

South Milwaukee Building

Case Study



Location

South Milwaukee, Wisconsin

Market sector

Multifamily residential

Facility size

32-unit, two-story building

Prime mover

Single cylinder, 8 HP, liquid-cooled, Marathon reciprocating engine (1,200 to 3,400 rpm)

Engine maintenance

4,000 hr intervals

Fuel type

Natural gas

Electric output

1.2 to 4.4 kW

Thermal output

13,000 to 42,000 Btu/hr (160° F hot water)

CHP operation began

January 2022

CHP system efficiency

Over 90%

Local utility

We Energies, a sister company of Peoples Gas and North Shore Gas

How a South Milwaukee Building saved \$6,400 in a year with a micro combined heat and power (mCHP) system

The Peoples Gas and North Shore Gas Energy Efficiency Programs can work with you to save money on natural gas and electric bills with micro combined heat and power (mCHP). Learn how this Milwaukee building reduced overall energy costs and increased the reliability of utility service for residents with an mCHP system.

Key takeaways

In January 2022, a 4.4-kilowatt (kW) mCHP system was installed in a 32-unit, two-story multifamily residential building located in South Milwaukee, Wisconsin. The owner of the building selected the mCHP system as the best option for reducing their overall energy costs, while providing increased reliability of utility service for the tenants.

The thermal energy recovered from the mCHP system replaces the operation of a 210,000 British thermal units per hour (Btu/hr) natural gas-fired boiler to provide domestic hot water to the entire building. The existing boiler is now used as backup for increased reliability.

The on-site electricity generated by the mCHP system is used to offset electricity normally provided by the We Energies grid to meet the electrical demand in the common areas (entrance, hallways, laundry room) of the building. Any excess electricity generated on-site is sold back to We Energies.

Solving for both building owner and tenant needs

The building owner pays a single monthly natural gas bill covering natural gas consumed by the entire building (individual apartments plus common areas) for domestic hot water and space heating, which is included as part of each unit's rent, thus essentially invisible to the tenants. This is where building owners really see the impact and potential variability of the building's monthly utility costs, which can prompt an evaluation into ways to save.

In contrast, each occupant is responsible for their unit's monthly electric bill, while the building owner is responsible for paying a monthly electric bill that accounts for the electricity consumed in the common areas of the building.

This presents a unique challenge: tenants only see (therefore, care about) their electric bill, while the building owner's operating costs are significantly affected by both natural gas and electric costs. Their priorities are split. The mCHP system bridges that gap by solving for both building and apartment energy use needs in one combined system.

Optimizing energy use with mCHP

The multifamily building has a central hot water system, consisting of three natural gas-fueled boilers: two operating to supply space heating and one to provide domestic hot water throughout the building. With the installation of the mCHP system, recovered thermal energy now provides the necessary heat to produce domestic hot water, which is delivered to each apartment from a single 120-gallon buffer tank connected directly to the system's thermal output.

A 210,000 Btu/hr boiler remains in place as a backup to supplement domestic hot water production in the event the mCHP system cannot meet thermal demand. However, during the first year of operation, the mCHP system consistently met 100% of the building's domestic hot water requirements, eliminating the need to operate the backup boiler.

The mCHP system also powers the building's common areas. During the first year of operation, the system ran at a 94% capacity factor, producing 36,106 kilowatt-hours (kWh) of electricity. Of that, 30,677 kWh was used to meet the electric demand of the building's common areas, and the excess 5,429 kWh net was sold back to the local utility.

Energy savings summary

Despite colder-than-average weather in 2022, the mCHP system:

- **Reduced total natural gas consumption.**
 - Provided 100% of the building's domestic hot water.
 - Operated more efficiently than conventional boilers.
 - Lowered average daily gas use.
- **Generated enough on-site electricity to power common areas.**
 - Eliminated electricity costs for hallways, entrance and laundry room.
 - Reduced the building owner's electric bills to \$0 for common areas.
- **Produced excess electricity sold back to the grid.**
 - Sold back to the utility at \$0.04/kWh.
 - Avoided additional natural gas and electricity costs.

The total estimated first-year savings were \$6,400, including reduced natural gas and electric bills and revenue from selling excess power.

For more information

Interested in learning more about mCHPs or considering an installation for your building? Reach out to us to explore how mCHP technology can benefit your property. Contact us today.



Interested in learning how mCHP can work for your building?
Contact innovative-solutions@peoplesgasdelivery.com to learn more.