also own, operate and maintain the plant.

REFERENCE

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CONSTRUCTION COST:

\$34 Million

YEAR COMPLETED:

2011

636,000 SQ. FT.

INVESTMENT GRADE AUDIT

Concord Engineering performed a comprehensive audit of all building systems for identification, technical engineering analysis, life cycle cost analysis, and development of construction costs. More than 100 conservation measures were examined, including the hospital's envelope, lighting, and heating, cooling, and ventilation systems. The chilled water and heating plant was also optimized using cutting-edge technologies.

OUTSOURCED CENTRAL UTILITIES/COMBINED HEAT & POWER PLANT

Using a Design-Build approach, Concord Engineering minimized the time and costs necessary to design, build and commission the facility for the Combined Cooling, Heating, and Power (CCHP) plant and thermal storage technologies. As the plant's engineer and construction manager, Concord provided NRG with a competitive construction management fee structure that, in combination with the hospital's initiatives and NRG's expertise in financing, developing and operating similar projects, served as a catalyst to move the project forward. The ability to integrate engineering and construction management from a single firm as a single point of responsibility was a significant factor in meeting scheduling and cost constraints for this \$34 million design-build project.

Performing as Engineer of Record and Construction Manager, Concord completed detailed engineering documents and procured the equipment and sub-contractors required to complete the project on an accelerated timeline. The chiller plant uses a nominal 1-million-gallon chilled water storage tank, and is strategically located to minimize energy costs to the hospital. The combined heat and power plant utilizes a 4.6 MW Solar Mercury 50 gas turbine coupled to a heat recovery steam generator (HRSG) to produce 14,000 pph unfired (ISO). A 6MW diesel generator plant supports the plant and hospital critical electrical loads. The project is complete and has passed all performance and environmental testing.

ENERGY RESILIENCY AND ISLAND MODE CAPABILITY

The plant was designed to provide the hospital with onsite power in addition to the 6MW of emergency diesel generators from the 4.6 MW CHP plant during a grid failure. The plant required a detailed understanding of protective relaying and microgrid controls to ensure the plant would be able to support critical and non-critical loads during an outage. **IT SHOULD BE NOTED ALL TESTING FOR THE ISLAND MODE WAS PERFORMED WHILE PATIENTS WERE IN THE OPERATING HOSPITAL.**

Successes of the CCHP plant include:

- ◆ Design-Build project was on time and on budget for all equipment start-up milestones
- ◆ \$5 million in funding from the PSE&G Carbon Abatement Program
- ◆ Flexibility to export power in emergency and demand response programs
- ◆ Carbon offset equal to removing more than 1,550 cars from the road
- ◆ The new turbine resulted in an electrical efficiency of approximately 38%
- ◆ Received state ARRA-funded CHP grant of \$1.9 million