

GE helps North Shore-Long Island Jewish Medical Center save \$1 million per year with five-year ROI



The 48-acre North Shore-Long Island Jewish Medical Center (NSLIJMC) campus encompasses 1.2 million square feet of clinical space with plans to nearly double in size over the next ten years. In anticipation of the expansion, NSLIJMC constructed a new Energy Center in 2003, which included a footprint for a future cogeneration system.

This state-of-the-art thermal plant won the 2005 American Society for Healthcare Engineering (ASHE) Vista Award for infrastructure. The Energy Center's major equipment comprises three 53,000-lb-per-hour 150-psi boilers, three 2,000-ton steam turbine chillers, one 2,000-ton electric chiller, cooling towers, condenser and chilled water pumps.

To meet growing energy needs for the expanding campus, NSLIJMC considered paying the utility company to improve the substation to handle the load at the cost of millions of dollars. Instead, it chose a more cost-effective, energy-efficient solution of installing a cogeneration system in the Energy Center, which freed up 2,400 kW of power for new buildings.

PROJECT PROFILE

The facility

North Shore-Long Island Jewish Medical Center is an 827-bed voluntary, non-profit tertiary care teaching hospital serving the greater metropolitan New York area.

The opportunity

Substantially lower the Medical Center's energy costs, while providing energy independence and reducing its carbon footprint.

The GE solution

Install a cogeneration system comprising two 1,425-kW GE Jenbacher J420 GS gas-fueled reciprocating engines.

The results

- \$1 million annual reduction in energy costs
- \$1 million in incentives from the New York State Energy Research and Development Authority (NYSERDA)
- Five-year return on investment

The cogeneration system substantially reduces NSLIJMC's energy costs and carbon footprint. This efficient form of energy conversion has the potential for primary energy savings of up to 40 percent by using a gas generation system instead of separate power and heat generation equipment.

"The advantage of the Jenbacher cogeneration system is it generates both heat and power," explains Don Spieth, Power Generation, Renewable Growth Leader, GE. "This is a very large chiller plant and would have required a lot of power to start and run off the grid. Jenbacher engines deliver outstanding electrical efficiency. Plus by recovering heat for steam and hot water applications, NSLIJMC saves on the oil or natural gas they would have had to purchase."



Efficient, reliable cogeneration solution

NSLIJMC selected Northeast Energy Systems, GE's authorized distributors for Jenbacher gas engine systems, to add a state-of-the-art, energy-efficient cogeneration system to their Energy Center. WSP Flack + Kurtz, the design engineer, and Fresh Meadows Mechanical contractors also worked on the installation.

Two 1,425-kW GE Jenbacher J420 GS gas-fueled reciprocating engines were installed to generate power for the Energy Center. GE's Jenbacher cogeneration is much more efficient than grid electricity, which uses just 30 percent of the energy from the original fuel. Jenbacher engines deliver high electrical efficiencies of up to 44 percent.

"Cogeneration produces power at the point of use, so there are no losses due to transmission that you would have from a central utility plant," says Al Clark, President, Northeast Energy Systems. "And unlike utility plants, cogeneration systems allow you to recover heat that would otherwise be rejected into the atmosphere. The hospital benefits from reduced electrical and overall energy costs, while the community benefits from reduced emissions and better electrical service."

By recovering waste heat from engine operation, the cogeneration system generates high overall plant efficiencies (electrical and thermal) in excess of 86 percent. Thermal output from cogeneration is integrated with the hospital's steam distribution system. Stack heat is captured and piped into the main boiler system, producing 4,000 lb per hour of 150-psi steam at peak load. This helps supplement campus steam needs of anywhere from 10,000 lb up to 28,000 lb per hour in peak season. Jacket water from the system is recovered and used to reheat the steam condensate returning to the boilers and to preheat the boiler's city water make up.

Gas reciprocating engines are not designed to accept the large block loads from the large electric motor, so a "diesel assist" consisting of a 2-Mw diesel generator was incorporated

into the design. The generator can be run in parallel with the gas engines to help restart the Energy Center if it loses power. The generator's primary responsibility is to provide emergency power for patient care areas.

As it turns out, the load transfer capability of the Jenbacher engines outperforms the manufacturer's product data. The diesels are not needed except as an emergency standby system.

"Jenbacher engines are extremely efficient and very robust," says Jeff Scott, Senior Project Manager, LIJMC. "With the addition of variable frequency drives on the electric chiller and 500-hp CHW distribution pumps, GE Jenbacher equipment easily brings the plant online from a black start. Everyone involved in the project is very impressed."

Results

The GE Jenbacher cogeneration system is saving NSLIJMC approximately \$1 million per year in energy costs. Savings are used to fund projects that benefit NSLIJMC's core mission of caring for patients.

In addition, the project was awarded \$1 million in incentives by the New York State Energy Research and Development Authority (NYSERDA) for its innovative energy-conservation approach. Combined with the annual energy savings, LIJMC expects a return on investment from the project in less than five years.

"The project went very well," says George Bird, Director of Plant Operations, LIJMC. "The Jenbacher engines have been very reliable and trouble free. Cogeneration makes us energy independent, so we don't need to worry about losing power during summer months when there are heavy loads on the utilities. And there are huge cost savings. We are very happy with the project."

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To learn more, contact a member of our GE Jenbacher team, Donald Spieth at 630-652-4476.

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