

Project Profile

Cleaner & greener

Greater Baltimore Medical Center's boiler upgrade reduces emissions and benefits the bottom line

By Steve Schuster, Associate Editor

Despite unhealthy economic conditions, Greater Baltimore Medical Center (GBMC) successfully completed a boiler replacement project in 2009 that delivered more sustainable and cleaner operations to the medical center and benefited the hospital's bottom line.

In 2006, GBMC officials knew most of the medical center's infrastructure and equipment were at or near the end of their useful lives, and its three boilers were no exception, says Charles Butler, GBMC's director of facilities.

"The existing boiler plant was deteriorating to the extent that it was probably only operating at below 70 percent efficiency," he says, adding that the upgrade has boosted operating efficiencies to more than 90 percent — a direct financial benefit to the medical center.

Planning the upgrade

In 2006, GBMC — which employs 3,500 people and has a main building containing 1.2 million square feet — initiated a full-system condition assessment. The process determined that boiler replacement was the top priority. The project required a great deal of planning, given its complexity and impact on other hospital systems.

"This boiler system replacement actually touched the air conditioning units, chilled-water units, sanitary systems, water supply, and power supply which includes our fire alarms," says Butler, who was responsible for the project's scope, schedule, budget, and communications.

Construction to replace the three water tube steam boilers began in February 2008 and was completed in January 2009, just in time for winter.

"The in-service date was critical to us because we had to be online — that is, fully commissioned," he says. "We had to be online in time for the heating season, which was just a few months later."

The new boilers provided GBMC with a capacity of 40,000 pounds of steam per hour, compared with 24,000 pounds per hour from the old units. The need for continuous operation during the completion of the

project created challenges for Butler and his department.

"All of our systems had to be maintained during this very critical transition for safety reasons," he says. Also, the old de-aerator tank had to be removed to site new equipment, so the new tank was set into place and connected to the old boilers temporarily. This phase required operators to closely coordinate the automatic controls so there was always an ample supply of feed water to the old boilers."

The project included construction of a new control room, as well as the installation of advanced controls that are designed to enhance boiler efficiency.

"The new control panels offer better control with more screens and alarms," Butler says. "It was a big change for the personnel. The new controls technology also allows operators to sequence boiler operation to maximize efficiency."

"Because the new boilers are highly reliable, our current boiler operation sequence allows in-service rotation of one boiler on-line, another boiler in hot stand-by and a third off-line awaiting rotation to stand-by or in-service with a high degree of confidence, minimizing concerns regarding downtime, emergency planning, and operating expenses over budget."

For a behind-the-scenes look at GBMC's nerve center, visit <http://bit.ly/gbmcroom>.

Addressing access, emissions

Among the largest challenges for Butler and the project management firm was planning and executing the construction in an area of the facility that had very limited access.

"All material had to be craned in by a tower crane, erected specifically for this project," says D. Sean McCone with Johnson, Mirmiran & Thompson. "The boilers were lifted in over Memorial Day weekend (2009) by a 650-ton crane that was delivered and erected on Friday, performed the lift on Saturday, and was disassembled on Sunday and removed."

PHOTOS: GREATER BALTIMORE MEDICAL CENTER



Greater Baltimore Medical Center selected three watertube steam boilers for its replacement project, which also included a new deaerator tank, a feedwater pump seat, and a condensate surge tank.



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Among the biggest challenges for Great Baltimore Medical Center's boiler-replacement project was lack of direct of access to the work site on any side. To address the challenge, installers used a 650-ton crane to lower the boilers into place in the medical center's new plant.

The firm managed the design and permitting process and hired the general contractor. During construction, the firm inspected the work, managed the contractor. It also performed constructability reviews and executed the pre-bid meetings and contract awards.

The project required Butler to commit a great deal of in-house resources.

"I think the biggest challenge overall was the necessary commitment of man hours and resources to support the document reviews, startup testing and commissioning, and just getting this new plant up online," Butler says.

GBMC's boiler-replacement project, which required approval from the Maryland Department of the Environment for stack-emissions compliance, addressed these and other environmental concerns from the start.

"We began a series of plans that included alternative site locations, which were eventually presented to upper management," he says. "We also looked at the environmental impacts, such as noise, stack

emissions, and sight lines." Butler and his team also were aware of the impact of the boiler's past and future operations on the neighborhood.

"We didn't want to put this up on a hill because we didn't want to be a nuisance to our neighbors with bright lights and all-too-visible stack emissions," Butler says.

The improvement has been visible.

"The biggest noticeable difference is between the clean smoke coming out of the stacks and the (previously) black (smoke), which has to do with combustion efficiency," he says.

Loose ends

After the project's completion, Butler says GBMC's utility management plan also needed an update.

The management plan "was how we would continue to maintain life-support and infection control," he says. "Our steam for our boilers provided our central sterile process, where we clean our operating instruments and operating room equipment. That's a 24-hour a day operation. The steam we produce helps clean those instruments every day.

"We also had to update all of our plant descriptions, and another document critical to update was our emergency management and environment of care document."

Among the successes of GBMC's project was the fact that it completed the project on time and under budget. The entire project was budgeted at \$11 million, but the actual cost was a little less, Butler says. The boilers cost \$1.21 million, which included the economizers. The remaining \$9.89 million went to other costs, including construction of the new building.

As part of the upgrade project, GBMC doubled the size of its boiler plant size in anticipation of future campus development. The new boilers are located in a brand new facility.

"It's a new building, built in what was once an open air courtyard surrounded by hospital buildings," he says.

Despite the many challenges, Butler and his team were able to successfully complete the boiler upgrade, which now is delivering a host of benefits related to patient care, the community, the environment, and the bottom line. ■

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