Massachusetts Emergency Management Authority (MEMA)
Framingham, Mass.

# Case Study
# EMERGENCY DISASTER RESPONSE FACILITY

## AT A GLANCE

### CUSTOMER
Massachusetts Emergency Management Authority (MEMA)

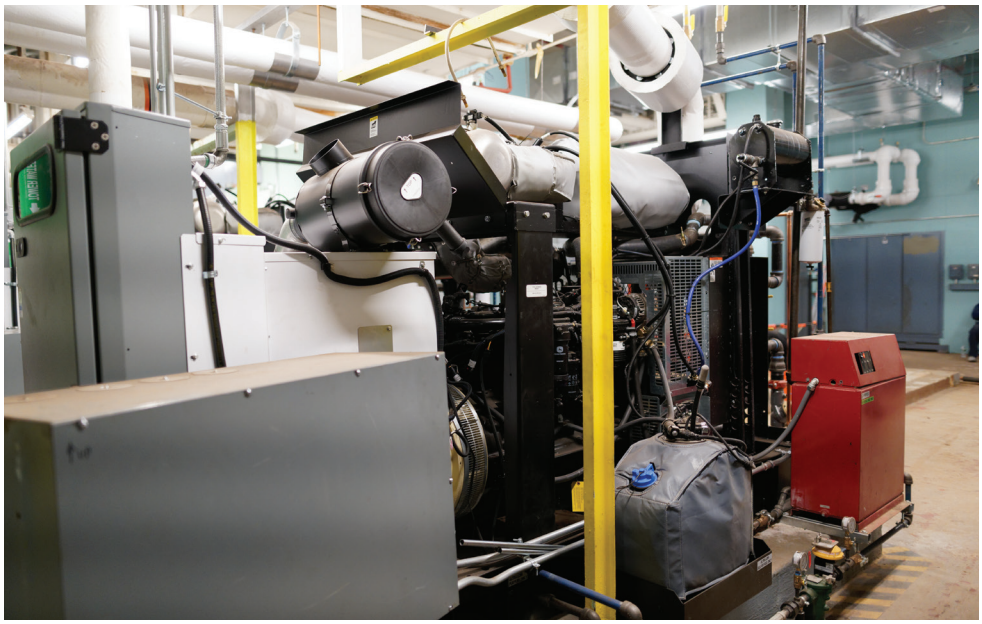
### LOCATION
Framingham, Mass.

### CHALLENGE
Provide standby emergency power for underground civil emergency complex with special genset cooling constraints and limited access

### SOLUTIONS
- Two KOHLER® 150REOZJ4 generator sets
- KOHLER DEC3500 on-board paralleling controller

### PRIMARY CHOICE FACTORS
Ecosystem's confidence in KOHLER product reliability and Kraft Power's ability to retrofit the solution given installation and rigging challenges

KOHLER generators meet NFPA 110 requirements for critical operations including supplying power within 10 seconds of an utility outage.



One of the KOHLER 150 kW generator sets at the MEMA complex in Framingham, Mass.

## BACKGROUND

The Massachusetts Emergency Management Agency (MEMA) is a Commonwealth of Massachusetts agency, headquartered in Framingham. Its emergency operations complex is located in a one-acre, underground, Cold War-era bunker with two-foot-thick reinforced concrete walls and ceiling. Massachusetts was the first state in the nation to have an underground blast-proof State Emergency Operations Center. During the early 1960s, President John Kennedy devised a plan for each state to have this type of facility to ensure continuity of state government following a nuclear attack. It is now used to provide Massachusetts residents and visitors emergency preparedness resources, emergency alerts, and information during and after emergencies and disasters. MEMA coordinates with federal, state, and local government agencies, nonprofit organizations, and businesses to prepare, respond, and recover from emergencies and disasters. The complex also serves as a crisis-response center, coordinating all the emergency services for the region. Most recently, the site has been instrumental in coordinating the state's response to COVID-19.

KOHLER® DEC3500 on-board paralleling controller

Under the auspices of the Department of Capital Asset Management and Maintenance (DCAMM), the state of Massachusetts is pursuing a new program to update its designated emergency facilities with Tier IV Final generators. The previous units in the emergency operations center were oversized and did not feature the latest Green technology.

Ecosystem served as the general contractor on the project. It is a full-service energy performance contractor that improves electromechanical systems through innovative, deep energy retrofits.

Kraft Power is an authorized KOHLER distributor, headquartered in Woburn, Massachusetts. Founded in 1965, it specializes in generators and generator power systems, power transmission products, and diesel and gas engines. It is also a pioneer in the development of combined heat and power (CHP) solutions. The CHP expertise played an important role in modifying the solution to accommodate heat exchanger cooling.

## CHALLENGE

The challenge for Ecosystem's project manager Jérémie Lavoie-Doyon and Kraft Power Corporation's CHP sales manager, David Barstow was to remove and replace two of the aging 250 kW diesel generators, despite limited access—a maintenance hatch that had been permanently blocked 20 years earlier during an upgrade. The third, nonfunctional unit was simply left in place. Further, DCAMM wished to pursue a responsible (Green) approach in terms of efficiency and impact.

## IMPLEMENTATION

Complex projects, inclusive of space constraints and permanent architecture, often help drive the product or system solution. In this case, access to the underground powerhouse required traversing through office space, narrow corridors, and steel-plated blast doors 82" high, 76" wide and 9" thick. At 5,695 pounds, removing them from their hinges and frames to facilitate removal of the old units, and installation of the new units was problematic. Accordingly, two of the existing three generators were disassembled and further broken up and removed, providing space for the new system. The new KOHLER units would have to lend themselves to easy disassembly and reassembly on the jobsite in order to overcome access and rigging challenges.

Further, MEMA office spaces within the bunker were in close proximity to the powerhouse. Thus, MEMA preferred to minimize the noise and heat associated with a conventional cooling fan and radiator. Therefore, the new system would need to accommodate the use of existing HVAC condensation as a means to cool the engine block and intercooler system during operation—and heat exchanger cooling.

## SOLUTION

Of the various solutions Kohler could provide, Kraft Power recommended two KOHLER 150REOZJ4 Tier 4 Final-certified, 60 Hz generators. Each diesel-power unit delivers a 106–154 kW standby rating and features a brushless, permanent-magnet alternator for superior short-circuit capability. Vacuum-impregnated windings with fungus-resistant epoxy varnish enhance dependability and long life.

"In the Cold War era, they oversized everything," said Ecosystem's, Jérémie Lavoie-Doyon. "In this case, the facility was equipped with three 250 kW diesel generators, providing triple-redundant auxiliary power. They were really inefficient in terms of operating expense and maintenance costs—plus they featured Tier 2 technology at best. One of these highly efficient, Tier 4 Final-certified KOHLER gen sets provides the facility with all the power it needs, plus redundancy. It is also a greener solution."

The heat-exchanger cooling system on the KOHLER® 150 kW generator

Kraft Power received the two standard radiator-cooled KOHLER generators and converted them to heat-exchanger cooling, wherein 85°F water from the cooling tower served as the cooling mechanism.

The critical part of cooling circuit was configured to maintain the engine's intercooler temperature at 126°F as specified by the engine manufacturer. Kraft Power designed the temperature-control circuit using a control valve to control cooling tower water flow through the heat exchanger. A temperature sensor in the air tube leading to the intake manifold provided input to the control valve.

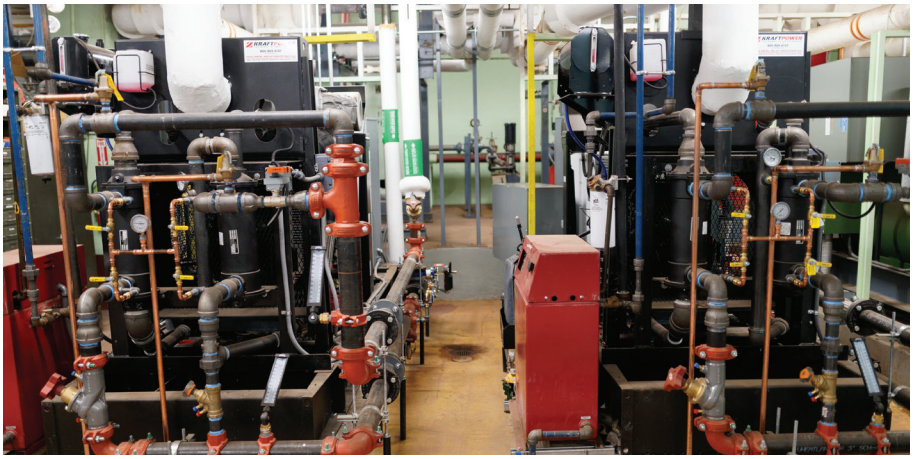
Joe D'Amato, Senior Technician, from Kraft Power Systems and a team of electricians and plumbers combined efforts to disassemble and remove the existing generators. They also reassembled the new converted KOHLER units on site and installed them into the bunker's powerhouse. Joe also reworked the control field wiring between the new generator sets and the existing switchgear.

The Kraft Power team also redesigned and reengineered the existing switchgear, eventually using only the existing paralleling and distribution circuit breakers. The KOHLER DEC3500 Decision-Maker® paralleling controller manages switchboard distribution, in addition to protecting the generator against instant overload. The Decision-Maker DEC3500 is ideal for facilitating communication with existing switchgear to support paralleling features arranged by third-party devices.

## RESULTS

According to Dave Barstow, "The project has been a great success. The controls have been set up so that on a call from either or both transfer switches, both units start to come up to speed and accept the emergency load. The load pickup and drop have been tuned so that a single unit never carries more than 87 percent of its rated load, at which point the second unit is added."

The service team from Kraft Power Systems continues to inspect and tweak the system to ensure continued reliability, service life and overall customer satisfaction. Barstow further noted, "This was a highly complex project with a number of hurdles, given we had to work within the confines and limitations imposed by a unique, monolithic structure. The installation, testing, and commissioning speed, not to mention the workmanship involved in this project, serve as a testament to the cohesiveness of an amazing team."



KOHLER 150 kW generators in the MEMA complex

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