

CASE STUDY

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MTU Onsite Energy power system plays a dual role for the LEED-certified Blue Earth County Criminal Justice Center

A 2,000kW emergency standby power system from MTU Onsite Energy is providing emergency standby power plus a load-shedding function that reduces the facility's demand on the local utility and helps cut its carbon footprint.

MANKATO, Minnesota – When Blue Earth County officials set about building a new jail and justice center, they had several goals in mind. At the very least, the new facility had to meet compliance standards for staffing and inmate housing (the previous building didn't, and that fact became the catalyst for the project). In addition, the facility had to house all offices under one roof (previously, offices and courtrooms were scattered throughout the downtown area). But the most challenging goal was to create a public building that minimized its impact on the environment. That goal was realized when the [Blue Earth County Criminal Justice Center](#) became the first public LEED®-certified building in southern Minnesota.

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The 168,000-square-foot building incorporates many energy- and water-saving technologies—such as a geothermal ground source heat pump system to heat and cool the building—and features the use of recycled and recyclable building materials. The emergency standby power system from [MTU Onsite Energy](#) also contributes to the building's green appeal. It is used not only for backup power in case of utility failure, but also as an auxiliary power source to remove the building's load from the local utility during periods of peak electricity demand. The versatile power system was cited in the facility's LEED certification application as one example of its efforts to cut energy use and reduce its carbon footprint.

Energy costs are 30 percent less than those of a traditionally designed building

The [Leadership in Energy and Environmental Design](#) (LEED) Green Building Rating System is the nationally accepted benchmark for the design, construction and operation of high-performance green buildings. The LEED program was originated by the U.S. Green Building Council (USGBC) and is used to rate new construction, existing buildings, commercial interiors and even homes and neighborhood developments for their impact on the environment. Introduced in 1998 by the Green Building Council, LEED has certified projects in all 50 states, 25 percent of which are government-owned buildings.

Taken together, the efforts to reduce energy and water use in the new Blue Earth County Criminal Justice Center are expected to reduce CO₂ emissions by more than 16,000 tons annually compared to a conventionally built facility. Energy costs are projected to be more than 30 percent less than those of a traditionally designed building.

In addition to LEED standards, the architectural firm of [Paulsen Architects, Mankato](#), designed the building to increase safety, promote efficiencies between agencies, reduce response times and operational costs and accommodate future growth. The Blue Earth County justice facility houses the sheriff's department; the county attorney's office; the

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county jail; the corrections department and the county courts; offices for judges, attorneys and public defenders, and a dispatch facility. The jail has accommodations for 150 people.

Design of the power system

“The 2,000-kW emergency standby power system was sized to power the entire building,” says Tim Edwards, physical plant director for the facility. “This includes our ground-water heat pump HVAC system, lighting and elevators. We also have three UPS systems: one for our data room, one to back up our dispatcher area and one in the jail central control area.”

The building’s power system consists of an MTU Onsite Energy 2000 RXC6 DT2 Series 4000 generator set, a digital master control, automatic transfer switches and associated switchgear. The standby generator itself is located outside in a sound-attenuated enclosure, but the switchgear and control system are located inside the facility in a mechanical room. Edwards says the sound attenuation was necessary because the enclosure is located adjacent to a part of the building that houses the judges’ chambers. The base of the enclosure features a 3,520-gallon fuel tank that provides about 48 hours of continuous operation before refueling is necessary. A contract with a local fuel supplier ensures that additional fuel can be delivered on short notice.

The 2,000-kW generator set was purposely oversized for the current building loads, says Edwards. The design of the building allows for some future expansion, and the county decided it was more economical to purchase a larger generator set that could accommodate load growth. Edwards estimates that the current total load on the generator set is approximately 1,000 kW.

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Soft-load transfer system eases power transitions

“To meet the need for both backup power and load-shedding capability, the power system was designed with soft-load transfer,” says Jerry Boggs of [Interstate Power Systems](#) in Bloomington, Minnesota, the local distributor for MTU Onsite Energy.

“This system makes the transition seamless between utility power and generator power during load shedding or system testing,” he says. “For load shedding, the generator is started and paralleled with the utility after the generator set reaches speed and frequency. Then, the master control ramps the load off the utility onto the generator and opens the utility breaker, completely disconnecting the utility. When the utility curtailment period is over, the facility’s load is ramped back onto the utility and then the generator is disconnected and shut down. Because there is never a break in the power flow, the load doesn’t know that anything happened,” he says. The load-shedding program will be applied during peak demand periods that normally occur in July and August in Minnesota.

Exercise and maintenance ensure reliability

To ensure reliable and worry-free operation, the generator set is exercised several hours every two weeks. In addition to ensuring that the power system works as designed, the regular exercise also helps burn diesel fuel that could otherwise get old and cause fuel filters to clog. By using the stored fuel and replenishing it with fresh fuel on a regular basis, most quality issues with the fuel supply are avoided.

The soft-load transfer system is also ideal for testing the power system using the actual building load. Not only does it allow standby power system testing without affecting any electrical devices within the building, it also provides the best assurance that the power system will supply the actual building load in the event of an emergency. Without a soft-load

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transfer system, testing must be done using a resistive load bank. If building loads are used during testing with a hard-transfer system, there is a chance of electrical disruptions.

While the regular system testing is done by facility personnel, Edwards says that other maintenance procedures, such as oil changes, inspections and repairs are handled by the MTU Onsite Energy distributor and another local company.

The new Blue Earth County Criminal Justice Center has met its initial goals of regulations compliance and a single building to meet the needs of its agencies. And the vision that county officials had for a building that minimizes environmental impact is also a reality. Helping to make that vision a reality is the flexible power system from MTU Onsite Energy, proving that diesel power can also be environmentally friendly.



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(MTU-8148)



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MTU Onsite Energy Corporation

MTU Onsite Energy Corp. (formerly Katolight Corporation) is a leading producer of diesel-powered generator sets from 30 to 3,250 kW and natural gas-powered generator sets from 20 to 400 kW for standby, prime power and cogeneration applications. The company also provides automatic transfer switches, paralleling switchgear, controls and accessories for complete power system solutions. Based in Mankato, Minnesota, MTU Onsite Energy Corp. combines the expertise of Katolight and MTU Detroit Diesel Power Generation under one brand to meet the ever-increasing distributed power needs of customers in North America and around the world. MTU Onsite Energy Corp. is part of the Tognum Group's business unit, Onsite Energy and Components. For more information, visit www.mtu-online.com

Tognum

With its two business units, Engines and Onsite Energy & Components, the Tognum Group is one of the world's leading suppliers of engines, propulsion systems and distributed energy systems. These products are based on diesel engines with up to 9,100 kilowatts (kW) power output, gas engines up to 2,150 kW, stationary fuel cells up to 345 kW and gas turbines up to 45,000 kW.

The product portfolio of the Engines business unit comprises MTU engines and propulsion systems for ships, for heavy land, rail and defense vehicles and for the oil and gas industry. The portfolio of the Onsite Energy & Components business unit includes distributed energy systems of the brand MTU Onsite Energy and fuel-injection systems from L'Orange. The energy systems comprise diesel engines for emergency standby power, prime power and continuous power, as well as cogeneration power plants based on gas engines, fuel cells and gas turbines that generate both power and heat.

In 2009, Tognum generated revenue of €2.5 billion and employs more than 8,700 people. Tognum has a global manufacturing, distribution and service structure with 25 fully consolidated companies, more than 140 sales partners and over 500 authorized dealerships at approximately 1,200 locations. The shares of Tognum AG (ISIN: DE000A0N4P43) have been stock-exchange listed since 2007 and are included in the MDAX.

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