CASE STUDY

Timmins and District Hospital

TIMMINS, ONTARIO, CANADA

CHALLENGE:

Decrease the cost of electricity and utilize natural gas fuel more efficiently while offering power resiliency to a critical facility

SOLUTION:

Two Generac 500 kW natural gas generators

RESULT:

A system that is no longer reliant on the grid to provide power crucial to hospital operations, thereby allowing the facility to continue to operate at full capacity no matter the circumstances

"Projects like this can improve the quality and capacity of a patient's experience and the preparedness of the health care service provider in times when we need it most."

Microgrid Improves a Hospital's Energy Efficiency and Power Resiliency

"The novel Coronavirus has already taught us how crucial healthcare systems are, especially in times of crisis," said Lisa Barber, director of business development, CEM Engineering. "It has also shown how fast they can be crippled if not cared for by those who oversee them. Storms or other grid outages have taught us about the importance of power that not only keep a hospital's lights on, but also power lifesaving ventilators that continue to be required as we weather this pandemic.

While some health care institutions are still grappling with what an effective disaster plan might look like, Timmins and District Hospital recently underwent an innovative, hybrid project to solidify their plan. The objective was to increase the power quality of the facility, actively manage the energy spend of the entire hospital complex, and to ensure they always have a reliable source of power. Hospitals have a lot at stake, especially during a global pandemic, and the success of this system was vital. Healthcare facilities provide a wide range of care, and if the power is unreliable, the lives of patients, staff members and visitors are at risk. Additionally like all industrial consumers of gas and electric, the hospital wanted to take a more active approach in managing their energy spend.

"The purpose of the project was to decrease the cost of electricity and utilize natural gas fuel more efficiently," said Derek Neill, Total Power Limited. "CEM Engineering and Total Power Limited were brought onto the project to engineer and install a reliable and efficient source of electricity, thermal energy through hot water production, and backup power."

An important design factor for the engineering team was Ontario's Global Adjustment (GA). GA was established by the Ontario government in 2005 to cover the cost of providing adequate generating capacity and conservation programs for Ontario. All Ontario electricity customers pay the additional fee on top of their normal bill based on time-of-use. GA is set monthly to reflect the differences between the wholesale market price for electricity, known as the Hourly Ontario Energy Price (HOEP), and regulated rates for generating stations as well as payment for building or refurbishing infrastructure. Generally, when the HOEP is lower, GA is higher to cover additional energy production costs. In April 2017, the government of Ontario announced that customers with an average peak demand of above 500 kW could opt to participate in the Industrial Conservation Initiative (ICI). Consumers participating in the ICI pay GA based on their individual power consumption during the top five peak Ontario demand hours over a 12-month period. For many commercial and industrial customers in Ontario, this GA surcharge ends up being a very substantial part of their monthly utility bill.

To help the hospital achieve their goal of becoming more energy efficient, CEM Engineering began designing a combined heat and power (CHP) and GA mitigation package. CHP is an integrated set of technologies for the simultaneous, onsite production of electricity and heat. CHP is an energy efficient technology that generates electricity and captures the heat that would otherwise be wasted to provide useful thermal energy that can be used for space heating, cooling, domestic hot water and industrial purposes. According to the United States Environmental Protection Agency

APPLICATION:
Healthcare

MODELS:
Two 500 kW natural gas generators

(EPA), nearly two-thirds of the energy used by conventional electricity generation is wasted in the form of heat discharged to the atmosphere. In addition, CEM Engineering wanted the GA mitigation system to help with peak shaving. Peak shaving is a technique that is used to reduce electrical power consumption during periods of maximum demand on the power utility, allowing the hospital to save substantial amounts of money. Utilities tend to have different pricing based on demand, and pricing during the peak demand hours are usually the highest. This type of pricing makes peak shaving an attractive idea to organizations with large power demands during peak hours. One of the best ways to peak shave is by using generators to supply power during peak utility demand, essentially allowing the hospital to self-generate during those more expensive periods of the day. "Generac generators can be utilized for GA busting, or peak shaving, as a cost effective approach to save money and have emergency backup power," said Neill. "More companies are investing in this type of solution to lower their growing energy costs and provide the business reliability that comes with the Generac standby generator."

CEM then teamed up with Total Power Limited, a Generac Industrial Power dealer, to specify the units to be used in the design. "Generac is a world class company in multiple sectors in the industry," said Neill. "And with Total Power's expertise and long standing relationship with the client, we knew we would have a successful project." In the end, the final design called for two 287 kW CHP and two 500 kW natural gas generators. "The CHP units are being utilized to provide electricity and hot water to the hospital, while the Generac units provide addition peak shaving," said Neill. "The Generac generators will come on approximately 20 times a year when electricity peaks are at their highest and will lower the hospital's electrical bill. Besides peak shaving, they will be used to lower the hospital's electrical pull from the grid by running during the designated GA peaks, which will then substantially lower their GA surcharge."

Neill recommended natural gas fuel to be used for several reasons. One reason is that peak shaving is most viable with natural gas generators, rather than diesel generators, because of the higher cost of diesel fuel and fuel maintenance costs. Natural gas also provides for a much cleaner solution that in many parts of North America, is the only solution allowed for operating profiles that are beyond standby. Neill also recommended the generators be paralleled instead of just one unit. "With all four units running, the hospital will always have the confidence of meeting their power needs." Generac's MPS, or Modular Paralleling System, allows for greater system flexibility by allowing additional diesel, natural gas, or propane units to be added to the system later as power needs change.

Barber said the project will not only reduce the hospital's energy costs by over $1 million annually, but it also provides resiliency to the Timmins community by enabling complete electrical islanding of the hospital during an emergency event. "By implementing these measures, Timmins and District Hospital is no longer reliant on the grid to provide power crucial to its operations," she said. "And therefore the facility can continue to operate at full capacity no matter the circumstance." Construction was completed under COVID-19 restrictions and is the first virtual hybrid project commissioned in Ontario of its kind.

"Projects like this can improve the quality and capacity of a patient's experience and the preparedness of the health care service provider in times when we need it most," said Barber. "If history teaches us anything about how to deal with the future, the time to be prepared is now."