Memorial Sloan Kettering

Healthcare

Power Profile

Customer
Memorial Sloan Kettering Cancer Center

Location
New York, New York

Commissioned
January 2019

Fuel
Pipeline Natural Gas

Technologies
- (1) C1000S Microturbine

Capstone Green Energy Distributor
RSP Systems

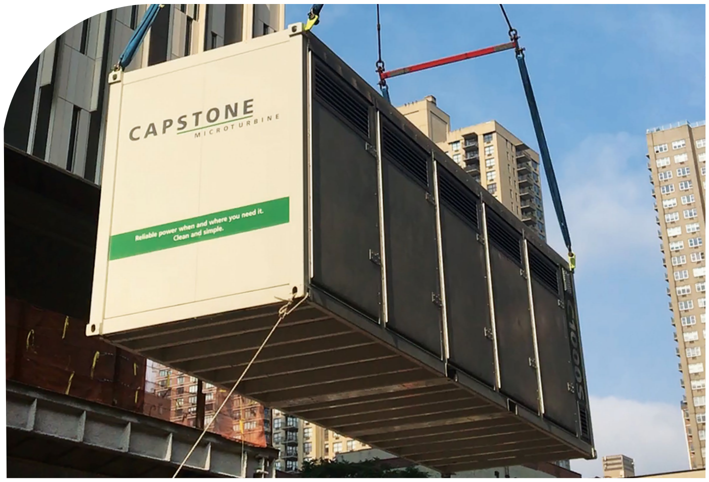
The Challenge

The David H. Koch Center for Cancer Care at Memorial Sloan Kettering (MSK) is a comprehensive care facility located on the upper east side of Manhattan. This 25-story, 760,000-square-foot center, featuring two below-grade levels of parking, is New York's largest freestanding cancer care center. Back in 2012, when the facility was being designed, one of the primary goals was to address the critical need for uninterruptable power, particularly in light of the facility's geographic footprint beside the East River within the 100- and 500-year floodplain. Having witnessed extreme weather devastation when Superstorm Sandy hit New York, MSK's director of facilities engineering, Steven Friedman, clearly delineated the project goals: "We need to think outside the box of normal health care construction. We're building for a minimum 50-year life span, and, given the critical nature of patient care delivery and high-tech programs, this facility needs to remain active under all possible adverse weather conditions and any potential incoming utility failures."

MSK's engineering, operations, design, and construction teams were not only tasked with ensuring the highest power reliability but also with infusing the plan with energy conservation and sustainability features wherever possible. Among many sustainable attributes of this facility, the team collaboratively decided to use microturbine technology for an on-site power

Microturbine technology in health care construction is an absolute no-brainer. The ability to utilize natural gas in the summer months to offset higher electrical demand costs by the service provider and utilize the waste heat from the engine has paid back in large dividends."

— Steven Friedman, P.E., Director of Facilities
Memorial Sloan Kettering Cancer Center



A C1000S microturbine provides New York's largest freestanding cancer care center, Memorial Sloan Kettering (MSK), electrical power generation and additional standby power to the facility should there be an interruption in utility power.

system, and ultimately installed a 1 MW cogeneration system that provided energy resilience, environmental benefit, and cost savings.

The Solution

The center's heating system is comprised of a dual-fuel (natural gas and fuel oil) hot water boiler plant consisting of three 500-BHP boilers. When determining the size of the plant, in lieu of sizing for the peak building load, the design coupled the boiler plant with a combined heat and power (CHP) cogeneration system that would satisfy the heating demand load in the building as well as address the resiliency needs for the project. The design configuration allowed for boiler equipment to be staged on/off, coupled with the CHP plant, based on building load.

The on-site power system features a 1000S microturbine that include five 200kW modules fueled by natural gas. One of the decisive factors behind the selection of the multiple module technology was its ability to maximize operational efficiency by accommodating fluctuation of the building's heating load.

The microturbines are coupled with an air-to-hydronic-type heat recovery heat exchanger that uses waste heat from the exhaust and transfers this energy to the heating hot water distribution. This configuration operates in parallel with the building's hot water boilers, which allows all heat recovered from the operation of the microturbine engines to be used as the building's primary heating source. If the building's heating demand exceeds the capacity of the CHP heat exchanger, the hot water boiler's sequence is altered to meet the building's heating demand. Based on the system's configuration, the CHP heat exchanger capacity can meet the building's heating demand load during the summer and shoulder seasons, giving the facilities staff the flexibility to operate only the hot water boilers during the winter heating months.

Though the local utility is the facility's primary power source, the microturbine system is set up for load-following, operating in parallel with the normal power electrical distribution. The microturbine system provides up to 1 MW of electrical power generation for the building, thus reducing the overall peak electrical demand the building draws from the utility. Furthermore, the system is configured to allow for the CHP cycle to provide additional standby power to the facility should there be an interruption in utility power.

The Results

In addition to the high efficiency provided by the waste heat recovery configuration, the microturbine plant offers several advantages compared to other technologies used in small scale power generation. With just a single moving part, microturbines have long maintenance intervals set between 5,000 and 8,000 hours, and because this system is designed with five individual modules, any unit can undergo component maintenance without a total shutdown of the system.

The compact size and lightweight footprint of the system allowed for it to be installed on the building's roof compared to more traditional systems that would need to take up valuable real estate within the facility.

The reduction in the need to use peak utility power has reduced overall operating costs for the facility, as has the dramatically improved energy efficiency provided by the waste heat recovery—a benefit that has also made a significant impact in minimizing the facility's greenhouse gas emissions.