Lake Otis Medical Clinic

Healthcare

The Challenge

Located in the heart of Anchorage, Alaska, Lake Otis Medical Clinic is a 30,000-square-foot building that provides healthcare services to over 200 patients per day.

On November 30, 2018, the city experienced a 7.1 magnitude earthquake that caused irreparable damage to the facility's mechanical/electrical room and destroyed the only boiler in operation at the time. The clinic was forced to install large portable space heaters to provide temporary heat to the building until a replacement system could be installed.

The medical clinic worked with Capstone partner, Arctic Energy Inc., to tackle numerous concerns surrounding the adoption of a new cogeneration system, and ultimately decided on a Capstone C65 integrated combined heat and power (ICHP) system as the best solution. As a result, the clinic improved their energy resiliency, ensuring the reliable, regular supply of energy and contingency measures in the event of utility power outages. Additionally, the system provides a hedge against rising electrical costs in the region.

The Solution

At the time of the installation, the clinic's electrical utility costs averaged $7,000 per month, with its aging boilers operating only at 51% efficiency. The installation, which included removing old boilers and replacing them with two Capstone C65 microturbines, took approximately five months to complete. It was a three-step installation process: temporary heat only, no electricity; heat and temporary electricity during construction; stand-alone power supporting the entire building.

I can tell you right now, from everything I've seen over the last four or five years working with these microturbines, they do what they say they'll do if installed in the right circumstances."

— Brad Bosshart, C.P.C.

Power Profile

Customer
Lake Otis Medical Clinic

Location
Anchorage, Alaska

Commissioned
November, 2019

Fuel
High Pressure Natural Gas

Technologies
- 2 C65 ICHP Microturbines

Capstone Green Energy Distributor
Arctic Energy, Inc

Two C65 ICHP microturbines provide all of the medical facility's thermal and electrical needs, decreasing their carbon footprint by more than 70% and reducing noise pollution.

Still, the system installation was not without initial challenges. The team of mechanical and electrical engineers that originally designed and installed the combined heat and power (CHP) system directly coupled it to the building hydronic heating loop. They discovered not long thereafter that, due to aging piping and a malfunctioning building automation system, the configuration was not reliable enough for the Capstone system. Therefore, in spring 2020, the CHP system received an upgrade: an isolated hydronic loop exclusive to the CHP system, decoupling the CHP system from the existing infrastructure. No shutdowns have occurred since the upgrade.

Concurrently, the utility required an update to the building's electrical infrastructure to meet National Electrical Code (NEC) standards. It added substantial costs to the project, but the building passed electrical inspection in October 2019.

In the upgraded system, hot water flows through an isolated loop to the facility's heat exchanger, the building's primary boiler. During winter months, when the facility is consuming all the heat and hot water it produces, the CHP system runs at efficiency between 85-90% efficiency—a major improvement.

The system runs in "dual-mode," parallel with the grid, so that in the event of a power outage, the microturbine system takes the entire load of the building. Once the grid comes back online and is stable for a minimum of five minutes, the system can re-connect to the grid.

The Results

The new Lake Otis CHP system solved a big problem: the utility's unreliability. For the past decade, the utility regularly lost phase A power from the local feeder for 15 to 40 minutes at a time, causing sensitive equipment failures. Thankfully, the CHP system's stable on-site power supply proved the building's connection to this unreliable utility unnecessary, and the building withdrew from utility power support.

Currently operating completely off the grid, the microturbines provide the entirety of the building's thermal and electrical energy needs, decreasing the carbon footprint by more than 70% and dramatically reducing the amount of indoor and outdoor noise pollution.

Its original configuration estimated the simple payback of the project under 4 years with a total installed cost of approximately $412,000. With the emergency heat-only production, building electrical upgrades, and the isolated heating loop requirements, the total cost increased to approximately $900,000, but still delivers an impressive payback of roughly 7 years.

Capstone C65 ICHP Microturbine

A C65 provides up to 65kW of electrical power while the UL-Certified C65 ICHP provides up to an additional 150kW of thermal power for CHP and CCHP applications.

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