

Union College

1.8 MW CHP System



Location of CHP plant at Union College, Schenectady, NY

COURTESY OF Cogen Power Technologies

Quick Facts

- LOCATION:** Schenectady, NY
- MARKET SECTOR:** Colleges and Universities
- FACILITY PEAK LOAD:** 2.4 MW
- EQUIPMENT:** 1.8 MW Kawasaki GPB17D combustion gas turbine
- FUEL:** Natural Gas
- USE OF THERMAL ENERGY:** Space heating and cooling, domestic hot water
- CHP TOTAL EFFICIENCY:** 83.6% LHV
- ENVIRONMENTAL BENEFIT:** 7,400-ton annual reduction in CO₂ emissions
- TOTAL PROJECT COST:** \$13.7 million
- ANNUAL SAVINGS:** \$450,000
- CHP IN OPERATION SINCE:** 2014
- NOTE:** CHP plant accelerated Union College target date for carbon neutrality from 2060 to 2035

Site Description

Union College is a private liberal arts school located in Schenectady, NY. It has 2,242 students on its 130-acre campus. In 2018, Union College was named in *The Princeton Review's "Guide to Green Colleges"* for the ninth straight year, scoring a 93 out of a possible 99. The Guide to Green Colleges score incorporates the health and sustainability of student life on campus, the education of students for employment and citizenship in a clean-energy economy, and the environmental responsibility of the school's policies. In 2007, former Union College President Stephen Ainlay signed the American College and University Presidents Climate Commitment, with a goal of carbon neutrality by 2060. The school conducted energy efficiency upgrades, including converting its hockey stadium to LED lighting and designing new campus buildings to LEED Gold standards.

Reasons for CHP

Union College needed a way to meet the electric, heating, and cooling needs of their rapidly expanding campus despite local electric grid constraints. Resiliency for the campus, ensuring continuity in the provision of heating, cooling, and hot water in the case of a utility outage, was identified as a critical feature of the CHP investment. On-site electric and thermal generation with CHP meets both of these needs, reducing the college's reliance on the grid during normal operation and delivering critical energy services during outages of extended duration.

Union College has incorporated its use of CHP with its broader environmental goals; with the installation of the CHP plant, Union College was able to accelerate its timeline for carbon neutrality from 2060 to 2035. CHP has met the environmental and resiliency needs of the college while providing significant energy cost savings, greatly benefitting the college on all fronts.

CHP Equipment & Operation

The CHP system at Union College consists of a 1.8 MW Kawasaki GPB17D combustion gas turbine, a Rentech heat recovery steam generator (providing 90 psig saturated steam at 11,000 lb/hr unfired, and 45,000 lb/hr fired), a 225 psig natural gas compressor, and a 600 ton absorption chiller, so it can provide space cooling as well as heating. The system provides 75% of the electricity, 90% of the steam, and 87% of the cooling for the entire campus.

In the case of a utility grid outage, the system is equipped with an automatic load shed system to control the electricity supply when islanded and maintain hospital facility operation. It also has a 500kW black start generator so that the turbine can be started during an outage, ensuring students have heat, cooling, and electricity. Since beginning operation, the CHP system has functioned in "island mode" several times as a result of grid outages.



Outdoor Enclosure of Kawasaki GPB17D gas turbine at Union College

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Education

Union College uses the CHP system as a learning environment for Union College and its campus community, including the Schools of Economics, Environmental Science, Political Science, and Engineering. Throughout the year, many students, faculty, and staff tour the plant and utilize its data on various projects to enhance the learning experience.

***"The plant is a living learning environment that Facilities Services is proud and happy to integrate within the fabric of our community."
- Marc Donovan, Assistant Director of Facilities
Union College***

Engineering students gain real time data and technical information to better understand the subject matters and engage in internships at the plant operating the CHP system. This gives them real life experiences with plant operators and the plant itself. Economics, Environmental Science, and Economic Policy majors often seek to understand the impacts of the plant fiscally and from a carbon responsibility perspective. The plant provides a valuable learning resource for the college in addition to its resilience, carbon reduction, and economic benefits.

For More Information

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