

# Innovative CHP System Provides Affordable, Clean Energy to Butler Hospital

## Annual Savings of \$92,000 Projected

### Background

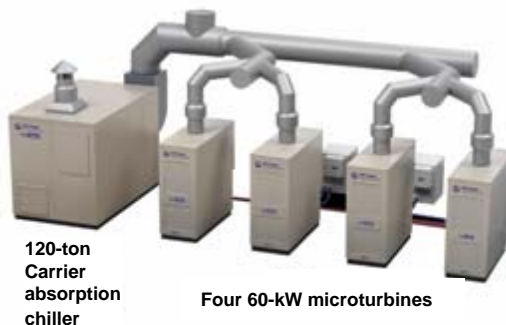
Butler Hospital is recognized as one of the top psychiatric hospitals in the country and has a reputation for outstanding medical care. The well-maintained facilities and carefully manicured, wooded campus in Providence, Rhode Island reflect efforts to provide quality care and comfort to patients. The facility's 500,000 square feet houses the inpatient hospital, day hospital, outpatient programs, as well as programs and departments of other agencies. Last year, 11,200 square feet of space was added to accommodate Butler's state-of-the-art Senior Treatment Center in the new Lippett Building. All together, the hospital was spending about \$500,000 annually for heating and cooling prior to the installation of the PureComfort™ cooling, heating, and power system. Electrical power and space conditioning are now provided more efficiently and with less environmental impact.



*Butler's attractive facility and campus*

### Technology

Butler installed the United Technologies PureComfort™ Model 240M packaged system in 2005. This technology was developed under a DOE/ORNL/IES contract and includes four Capstone 60 natural gas-fired microturbines that can generate up to 240kW of electricity. A Carrier chiller uses exhaust heat from the turbines to produce either 120 tons of chilled water for cooling or 900,000 Btu of hot water. Two compressors provide natural gas to the turbines. The system replaced oil-fired boilers and a steam heating system, and supplements the remaining campus heating and cooling system.



120-ton Carrier absorption chiller

Four 60-kW microturbines

### Benefits

- **Cost Savings** – The hospital projects savings of \$92,000 in utility costs annually.
- **Energy Efficiency** – The system is expected to reach around 80% efficiency, compared with 33% efficiency for utility power plants.

- ***Environmental Friendliness*** – The PureComfort™ system produces about 40% less CO<sub>2</sub> than an average fossil-fuel central power plant. In addition, for Butler, it ends the handling, storage, and combustion of fuel oil, eliminating the need for an air emissions permit and further reducing costs.
- ***System Simplicity*** – The use of waste heat from the turbines eliminates the need for additional water heating or steam equipment. Butler is able to use the same room-by-room terminal heaters/chillers of the previous system, running water heated by turbine exhaust through the units for heating, and cold water from the chiller through them for cooling.
- ***Energy Security*** – Although Butler’s PureComfort™ system is grid dependent, new “black-start,” grid independent versions are now available. This technology is ideal for health care facilities that must continue to operate as usual, even during sustained power outages like those experienced in the aftermath of Hurricane Katrina in 2005.



*The potential uses and benefits for CHP in the healthcare industry are huge. Hospitals represent a 7-gigawatt market with potential energy savings of 0.38 quad/year. More than 200 hospitals have already taken advantage of the lower costs, decreased environmental impacts, and the increased reliability and power quality that CHP brings.*

### **Future Work**

Butler will install a dedicated monitoring system at 19 points within the integrated energy system that will continuously measure power, gas use, and thermal flows at 15-minute intervals over one year. These data will allow evaluation of the performance of the microturbines and chiller-heater over a range of operating conditions, measure how well the CHP system meets key loads, and quantify the system’s economic benefits. Furthermore, through ORNL, DOE has awarded similar contracts to other hospitals that will install and test much larger packaged CHP systems.

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