

Maintaining air quality

The WCCF is one of the cleanest power plants in the Midwest. The facility meets all air quality standards with state-of-the-art emission controls. For example, the facility's emission levels that contribute to ozone are lowest compared to any other similar plant in the state. The controls, combined with the efficiency of cogeneration, produce markedly fewer greenhouse gases and other emissions such as heavy metals (mercury) and sulfur dioxide.

Reducing water impacts

The cogeneration facility was designed to minimize water use. Water is used for steam and chilled-water production and general use.

Water from Lake Mendota is used in the cooling towers. Most of this water returns to the environment through evaporation. Lake water use averaged about 111 million gallons per year—approximately the amount lost from lake evaporation during two hot summer days.

City of Madison municipal well water is used for all other purposes including boiler make-up water. The annual usage of city water has averaged 34.7 million gallons per year.

MGE took steps to reduce water use impacts from the facility after working with government, water resource experts and concerned citizens. From this careful review, MGE implemented a water source plan that uses the least amount of water overall and helps the area's watershed. Our steps include:

- The facility's water withdrawal from Lake Mendota does not produce a significant impact on Dane County's lakes and rivers—except during periods of extreme low water flows. The Yahara River, south of Lake Waubesa, is the primary area of concern.

When the river has low water flows, groundwater is pumped from a well south of the city to supplement the river. The amount of water pumped into the river offsets the water used by WCCF during these times. The need to use this mitigation well has been infrequent since WCCF went online in 2005.

- Another system offsets the overall water taken from this well. A groundwater recharge system at Odana Hills Golf Course collects and infiltrates storm water runoff to recharge the groundwater system.

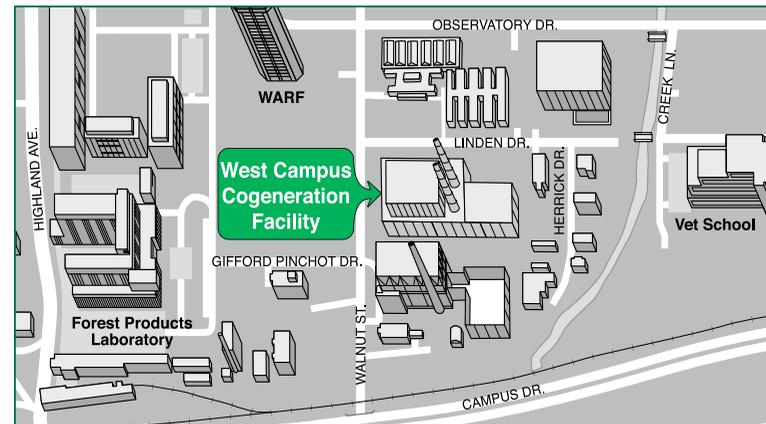
WCCF Fast Facts

Dimensional data

- Site: 4.5 acres
- Facility footprint: 80,500 square feet
- Maximum height: 116 feet
- Height of exhaust stacks: 175 feet

Components of facility

- Combustion turbine system
 - Two dual-fuel GE LM6000 combustion turbines with electric generators
 - Two dual-pressure, duct-fired Deltak heat-recovery steam generators with maximum capacity of 250,000 lb/hour of steam per unit
- Steam turbine system
 - One dual-pressure, extracting/condensing GE steam turbine with electric generator
 - Seven draft-induced Marley cooling tower cells with plume abatement technology
- Chilled water system
 - Six electric-driven York chillers at 5,000 tons of chilling capacity each
 - Eight draft-induced Marley cooling tower cells
- Two natural gas Universal Compression compressors
- Process water system with two 250,000-gallon tanks— one for raw service water and one for demineralized water



West Campus Cogeneration Facility



Meeting multiple energy needs through the efficiency of cogeneration

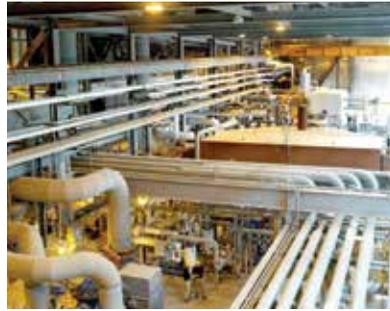


West Campus Cogeneration Facility

The West Campus Cogeneration Facility (WCCF) provides reliable heating and cooling for the UW-Madison campus and electricity for MGE customers. The facility began operation in spring 2005.

Through the efficiency of cogeneration, this facility is capable of producing approximately:

- 150 megawatts of electricity for MGE customers.
- 500,000 lb/hr of steam for campus heating.
- 30,000 tons of chilled water for campus air-conditioning.



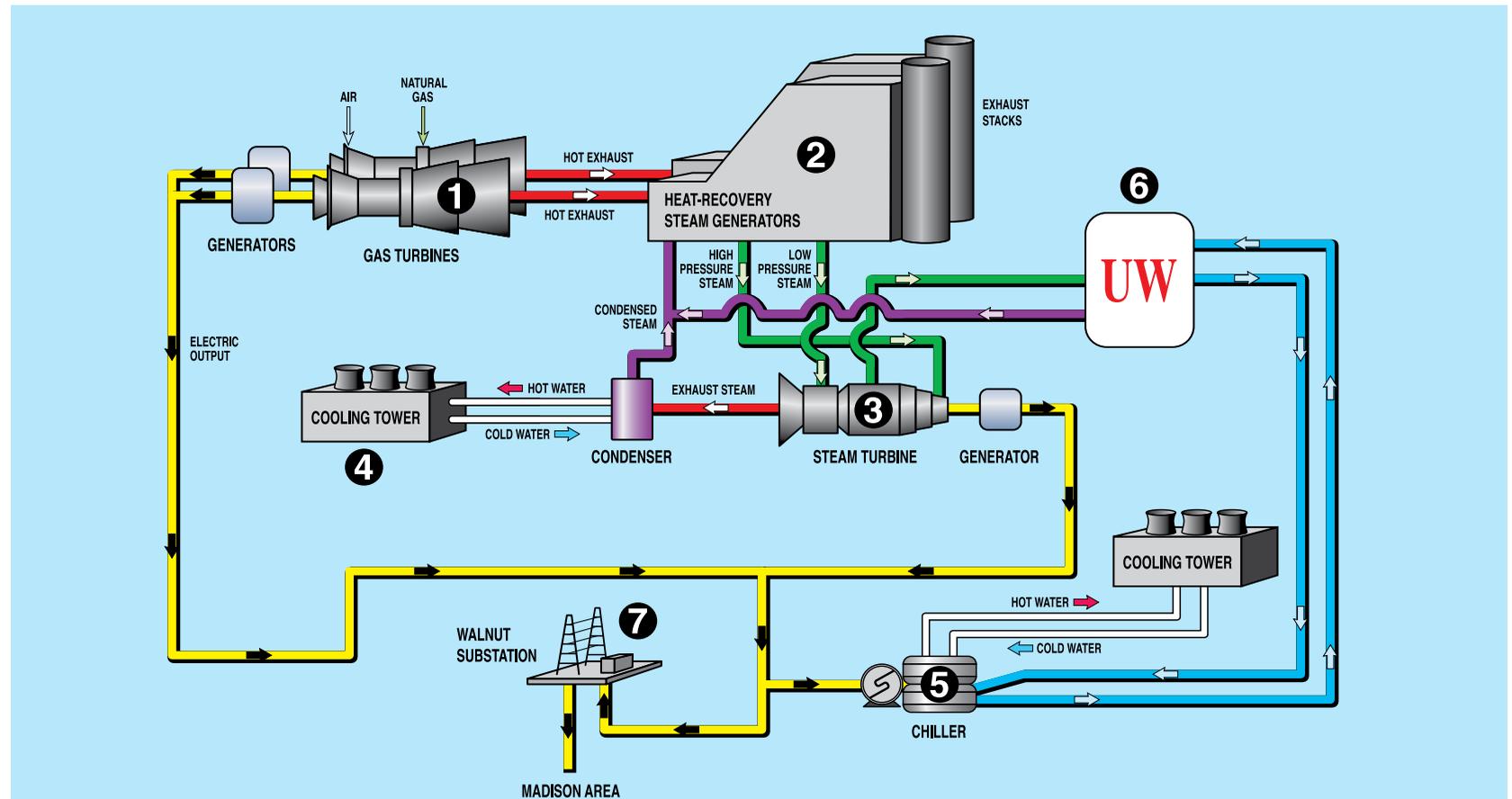
As a regulated utility, MGE has the responsibility to plan for and provide reliable electricity for our customers at an affordable price. The cogeneration facility offers a good balance of cost and efficiency to deliver needed electricity with the least environmental impacts.

The natural gas-fired plant is one of the cleanest in the Midwest. MGE and UW-Madison worked with community members to take steps beyond current environmental regulations.

MGE and UW partnership

MGE and UW-Madison jointly own the power plant. MGE owns the assets related to electric production, while UW-Madison owns the steam heat and chilled-water assets. Both MGE and UW-Madison also rely on other energy facilities to meet the power needs of the city and campus.

MGE operates and maintains the cogeneration facility under a joint plant agreement with the university. Sixteen employees work at this highly automated plant, which is staffed 24 hours a day. The facility is located on 4.5 acres just north of the UW heating station on Walnut Street.



How the cogeneration facility works

The highly efficient cogeneration operation uses the residual heat typically wasted in a standard power plant. This facility has an overall net efficiency rate of up to 70% when in cogeneration mode compared to a 30% to 35% rate for a conventional power plant.

- 1 Two natural gas-fired combustion turbines drive generators to produce electricity.
- 2 The hot combustion gases from each turbine pass through a corresponding heat-recovery steam generator (HRSG) to produce steam. The HRSGs contain duct burners to produce additional steam as needed.

3 The high- and low-pressure steam from the HRSGs passes through a single extracting/condensing steam turbine that sends heating steam to the UW and produces electricity for the Madison area.

4 The exhaust steam is sent to a condenser and then cooled by cooling towers. This process forms water that is reused.

5 Centrifugal chillers provide 30,000 tons of chilled-water capacity. Electric-driven chillers use roof-mounted cooling towers for heat rejection.

6 The steam heat and chilled water is used on the UW-Madison campus.

7 The electricity is sent to an adjacent substation and then to the Madison area.