CASE STUDY

University of New Hampshire Cogeneration Facility, DURHAM, NH

EDUCATION

UNIVERSITIES

OPERATING COMPANY:
EMCOR Energy Services, Inc.

CLIENT:
University of New Hampshire

GENERAL CONTRACTOR:
EMCOR Energy Services, Inc.

PROJECT DURATION:
Ongoing

VALUE DELIVERED

Increased energy efficiency, a 30-percent reduction in NOx (nitrous oxide) emissions and a 60-percent reduction in SOx (sulfur dioxide) emissions, greater flexibility for meeting energy needs, lower energy costs, expandability to meet future requirements, new educational opportunities.

OBJECTIVES

To address its growing campus energy demands more efficiently, sustainably, and economically; to find a design/build operate-and-maintain contractor with the technical experience, financial security, and commitment to be the university's partner in constructing and operating an energy plant capable of handling the next 20 years of growth; to construct a self-sufficient, environmentally friendly cogeneration plant with a continuous emissions monitoring system.

SOLUTIONS

To help this client meet its exacting standards and achieve its substantial objectives, EMCOR Energy Services (EES) devised an innovative cogeneration solution. It supplies about 75-80 percent of the client's electrical requirements and approximately 85-90 percent of its steam load, while reducing the annual kilowatts/hour purchased from the local utility to about 10 percent. Staying connected to the local grid also provides the university with more flexibility.

The solution involved adding cogeneration and chilled water operations to the client's existing central heating plant. Taking into account the reasonably good condition of the plant's steam generating equipment, EMCOR recommended keeping it in service to provide redundancy and to meet steam loads that exceed the new facility's capacity.

TECHNICAL SOLUTIONS
Relationships
Quality Service
VALUE ENGINEERING
Experience
Project Schedule & Coordination
EXPERTISE

- ☐ New Construction
- ☐ Retrofit
- ☑ Electrical Construction
- ☑ Mechanical Construction
- ☐ Facilities Services
- ☑ Consulting Services

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SOLUTION (continued)

This approach helped reduce construction time and cost. Furthermore, since the existing boiler plant operates on #6 fuel oil, continuing to use its equipment gives the university the ability to meet a portion of its steam requirements with more cost-effective fuel.

The new construction required installation of a 7.9-megawatt (expandable to 27 megawatts) dual-fuel combustion turbine generator train, including an HRSG (heat recovery steam generator), with a duct burner having a total capacity of almost 100,000 pounds of steam per hour. To meet the campus's growing chilled water demands, the company also built a 1,200-ton chilled water plant.

The EMCOR solution also required building a satellite facility approximately three eighths of a mile from the central heating plant, rather than closer as specified by the client's master plan. Since the campus consists of over 5-million square feet of buildings located on over 1,000 acres of rolling topography with woodlands, streams and wetlands, it was more efficient to construct a new electric-driven satellite chiller plant that uses existing above and below grade electrical conductors than to excavate through heavy granite subsurface areas to accommodate large diameter insulated pipes.

Space, however, wasn't the only challenge EMCOR confronted. Time, too, was a factor. Because of the close proximity to research laboratories and student housing, the company had to work closely with the campus community to keep the project on-track without negatively impacting the university's routine activities. This was especially necessary when the time came to transfer the entire mission-critical electrical distribution system from the utility grid to the new switchgear. To avoid disrupting academic and research programs, the company performed the switch-over when students were off campus and classes were not in session.

EMCOR contributed to the university community in a more direct way as well. Demonstrating thought leadership on behalf of the client, the company proposed using the project as a learning tool, one that innovatively expanded the school's teaching capabilities and significantly contributed to its learning potential. The university welcomed the idea. It invited civil and mechanical engineering students to the site during geotechnical evaluation, as well as while piles were being driven, and pile caps and foundations were being poured. Furthermore, an internship program during construction and start-up activities provided employment for one of the school's engineering students. When the cogeneration facility is fully online, engineering students can observe plant operations on classroom computers. The project will also serve as an on-campus case study for students in engineering economics and finance.

As that occurs, EMCOR will still be there. To ensure continued high-performance service and reliable, responsive maintenance, the company's agreement calls for the firm to continue providing plant operations, campus maintenance and consulting services for the next 20 years.

BACKGROUND

Founded in 1866, the University of New Hampshire (UNH) is a top-tier land-, sea-, and space-grant public university, serving more than 10,000 undergraduates and 2,000 graduate students. Recognized as a rising star among research universities, UNH was at the top of its class among the most energy efficient research campuses in the country even before the cogeneration project got underway. With the new facility, the university has a reliable way to meet both current and changing needs by efficiently producing thermal and electrical energy, while meeting all applicable state, local and federal emission requirements. This, combined with its current use of propane–powered vehicles and composting program, continues the school's solid tradition as a regional sustainability leader, a position that has won it various regional and national energy conservation awards.

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EMCOR Energy Services