Eastern Maine Medical Center (EMMC) Receives "Critical Power Reliability" from CHP System

CHP System Construction Project is Prompted by State "Certificate of Need"

Background

Recently, traditional hospitals have taken on an expanded role in disaster readiness throughout our country. Since the terrorist attacks of September 11, 2001 and anthrax scare, hospitals have stepped up their readiness efforts is order to be better prepared in responding to not only traditional disaster threats, but an even more real potential of terrorist attacks.

In 1998, an ice storm had a catastrophic effect on this region with EMMC losing dependable power more than 16 hours. Much of the utility infrastructure was damaged, causing many homes and businesses to be without power from several days to six weeks.

EMMC gets most of its electricity and steam from on onsite combined heat and power installation

In 2005, EMMC was awarded a "Certificate of Need" by the State of Maine which demonstrated that a capital construction project was needed by and would benefit the public. As of 2006, a CHP system was installed, being operated, and tested with encouraging results.

Technology

Soon after the 1998 power outage, EMMC started working with engineers to look at the feasibility of using turbine technology to provide "critical power reliability" with onsite power coming from a gas turbine-powered cogeneration system and having dual fuel capability (natural gas or oil) to greatly improve its ability to operate under any condition.

The following original design criteria for EMMC's CHP system were considered:

- Ability to respond to a specific energy concern for healthcare – power reliability
- An integrated, modular "power island" concept to reduce field labor costs and installation time while increasing the opportunity for replication
- System design that would apply to similar application with a minimal amount of balance of plant and integration costs
- CHP system structure will use advanced information technology to aid in information dissemination

The installed EMMC system utilizes a Solar Turbines gas turbine to generate 4.4 MW of electricity, 24,000 lb/hour of steam, and drive a 500 ton absorption chiller. EMMC will also be able to operate in parallel with the grid, or in islanded mode which would isolate the hospital from looming blackouts or other power outage or quality events. The system was also designed to address Bangor's northern exposure to harsh winters and moderate summers, which result in high historical steam loads in the winter and low loads in the summer. To complicate matters, EMMC's electric load is just the reverse, with peak electric demand occurring in summer.

EMMC's CHP system provides power, cooling, and heating to the hospital

In order to optimize the CHP plant, a steam absorption chiller was employed to improve summer steam demand while trimming electric demand by shutting down electric motor driven chillers. This method of demand side management reaps strong benefits for the project. EMMC will realize nearly $1 million in energy savings annually. The $8.5 million project costs, less a $3 million DOE award, will let EMMC achieve payback in 5.5 years. Energy cost savings are initially reaped by the hospital, but by reducing its energy costs, the patients will realize these benefits through lower costs for services rendered by the hospital.

EMMC received the State of Maine's first "Certificate of Need" for a CHP project. This certification status shows that a capital project is needed by and will benefit the Maine residents, as well as putting rational investment limits on medical equipment and facilities.

Future Work

EMMC and Oak Ridge National Laboratory will continue to collect data to assess overall system performance. Statistics on plant operations are available to the public on the EMMC website (www.emmccoogen.org).

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