

Morristown Medical Center

4,600 kW CHP System

CHP
TECHNICAL ASSISTANCE
PARTNERSHIPS

Quick Facts

LOCATION: Morristown, NJ

MARKET SECTOR: Hospital

FACILITY SIZE: 735 Beds

EQUIPMENT: 4.6 MW Solar Mercury 50

Combustion Turbine and Cleaver

Brooks Heat Recovery Steam

Generator (HRSG)

FUEL: Natural Gas

THERMAL OUTPUT: Steam

USE OF THERMAL ENERGY: DHW,

Sterilization, Space Heating, Cooking

CHP TOTAL EFFICIENCY: Est. 69% HHV

ENVIRONMENTAL BENEFIT: CO₂ Emissions

Reductions of 4,222 tons/year

INCENTIVE: \$3 million

CHP IN OPERATION SINCE: January 2022



Morristown Medical Center

Site Description

Morristown Medical Center is located at 100 Madison Avenue, Morristown, NJ 07960. It is a 700+ bed regional trauma center and has been the top ranked hospital in New Jersey for the past four years. The initial goal of switching to CHP was to have reliable electricity for the hospital at all times. This developed into a state-of-the-art cogeneration plant and now provides the hospital with reliability that they have never had before.

Reasons for CHP

Over the last decade, Morristown Medical Center has experienced several extended power outages lasting eight (8) hours or more as well as many brief outages. These outages were caused by a combination of storms, downed tree limbs, and aging equipment and infrastructure. Power outages cause interruptions to hospital operations and suspended surgeries, reducing the facility's ability to provide patient care. Ten years ago, its sister hospital, Overlook Medical Center, owned and operated a power, heating, cooling CHP system. This was a successful project and illustrated the resiliency benefits of CHP when the system powered the hospital during grid outages resulting from Hurricane Sandy. This greatly influenced the decision to install a CHP system at Morristown, however significant upgrades to the electrical infrastructure were needed first to support installation.

Prior to the CHP project, hospital loads were served from two utility feeds, a Madison Avenue and a Franklin Street feeder, both supplied from the Morristown 12.5 kV substation. This electrical infrastructure configuration resulted in numerous extended outages since both services were fed from a common substation. Additionally, the underground

Madison Avenue feeder was unreliable due to aging and corroded cables. In the event of a feeder failure, the utility company could manually swap feeders, which typically took one to three hours.

CHP Equipment & Operation

The recently installed CHP system is based around a 4.6 MW, natural gas fired, Solar Mercury 50 combustion turbine, Cleaver Brooks HRSG (rated to produce 13,000 lb/hr of 100 psig steam), 1,800 square foot CHP plant, and JJ Crewe 200 psi gas compressor. The medical center is also installing a 1.2 MW solar farm in 2023. Installation of the CHP system was part of a larger project that included upgrades to the existing electrical infrastructure, including the replacement of seven onsite utility owned transformers, installation of a new primary voltage (12.5 kV) switchgear, and running over 4 miles of new underground primary voltage cable. The design-build team was led by Cogen Power Technologies.

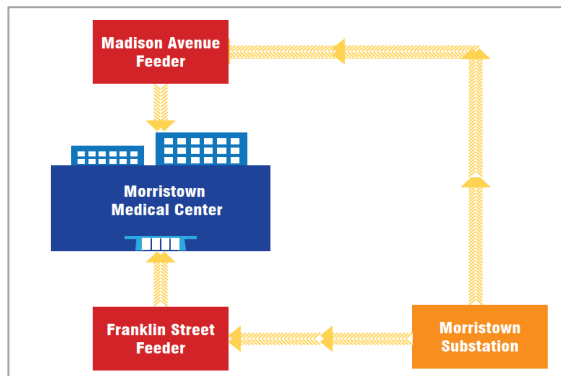
The CHP project was completed as a portion of the hospital's larger electrical infrastructure upgrade projects. This included the extensive onsite work described above in addition to the utility modification of the Madison Avenue feeder so that it is served from a separate substation. This work resulted in two independent utility feeds served by separate substations as well as the onsite generation resource. This significantly reduced the hospital's risk of extended power outages.



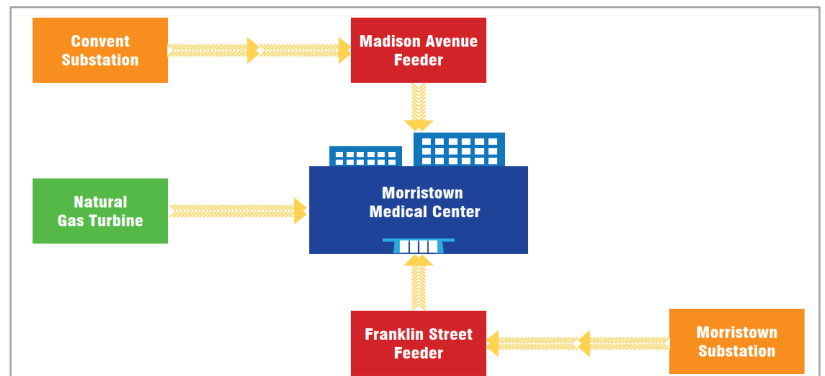
Solar Mercury 50 Turbine installed at Morristown Medical Center

COURTESY OF Morristown Medical Center

Original Configuration



Updated Utility Configuration



The new CHP system runs in sync with the Franklin feeder and provides onsite power while the facility must maintain a minimum utility import of 500 kW. The CHP is monitored 24/7 with focus on the natural gas compressor, primary voltage switchgear, turbine power output, and HRSG steam production.

Benefits of CHP

The use of CHP represents one of the most efficient uses of natural gas, allowing the medical center to produce steam and electricity onsite. Installation of the CHP system has delivered annual carbon emissions reductions on the order of 4,200 tons while simultaneously providing over a 60% reduction in utility bills (from \$6 million to \$2.3 million). During the winter months, the CHP system produces 85% of campus electricity and 45% of campus steam. In the summer months, that shifts to about 45% of electricity and 65% of steam. The medical center received a \$3 million grant from the New Jersey Clean Energy Fund to help cover a portion of the project cost.

For More Information

U.S. DOE NEW YORK-NEW JERSEY CHP TECHNICAL ASSISTANCE PARTNERSHIP (CHP TAP)

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