



CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Penn Medicine Princeton Medical Center System

4.6-MW CHP System



Penn Medicine Princeton Medical Center in Plainsboro, NJ

PHOTO COURTESY OF Clearway Energy, Inc.

Site Description

Penn Medicine Princeton Medical Center, formerly known as University of Princeton Medical Center at Plainsboro, is one of the most advanced healthcare institutions in the nation. Established in 1919, the hospital moved from Princeton, NJ to a new \$522 million, 636,000-square foot facility in Plainsboro, NJ in 2012. The new facility houses 231 single-bed rooms, an attached medical office building, education center, and skilled nursing facility. Penn Medicine Princeton Medical Center is a New Jersey State-recognized Primary Stroke Center and has received top ranking in exceptional customer care, integrating advanced technologies and diagnostics into its treatment protocols. Clearway Energy, Inc. designed, built, and financed an on-site CHP microgrid solution on the campus of the new facility.

Quick Facts

LOCATION: Plainsboro, NJ
MARKET SECTOR: Hospital
FACILITY PEAK LOAD: 6.5 megawatts (MW)
EQUIPMENT: 3x 1,000 ton York Electric Centrifugal w/ VFD Chillers
 1x 700 ton York L.P. Steam Absorber Chiller
 3x 24,000 lbs/hr Cleaver-Brooks Firetube
 1x 34,300 lbs/hr Rentech HRSG
 1x 4.6 MW Solar Turbine Gas-turbine generator
 3x 2 MW Caterpillar Reciprocating Emergency Generators
 1x PV Solar Array
FUEL: Natural Gas
USE OF THERMAL ENERGY: Space heating and cooling, medical processes
CHP TOTAL EFFICIENCY: 78%
ENVIRONMENTAL BENEFITS: Energy efficient boilers, chillers, and generators use a small amount of fuel to produce both power and steam, solar panels onsite offset energy usage
TOTAL PROJECT COST: Approximately \$32M
YEARLY ENERGY SAVINGS: \$2.5M annually
PAYBACK: 15 year payback, 13 year contract
CHP IN OPERATION SINCE: Partial Operation in May 2010, Commercial Operation in May 2012

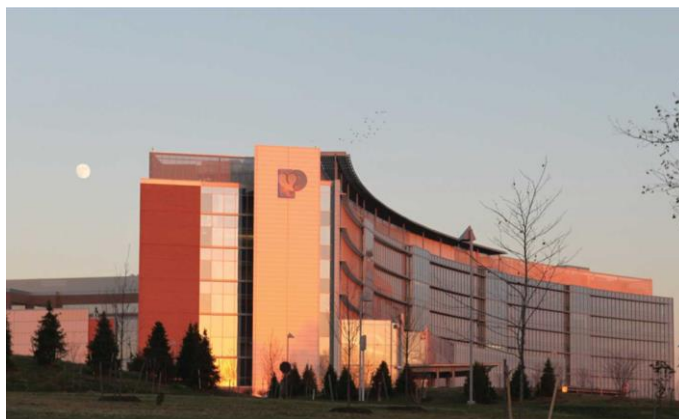
Reasons for CHP

Penn Medicine Princeton Medical Center was looking for an exceptionally reliable, but cost- and energy-efficient solution to power their new hospital facility. The integrated nature of this microgrid solution enhances UMCPP's energy reliability at an overall cost that is significantly less than the costs needed to provide and implement these technologies individually.

- CHP dramatically reduced the facility's electric bills and emissions footprint
- Inherent reliability of CHP and ability to operate independently of the grid at full capacity protects hospital against outages.

CHP Equipment & Operation

- One 4,600 KW CHP system (natural gas turbine) matched to a supplemental-fired heat recovery steam generator
- Three low-emission steam boilers with a total capacity of 72M lb/hr
- Three electric driven chillers totaling 3,000 tons
- One 700 ton steam absorption chiller
- Three Tier IV diesel emergency generators totaling 6,000 kW
- A 1 million gallon thermal energy storage (TES) system for off-peak chilled water production, which flattens its thermal and energy demand profiles and provides substantial energy savings



Penn Medicine Princeton Medical Center in Plainsboro, NJ

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The CHP system consists of a clean natural gas-fueled turbine generator with a compressor system to boost its pressure, and another system to manage its parasitic load. This generator can supply all of the hospital's essential power needs. At the same time heat from the turbine exhaust is captured and used to provide thermal energy to the building — including steam for heating and sterilization and chilled water for air conditioning. If necessary, the hospital's electricity load can also be supplied from the grid via two parallel feeders, either of which can supply the hospital's entire load as a contingency. The CHP system is also backed up by three emergency generators, which are used if there is need to black-start the turbine, or if there is an outage while the turbine is undergoing scheduled maintenance. If more power is generated by the turbine than what the hospital needs, the additional power can be sold back to the grid operator.

Due to mission-critical nature of the services provided by Energy Center Princeton, the system is typically online 24/7. Unplanned downtime is rare and typically due to local utility (PSEG) power dips and outages. In 2018 there were roughly 50 power dips that caused short, momentary disruptions to the hospital and plant, but the CHP system was able to ride through these disruptions without any negative impacts.

Public-Private Partnership and Power Purchase Agreement

Penn Medicine Princeton Medical Center aimed to use green building practices while incorporating a variety of environmentally friendly and sustainable initiatives. To accomplish this, the company entered into a public-private partnership arrangement with Clearway Energy, Inc., which provided the financing, design, and construction of the project and currently owns, operates, and maintains the system. Penn Medicine Princeton Medical Center in turn purchases energy from Clearway Energy, Inc. under a long-term energy services agreement.

“CHP enables us to use environmentally sustainable energy as we fulfill our mission of providing high-quality healthcare. It meets our hospital’s energy needs while reducing our operating costs and protecting the environment.”

***- Barry Rabner, President and CEO
Penn Medicine Princeton Health***

For More Information

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More CHP Project Profiles:

www.nynjCHPTAP.org

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