



### The Challenge

Microgrids represent a rapidly growing distributed energy market segment, and Capstone is well positioned to participate. While there is no one definition for what a “microgrid” is, it typically refers to a combination of distributed energy resources (DERs) able to operate connected to a utility grid, but also able to operate completely isolated from the grid.

Ensuring reliable power for the mission-critical data center was the main priority of the state-of-the-art facility. A main driver of the purchase was resiliency that the utility could not provide. Traditional data centers rely on power from the utility and have banks of batteries that keep servers and equipment running during short power losses. A standby emergency generator is typically used for longer outages. Because of the critical nature of the complex, the microturbine is configured to provide power and thermal energy in stand-alone mode in the event of a grid failure.

### The Solution

At the heart of this microgrid is a Capstone C600 Signature Series natural gas-fired microturbine that simultaneously creates electricity and thermal energy for heating and cooling. The C600S microturbine is a dual mode model, able to operate connected to a utility grid or operate stand alone, providing power to critical loads when the utility is unavailable.

The clean exhaust from the microturbine is brought to a 200-refrigeration-ton capacity absorption chiller for building cooling, or can be directed to a heat exchanger to provide up to 3MMBTU per hour of hot water for building heating. This combination of outputs is called combined cooling, heating, and power (CCHP) and provides more efficient use of fuel than the traditional utility electric power and separate thermal systems. The C600S microturbine is controlled by two fully redundant Capstone controllers for maximum resiliency.

## Power Profile

### Customer

Utility Software Company

### Location

Bloomington, Minnesota

### Commissioned

May 2017

### Fuel

Natural Gas

### Technologies

- Capstone C600 Signature Series Microturbine
- 200-ton Absorption Chiller
- Hot Water Heat Exchanger (3MMBTU)
- Solar Panels
- Wind Turbines
- Battery Energy Storage
- Diesel Backup Generator

### Capstone Turbine Distributor

Vergent Power Solutions



“This groundbreaking microgrid project is a showcase for data centers that demonstrates the resiliency and financial value of microturbine baseload generation with CCHP.”  
— Justin Rathke, President  
Vergent Power Solutions



*A 600 kW Capstone natural-gas-burning microturbine paired with absorption chiller and heat exchanger form the backbone of the microgrid for the office building and data center.*

Additional distributed energy resources in this microgrid include solar panels that can produce up to 180 kilowatts of power, wind turbines with a capacity of 24 kilowatts, energy storage capacity of 231 kilowatt hours, and a traditional 1,500-kilowatt backup diesel generator.

Tying all these separate power generation technologies together is a smart microgrid controller, featuring cutting-edge technology with the ability to control and dispatch using advanced optimization models.

## The Results

The Capstone C600S microturbine provides the backbone, and operates 24 hours a day, 7 days a week. The microturbine output is adjusted by the microgrid controller to coordinate with the non-firm solar and wind power generation to provide the best overall economics.

The new office building being powered by the microgrid is five stories, 110,000-square-foot, fully sustainable, and houses a critical data center. This customer could have developed the site using only a backup power generator, but instead went a step further and built it as a microgrid site, fully islandable from the grid. They wanted to demonstrate how a microgrid can not only make sense in terms of providing backup power for a critical facility, like their data center, but also can make economic sense.

The customer intends to expand the microturbine package to 1000 kW as the building load increases, which it can do without altering the system footprint since the C600S has two available bays for expansion. The system is covered under a nine-year bumper-to-bumper Factory Protection Plan (FPP) serviced by Vergent Power Solutions. ■

## Capstone C600S Microturbine



**A C600S Microturbine provides up to 600 kW of electrical power and contains three microturbine engines.**