

Combined Heat and Power Feasibility Study

Clients: Saratoga Hospital
2017–ongoing

CHP is a superior energy resource for hospitals because it can efficiently provide a hospital's energy services and, because they use less fuel than conventional energy services, are cost effective and reduce harmful emissions. CHP also provides resiliency because they can operate indefinitely during grid outages, which is vital for hospitals. Losing electricity—even for short periods—can disrupt critical life support systems.

In 2017, Saratoga Hospital in upstate New York was interested in installing CHP. Frontier Energy conducted a feasibility study for a 1 MW Flex Energy CHP with three 333 kW Flex Energy microturbine units with hot water heat recovery and one 100-ton absorption chiller.

The Frontier team developed a detailed 8,760-hour model of building loads, system performance, and resulting CHP fuel conversion efficiency (FCE_{CHP}). We predicted that the system would produce 3,833,140 kWh annually net of all parasitic loads, recover a total of 16,707,124 MBtu of heat, and consume 49,463,855 MBtu of natural gas—resulting in an annual CHP performance of FCE_{CHP} 60.2% HHV, with a capacity factor of 69%, meeting generally accepted standards for a high-performing CHP system.

Overall, the combined CHP and absorption chiller system was found to reduce annual electricity purchases by 4,084,420 kWh and reduce maximum demand by 561 kW during the peak month of August.



FRONTIER ENERGY:

- Extracted building loads from utility bill data (hourly electrical and monthly natural gas)
- Modeled CHP performance using curve fits of manufacturer's performance data
- Performed temporary thermal metering on the existing DHW and re-heat circuits for the hospital to further characterize loads where the proposed CHP system will directly interface with the hospital
- Investigated additional aspects that would impact the project, including electrical interconnection, gas interconnection and pressure, and physical layout
- Recommended system classification to maximize system efficiency and simple payback