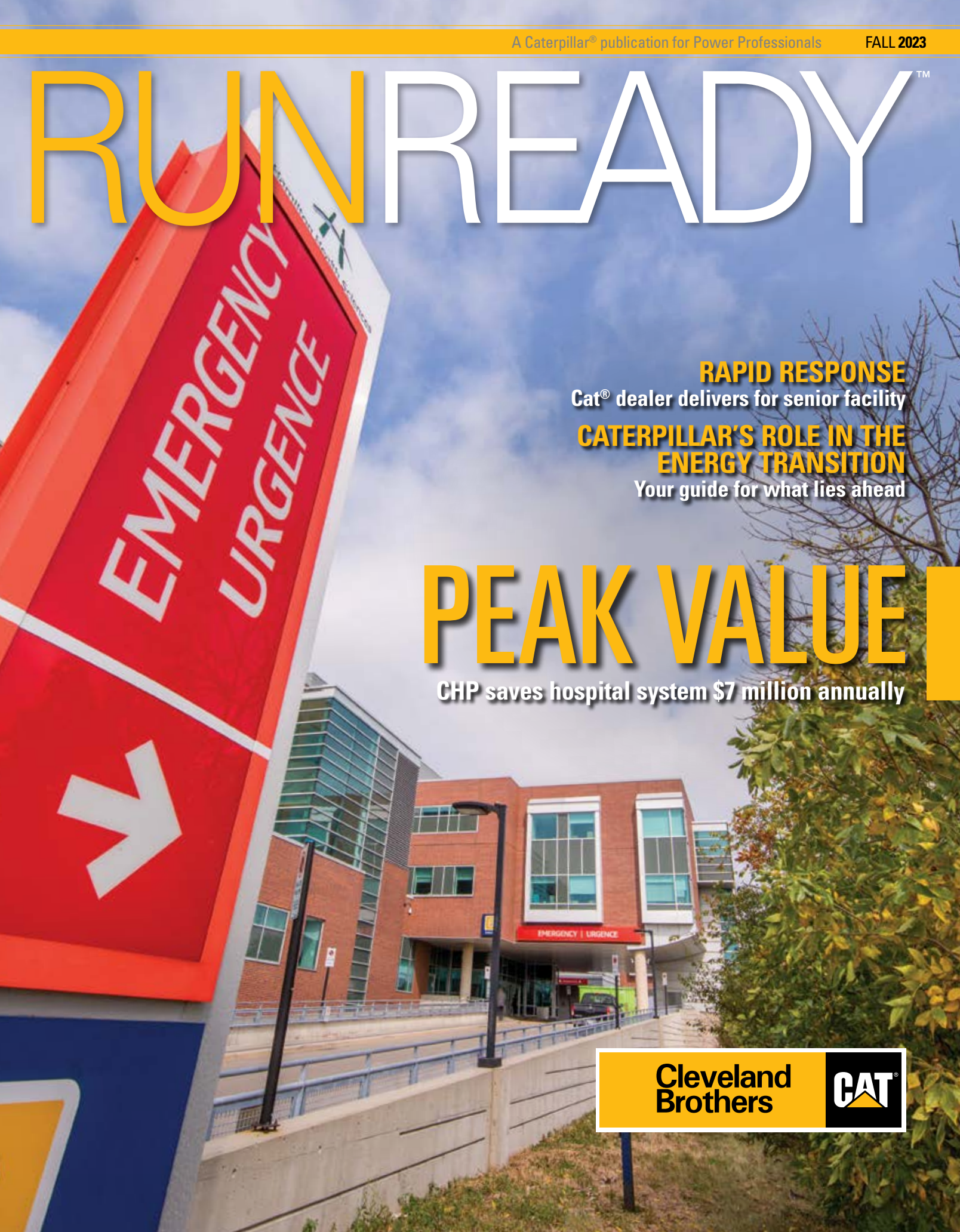
A Caterpillar® publication for Power Professionals FALL 2023

RUNREADY™



RAPID RESPONSE
Cat® dealer delivers for senior facility

CATERPILLAR'S ROLE IN THE ENERGY TRANSITION
Your guide for what lies ahead

PEAK VALUE
CHP saves hospital system $7 million annually

Cleveland Brothers CAT®

The Heat is On

Evidence shows that our planet has been getting hotter. The warmest 20 years on record have occurred during the last 22 years, according to the World Meteorological Organization—and the warmest four were within a six-year period: 2015 to 2020. Global average temperatures are now 2.16°F higher than the pre-industrial era of 1750 to 1850.

A degree doesn't sound like a lot, but the reality is that this incremental warming already appears to be having a negative impact. What's more, if recent trends continue, this is set to worsen, with predictions of global temperatures increasing by as much as 4.86°F by 2100.

Hamilton Health Sciences, a hospital system in Canada, is doing its part to combat climate change. It has the stated goal of reaching net zero GHG emissions by 2050. A key component of the plan is a cogeneration system that operates more efficiently than traditional energy sources.

Meanwhile, the energy transition has become more critical than ever in reducing pollution and climate impacts. Globally, the potential savings of this transition have been estimated at up to $4.2 trillion per year by 2030, according to a United Nations report.

As decision makers strive to adopt ambitious environmental, social and governance (ESG) goals, they are evaluating equipment options that can help them achieve their sustainability objectives. Caterpillar and Cat® dealers provide multiple advanced power technologies to enable the energy flexibility customers need to be successful in a lower carbon world.

We hope you enjoy this issue of ***RunReady*** as you evaluate your own ESG goals.

DID YOU KNOW?

Interconnection Gap

Interconnection is one of the most important aspects of the energy transition. The Interstate Renewable Energy Council (IREC) and the advocacy group Vote Solar graded all 50 states, as well as Washington, DC and Puerto Rico, based on their distributed energy resource (DER) interconnection policies.

Only seven states received 'A' or 'B' grades, while 13 states that have not adopted statewide interconnection rules received "F" grades. The grades are based on ten criteria, including cost, efficiency, transparency, and the technologies eligible to interconnect.

Of the 39 states and territories that have statewide interconnection procedures, only one state, New Mexico, received an 'A' for its interconnection rules. An additional six states (Arizona, California, the District of Columbia, Illinois, Michigan, and New York) received B's.

"The 2023 Freeing the Grid interconnection grades make clear that a majority of states have significant room for improvement in their interconnection procedures," said IREC CEO Larry Sherwood. "Without improvements to align with new best practices that have emerged over the last several years, state interconnection policies are likely to be a barrier to the efficient and affordable growth of DERs, holding back the pace at which clean energy and climate goals can be met."

Belgium Data Centers Using HVO for STANDBY POWER

LCL Data Centers, the operator of five independent data centers in Belgium, has commissioned a new 13.5 MVA standby power solution at its LCL Brussels-West data center in Aalst that operates exclusively on 100% hydrotreated vegetable oil (HVO). It's the first data center in the nation to use biofuels for standby power generation.

Facility planners for LCL leveraged the expertise of engineering experts from Eneria, the local Cat® dealer, to design, install, test and commission the solution, which consists of six Cat 3516B diesel generator sets.

"With our deep roots in Belgium, we are committed to supporting environmentally responsible initiatives that create a better world," said Laurens van Reijen, managing director of LCL. "Our collaboration with Eneria and Caterpillar has demonstrated the viability of HVO100 in our standby power systems. We're strongly committed to becoming carbon-neutral by the end of this decade, and we've launched numerous initiatives across our operations to help us achieve this goal."

Eneria will also provide ongoing maintenance and service under a Cat Customer Value Agreement (CVA). Through fully customizable CVAs, Cat dealers assume responsibility for on-site maintenance and service of power solutions, enabling customers to focus on running their enterprises.

"We were delighted to receive the request from LCL to ensure its emergency power generators operate on HVO100, a renewable diesel fuel," said Tim Bisson, director of Eneria Belux, a specialist in renewable energy supply and emergency power installations in Belgium. "We tested the operation of Cat generator sets with traditional diesel, HVO100, and a blend of these fuels. We concluded that the power and reactivity performance of the generators remained the same, regardless of the fuel used."

Propelled by the success of the project in Aalst, LCL plans to convert the standby power solutions at all its data centers to operate on HVO over the next two years.

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Hamilton Health Sciences has the stated goal of reaching net zero greenhouse gas emissions by 2050. As part of this effort, the hospital system selected Cat® dealer Toromont Power Systems to supply 13 Cat G3516H natural gas generator sets providing a total of 25.5 MW of power to update its combined heat and power (CHP) capabilities.

FEATURES

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PEAK VALUE

CHP will save hospital system $7 million annually

Hamilton Health Sciences (HHS) is a network of seven hospitals, plus a cancer center serving more than 300,000 patients annually in southwestern Ontario, Canada. HHS has been ranked among the top four research hospitals in Canada during four of the last nine years by Research Infosource.

CUSTOMER PROFILE

Hamilton Health Sciences

Location: Hamilton, Ontario, Canada

Application: Cogeneration

Cat® Equipment: G3516H gensets (13), Cat Connect RAM

Hamilton Health Sciences

Located at the western end of Lake Ontario 42 miles from Toronto, Hamilton (pop. 569,353) is often referred to as the "Steel Capital of Canada," as 60 percent of the country's steel is produced in the city.

As Hamilton's largest employer with 15,000 employees, HHS demonstrates its commitment to environmental stewardship through numerous initiatives to reduce energy consumption, divert waste from landfills, encourage smart commuting, and support tree-planting and pollinator-friendly spaces.

HHS has the stated goal of reaching net zero greenhouse gas emissions by 2050. As part of this effort, the hospital system selected Cat® dealer Toromont Power Systems to supply 13 Cat G3516H natural gas generator sets providing a total of 25.5 MW of power to update its combined heat and power (CHP) capabilities.

Over the past 12 months, Toromont has commissioned the generator sets that were selected to fit within current facility floorspaces and supply cogeneration and peak shaving capabilities at Hamilton General Hospital, Juravinski Hospital and Cancer Centre, and McMaster University Medical Centre, which includes the McMaster Children's Hospital. A six-generator installation has been operational at McMaster University Medical Centre since mid-June, while systems integration and final commissioning were taking place at the other two hospital installations during early August.

Once fully operational, the cogeneration systems at the three hospitals are expected to reduce HHS' carbon footprint by 50 percent, cutting annual greenhouse gas (GHG) emissions by 30,000 tons. The cogen systems will also help improve the healthcare system's energy independence by contributing to more than 70 percent less reliance on grid power.

"We are taking steps to be at the forefront of responsible energy use and conservation," said Kelly Campbell, vice president of corporate services and capital development for HHS. "Minimizing our

impact on the environment while ensuring stability in our electrical production and heating system is a wise and sustainable investment in our future."

Major outage a catalyst for CHP

The Northeast blackout that occurred in August 2003 was a widespread power outage affecting parts of the Northeastern and Midwestern U.S., and most parts of Ontario. The outage lasted for more than 24 hours in Hamilton.

"It was August and it was really hot," recalls Chris Cuthbert, manager of cogeneration and energy for HHS. "So even though we had emergency power, we didn't have air conditioning. We had lights on in our operating rooms, but they couldn't do surgeries because it was too hot for the doctors to actually work in there. As a result of this event, it was decided that additional power generation was necessary to maintain hospital operations during a major disruption."

To increase energy resiliency, a cogeneration system was installed in 2006. By generating power using natural gas, the cost of electricity for HHS was half that of buying it from the grid.

"Once we accounted for the heat recovery that we used for heating in the winter and cooling in the summer, it was just a great opportunity to save some money for the hospital, so we could invest more on health care rather than infrastructure," Cuthbert said.

HHS sought to replace the original cogen units with a new cogeneration system that meets its current and future energy demands, while achieving reliability and efficiency targets, according to Cuthbert.

"It was getting to a point where the original vendor wasn't able to provide reliable parts support for the units anymore," he said. "But because the economics were still good to continue with cogeneration, we looked into replacing the units with something more reliable and modern.

"In the end, we chose Toromont and the Cat product for a number of reasons," Cuthbert said. "The Cat gensets are 16 percent more fuel efficient than our previous units, so that has a good economic benefit for us. And the G3516H genset is a proven product that has been continuously upgraded and improved over the years.

"We wanted something that had an excellent track record and good product support," Cuthbert continues. "We wanted to have a proven product that just started and ran without any issues."

Continued on page 6

Unlike the previous system, the Cat cogen systems at HHS will not run continuously, but will be utilized during times of peak demand on the grid—roughly 1,000 hours annually. The objective of peak shaving is to eliminate short-term spikes in demand and reduce overall costs associated with usage of electricity. This process lowers and smooths out peak loads, which substantially reduces high demand charges. CHP also makes HHS more energy efficient, positively impacting the bottom line and the environment at the same time.

Energy efficiency is a hallmark of a CHP system. More than 60 percent of energy used for electricity generation from a traditional utility plant is lost in transmission, according to the U.S. Energy Information Administration. While the combination of grid power and traditional boilers for thermal energy offers less than 50 percent energy efficiency, CHP systems from Caterpillar can provide total energy efficiencies up to 90 percent.

"In the end, we chose Toromont and the Cat® product for a number of reasons. We wanted something that had an excellent track record and good product support. We wanted to have a proven product that just started and ran without any issues."

CHRIS CUTHBERT, Manager of Cogeneration and Energy
Hamilton Health Sciences

9-year payback

A key driver for the project is the fact that carbon emissions are taxed by both the provincial and federal governments—currently at $65 per ton, and going up an additional $15 per ton each year until 2050.

"We are committed to reaching net zero by 2050 with the change in operation mode, going from Class B to Class A," says Alan Buxton, director of facilities management for the hospital system. "It's a major savings for us on the carbon tax—about $4 million per year."

Based on lower energy and maintenance costs and efficiencies gained through the new CHP systems, HHS expects to save $7 to $8 million (CDN) annually, says Buxton, adding that the anticipated payback on the new Cat CHP system is nine years.

"Our expectation is that these gensets should last for the next 25 years," he says. "The projected ROI on this cogeneration system makes it a good business decision."

The new CHP system provides HHS with flexibility in how they run the plant. Waste heat from the generators and the exhaust system is captured and utilized to produce steam or hot water for absorption chillers that provide air conditioning during the summer months.

"There are times we will run the gensets to be able to meet our air conditioning requirements as opposed to just peak shaving," Cuthbert says.

Adds Buxton: "CHP gives us the kind

of flexibility that enables us to run in the most efficient way we can. And in the event of an extended power outage on the utility grid like the one we had 20 years ago, we can black start and run the hospital on our CHP systems and keep our standby generators in reserve until grid power is restored."

Dealer expertise

In today's environment, the demand for electricity is becoming ever greater, notes Lou Colangelo, a general manager with Toromont Power Systems. Traditional sources of energy are being gradually phased out in favor of renewables like wind and solar.

"The energy transition is driving the demand for electricity that we've not seen perhaps ever," Colangelo says. "And we recognize that energy resiliency is important not only for the health care sector, but across a wide range of businesses and industries."

Toromont has an extensive history installing CHP systems across eastern Canada, while providing ongoing product and technical support.

"Toromont has been focused on combined heat and power for many years, providing our customers with efficient, robust solutions, including uptime guarantees," Colangelo says. "It starts with leveraging high-efficiency, highly reliable Cat products. And we back that with a significant in-house engineering group and project management team that's experienced in designing CHP systems which go far beyond the generator set itself. Our constructors are on site to make sure that the installation goes as planned."

Toromont commissioning

Once the gensets are installed, Toromont engineers assist with integrating systems, tying into the existing steam, hot water systems and natural gas supply, as well as the electrical distribution system.

"Installing generator sets is certainly a key task, but integration is really key to project success," Colangelo says. "A CHP plant needs to tie into so many systems in order to be successful. And once the plant is operating, we have a dedicated product support group that provides ongoing maintenance. Their objective is to meet the high availability commitment that we make to our customers."

Remote Asset Monitoring enhances performance

To ensure high uptime, HHS is utilizing Cat Connect Remote Asset Monitoring (RAM). Cat Connect can monitor and analyze more than 200 key performance indicators of the engine and electrical system, and be configured to use a satellite, cellular, or local network connection to deliver intelligence to key customer contacts and Cat dealer technicians.

Providing data, visualization, reporting, and alerts through an easy-to-use web interface or the Cat RAM mobile app, this technology helps operators and Cat dealers track and manage the operation of the system, confirm planned cost savings, flag potential problems, and perform remote troubleshooting. It stores long-term archives of site performance history, and identifies opportunities for further operational and system enhancements.

The combination of proven Cat technology and dedicated dealer support provides cost certainty for HHS.

"Working within a health care budget that is focused on patient care moreso than it is on infrastructure can be challenging," Cuthbert says. "So, it's very important to the organization as a whole that our costs are reasonable, contained and predictable. It's very important that we avoid expensive surprises.

"So far, our experience has been great," Cuthbert adds. "These Cat generator sets are a vast improvement over the previous ones that we had, and we're looking forward to benefitting from them for many years to come."

NEW CAT® XGC1900 NATURAL GAS POWER MODULE

HIGH EFFICIENCY & LOW EMISSIONS FOR CONTINUOUS POWER APPLICATIONS

Now available from Cat® dealers throughout North America, the new Cat XGC1900 natural gas power module provides up to 1900 kW of continuous power to support large-scale applications such as utilities, municipal infrastructure, fresh water and wastewater treatment plants, and mining and quarry sites.

The new XGC1900 natural gas power module is a highly efficient and power-dense solution with NOx emissions as low as 250mg/Nm3 without requiring aftertreatment.

Fully designed and tested by Caterpillar, the Cat XGC1900 uses proven technologies seamlessly integrated to enable simple, reliable operation. It's engineered for flexibility by easily switching between 50 and 60 Hz and across a range of voltages, enabling one power module to satisfy varying load requirements in diverse regions and applications.

Powered by the G3516H gas engine, the new module packages a CSA-certified gas train, plus cooling, air handling and other essential components in a weather-resistant 40-foot container that streamlines transport and deployment while providing exceptional sound attenuation.

Additionally, the XGC1900 has best-in-class fuel efficiency and reduced oil consumption as well as longer service and maintenance intervals, significantly reducing operating costs.

"As customers increasingly embrace the advantages of using gaseous fuels, this high-performing power module addresses large-scale continuous power needs with a potent combination of reliability, serviceability and low emissions," said Tom Caldwell, global general manager for electric power rental solutions at Caterpillar.

Dynamic capabilities

The Cat XGC1900 gas generator set provides numerous benefits that improve performance and reduce operating costs. It features Caterpillar's EMCP 4 control system, providing engine and generator set control, protection, and monitoring. An externally accessible, package-mounted control panel and power distribution panel facilitate operator access and serviceability.

The XGC1900 is equipped with Cat Connect technology to remotely track and manage the generator set and improve operational efficiency. The telematics send real-time information on fuel status, battery voltage, and run status. Connected assets support peak operation with timely insights that help customers better control costs, improve performance and reduce risks.

Providing excellent response in high ambient conditions and high altitudes, the Cat XGC1900 is engineered for high fuel tolerance, allowing for the use of gases with low methane numbers.

Additionally, it supports reduced oil consumption, as well as longer maintenance intervals.

For additional information about Caterpillar's complete range of rental power solutions, visit www.cat.com/rentalpower

Cleveland Brothers CAT

www.ClevelandBrothers.com

BUY GENERATORS AND MORE THROUGH SOURCEWELL COOPERATIVE PURCHASING

Save time and reduce risk

Save time and reduce risk with cooperative purchasing. Cleveland Brothers can help you obtain power systems equipment and provide you with unmatched support through Caterpillar's cooperative purchasing contract with Source**well** (formerly the National Joint Power Alliance or NJPA).

If you're familiar with NJPA, you'll be excited to hear that Source**well** will be continuing the same mission and contracts. Source**well** helps government, education and nonprofit agencies operate more efficiently with contract purchasing solutions. You'll save time and money (and avoid low-bid scenarios!) when you become a member for free.

Maximize Your Time and Resources

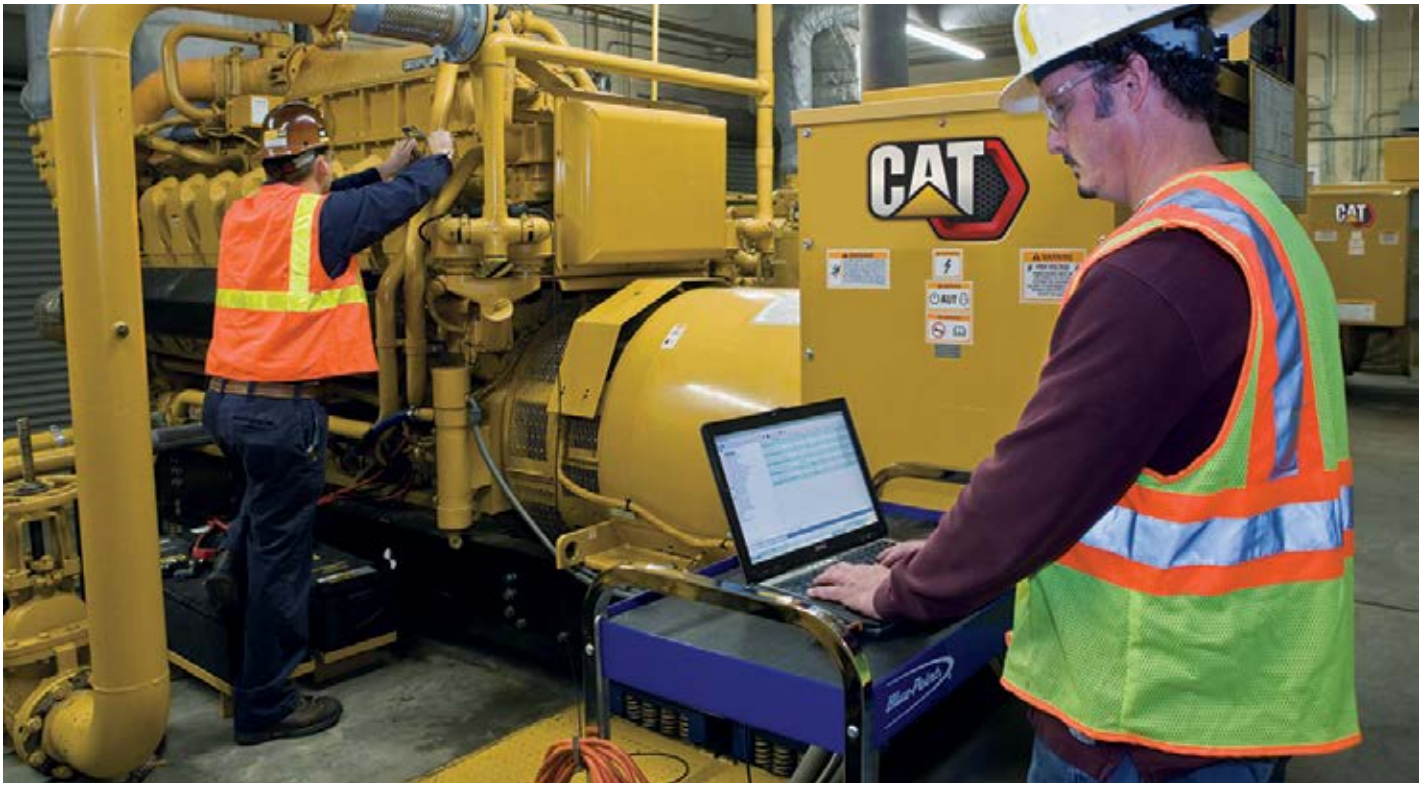
When you need power and the support to back it up, turn to Caterpillar® and Cleveland Brothers. As a member of Source**well**, you can select from a range of diesel and natural gas Cat generators, switchgear and automatic transfer switches to meet your specific needs (Contract #120617-CAT). You'll also get the unmatched product support and service you can expect from Cleveland Brothers.

As a member of Source**well**, you will:

- Avoid low-bid situations
- Save time spent putting bids together
- Get to purchase quality equipment at a greater value
- Work directly with Cleveland Brothers to meet your needs

Cooperative purchasing is the key to overcoming the challenges you face in your organization. If you're ready to join forces with Source**well** and Cleveland Brothers to improve your procurement outcomes, contact our dealership.

For more information on Sourcewell, go to www.sourcewell-mn.gov



MONITOR & MANAGE YOUR ASSETS

Now there's an easier way to monitor and manage your assets, no matter where they're located. Subscribe to Cat® Connect and let our expertise in energy turn your data into insights that can improve your profitability.

GET THE DATA YOU NEED TO MEET YOUR ENERGY GOALS

Cat Connect gives you the customized data you need to identify and resolve problems quickly—often before they result in costly repairs and unscheduled downtime. Choose the Cat Connect features that best fit your goals. Whether you aim to improve efficiency, reduce risk, cut costs or boost your bottom line, the data is at your fingertips through any cellular or local network connection.

Special Offers

1) **Free Cat Connect Standard Subscription***
   This standard offering includes the ability to remotely:
   - View the status and location of all generators
   - Receive updates on engine parameters
   - See current generator faults
   - Review performance and maintenance history
   - Setup custom email and text alerts and notifications

2) **Free Advanced Reporting with Purchase of a Customer Value Agreement (CVA)***
   - Uses data from Cat Connect along with Cat Inspect and Cat S•O•S℠ to give an overview of run cycle, inspection data, fault codes and fluid samples
   - These reports help you manage fleet performance along with governmental and industry compliance like NFPA 110 and JCAHO.

** Availability only at participating Cat dealers. Hardware purchase may be necessary to activate free subscription. Offers effective now through December 31, 2023. Both offers are available for Cat branded and non-Cat branded assets.*

Cleveland Brothers CAT

www.**ClevelandBrothers**.com

AIR POWER PERFECTED

Need portable compressed air on the job? There's no better combination than a Sullair compressor and a Cat® C4.4 engine. You get reliable air flow, great fuel efficiency, quiet operation and easy service access.

For more than 50 years, Sullair has been on the leading edge of stationary and portable compressed-air solutions. The company was one of the first manufacturers to execute rotary-screw technology in air compressors, and now Sullair compressors are famous throughout the world for their legendary durability.

Industry leaders in over 64 countries use Sullair equipment every single day. These include companies in the medical, pharmaceutical, automotive, petrochemical, food and beverage, construction, rental, mining and power-generation industries.

Sullair compressor quality is supported by three important pillars: reliability, durability and performance. The engines that power the compressors are critical for upholding these standards, and that is why Sullair engineers chose Cat® engines. The Cat C4.4 engine powering Sullair portable air compressors delivers reliable air flow, fuel efficiency and quiet operation.

The Cat dealer network is another benefit to renting a Sullair air compressor, as the engines can be serviced quickly to minimize downtime.

Why Rent From The Cat® Rental Store?

The Cat Rental Store offers products in a wide range of sizes, configurations and capabilities. Our inventory includes power generation products like generators and engines to keep your jobsites and equipment operating at maximum capacity. We supply businesses in a wide range of industries with an assortment of energy rental equipment at affordable rates.

Besides our huge selection of top-quality equipment rental products at competitive rates, we'll help you set up a flexible rental arrangement that works for your company. You can rent a machine or work tool attachment for a day, a week, a month or longer.

We'll also be there to provide reliable and fast repair and maintenance service whenever you need it. Professional on-site operator training is available as well so that you and your team can use the equipment as productively and safely as possible.

Feel free to call us at 1-800-RENT-CAT, or contact Cleveland Brothers.

Cleveland Brothers CAT

www.**ClevelandBrothers**.com

ADVANCED ELECTRICAL SERVICES

IMPROVE YOUR POWER SYSTEM'S PERFORMANCE

With so much at stake in your facility, our dealership in tandem with engineers from Cat® Switchgear can help solve complex problems and provide cost-effective solutions to enhance your system with faster processing and improved functionality. You'll benefit from more than 20 years of experience in Cat Switchgear that will help you and your team with the equipment, technology, and training you need to stay running.

If you want to improve or maintain your facility's performance, consider requesting preventive maintenance and upgrading or retrofitting outdated or obsolete components that will help you:

- Avoid system failures and shutdowns
- Improve the performance of your power system
- Extend the life of your power system components
- Reduce the expense of emergency repairs

Preventive Maintenance

Our technicians are familiar with your power system and can conduct a comprehensive audit that will:

- Determine the overall condition
- Identify areas of risk and opportunities for upgrades in performance, safety, and communications
- Recommend options for maintenance, upgrades and retrofits
- Suggest best practices for ongoing maintenance

Protective relays

Periodic relay maintenance and testing is critical for employee safety, avoiding unplanned electrical outages, and proper operation of critical power systems. We can provide:

- Studies that prove a comprehensive inspection, maintenance, and testing program is the only way to assure correct relay operation
- Service technicians who are familiar with your relays and are trained according to industry standards
- A detailed report to verify the settings and proper operation of your relays

Circuit breakers

Inadequate circuit breaker maintenance is a leading cause of unscheduled power outages. Circuit breakers need regular maintenance and testing to ensure electrical system reliability, employee safety through validation of proper equipment operation, and compliance with industrial regulations and standards to ensure against litigation and loss of productivity.

We can provide:

- Service technicians who are familiar with your circuit breakers and are trained according to industry standards
- Cat trained technicians who can conduct primary and secondary injection testing, insulation resistance testing, contact pressure testing, and trip unit operationverification
- A detailed comprehensive report on the condition of your circuit breakers

Switchgear Retrofit

A switchgear retrofit by Cat trained technicians can help improve your power system's overall performance. A retrofit can include a software update, hardware retrofit, or complete overhaul of your electrical power system. If any of the items below apply to your equipment, it's time for a retrofit:

- Outdated switchgear
- Decreased system performance
- A sequence of operations not working as designed
- Changes to site configurations

To learn more, contact the power systems experts at Cleveland Brothers.

Cleveland Brothers CAT

www.**ClevelandBrothers**.com

Renewable Liquid Fuels for CAT® GENERATORS

REDUCE GREENHOUSE GAS EMISSIONS

Available for over 20 years in some markets, renewable liquid fuels such as hydrogenated vegetable oil (HVO) and biodiesel are becoming more popular choices to reduce the impact of operations on the environment in the near term.

Renewable liquid fuels are produced from renewable resources, such as vegetable oils including soybean oil, canola oil, and palm oil, as well as used cooking oils and animal fats. While the resources may vary globally, finished fuel specifications are independent of the feedstock.

HVO and biodiesel are the two main renewable liquid fuels readily available for end users and acceptable for use in Cat® generator engines.

- Note that hydrogenated vegetable oil (HVO)/renewable diesel (RD) is per diesel fuel specifications except for density. HVO has lower density than diesel fuels.
- Biodiesel and HVO are sourced from the same feedstocks but differ in the processing and in the final product chemistry.
- Both fuels can be used "neat" or blended with conventional diesel at various percentages.

HVO and Biodiesel Renewable Fuel Benefits:

HVO and biodiesel have rather similar advantages relative to diesel and other fossil fuels, while the magnitude of these advantages may differ:

- Reduced carbon intensity of engine operation
- Reduced greenhouse gas (GHG) emissions
- Reduced emissions of carbon monoxide, particulate matter (PM), and sulfates, as well as hydrocarbon and air-toxic emissions
- Both fuels turn free solar energy and atmospheric carbon dioxide into fuel that displaces fossil fuels
- Water conservation: biodiesel production reduces wastewater relative to the production of petroleum-based fuels
- Biodiesel is nontoxic and biodegradable

Specifications & Standards

Biodiesel is registered with the U.S. Environmental Protection Agency (EPA) and is legal for use at any blend level in both highway and nonroad diesel engines. In the U.S., the applicable blending spec for B100 is ASTM D6751. The B20 blend specs in the US is ASTM D7467.

European fuel standard EN 14214 ensures that biodiesel is suitable for even the most modern engines. EN 16709 describes B20 and B30 biodiesel blends.

HVO fuels must be per EU 15940 spec. HVO fuels also satisfy the diesel fuels specifications ASTM D975 and EN 590, except for density.

Only purchase biodiesel and HVO fuels from reputable dealers selling commercial grade biodiesel.

Cat® diesel generators can run on renewable liquid fuels and have accommodated the use of biodiesel and HVO for over a decade. These fuels are available now and our dealership can provide guidance and recommendations for switching to renewable liquid fuels.

Caterpillar's Role in the ENERGY TRANSITION»

YOUR NEED-TO-KNOW GUIDE FOR WHAT LIES AHEAD

Energy transition refers to the global energy sector's shift from fossil-based sources of energy production and consumption—including oil, natural gas and coal—to renewable energy sources such as wind and solar, as well as battery storage.

The energy transition has become more critical than ever in reducing pollution and climate impacts. Globally, the potential savings of this transition have been estimated at up to $4.2 trillion per year by 2030, according to a United Nations report.

Reliable and efficient renewable energy resources could prove to be less prone to market shocks, improving energy security and resilience through a diverse energy mix. Looking at the bigger picture, the energy transition will provide positive impacts for humanity via increased access to power and healthcare, as well as reducing air pollution, which is the fourth leading factor responsible for early death worldwide. It's also projected to create local jobs, reduce the reliance on imported fuels and increase cost efficiencies.

As decision makers increasingly adopt ambitious environmental, social and governance (ESG) goals, they are evaluating equipment options that can help them achieve their sustainability objectives. Caterpillar and Cat® dealers provide multiple advanced power technologies to enable the energy flexibility customers need to be successful in a lower carbon world.

Hydrogen Power

Caterpillar is expanding on its legacy in gas engines and Solar® gas turbines based on more than 35 years of experience with high-hydrogen fuels. Many Cat products can use hydrogen on a blended basis today, with expanded capabilities in the future. In response to customer interest in hydrogen, some Cat gas generator sets are being configured to use 100 percent hydrogen on a design-to-order basis. Some commercial gensets

will be configured to operate on natural gas blended with up to 25 percent hydrogen.

Caterpillar is also exploring how hydrogen fuel cells can be used to power stationary and mobile applications. Through a collaboration with Microsoft and Ballard Power Systems, a power system incorporating large-format hydrogen fuel cells is being used to produce reliable and sustainable backup power for Microsoft data centers. The demonstration project is supported and partially funded by the U.S. Department of Energy under the H2@Scale initiative and backed by the National Renewable Energy Lab. Additionally, Progress Rail, a Caterpillar division, announced a memorandum of understanding with BNSF Railway and Chevron to advance the demonstration of a locomotive powered by hydrogen fuel cells.

Investing in Energy Transition Solutions

Beyond embracing lower-carbon sources of power, Caterpillar is investing to make conventional energy generation methods more sustainable. The company acquired CarbonPoint Solutions, a U.S.-based carbon capture technology company

THE ENERGY TRANSITION HAS BECOME **MORE CRITICAL** THAN EVER IN **REDUCING POLLUTION** AND **CLIMATE IMPACTS**

that provides technology to concentrate and capture CO_2 for utilization or sequestration. The company's patented processes can be applied to engines and turbines at oil and gas sites, distributed power and industrial plants and waste-to-energy sites. Caterpillar plans to offer these technologies for deployment on its Cat engines and Solar gas turbines.

Last year, Caterpillar acquired Tangent Energy Solutions, a U.S.-based energy-as-a-service company. Tangent provides customers with turnkey solutions for reducing energy costs, increasing energy efficiency, reducing emissions, monetizing electric grid support, and providing resiliency for customer operations. Caterpillar also invested in Lithos Energy, a U.S.-based battery technology company that produces lithium-ion battery packs and specializes in designing, engineering and manufacturing shock-resistant and high-performance lithium-ion battery solutions for applications in demanding conditions such as off-road and marine environments.

Energy Storage and Battery Power

Caterpillar is committed to delivering robust electrified products and solutions. Gaining valuable experience from initial introductions of battery-powered equipment, and additional battery-powered machines and chargers under development will help customers achieve their climate-related objectives.

Because customers are interested in energy storage for different reasons, Caterpillar's approach to batteries is modular and scalable across stationary and mobile applications. The Cat Energy Storage System (ESS) is a rapidly deployable electric power solution to help customers integrate multiple power sources on a worksite. The ESS can provide grid stabilization, transient assist, and renewable energy storage.

Cat microgrid solutions and controls integrate renewable energy sources into electric power systems. These installations are particularly valuable in remote locations where electrical grids may deliver inconsistent power, but where renewable energy sources like solar, wind or hydropower are available.

Enhancing Energy Reliability

Increasing renewable power used in electric grids creates opportunities for distributed power generation. Customers utilize Cat reciprocating engine generator sets and gas turbines to support electric grid stability. Additionally, Cat microgrid solutions serve as integrated sources to provide reliable power in remote locations.

Optimizing Natural Gas

Cleaner-burning natural gas is expected to play an important role in the transition to renewable energy. Cat reciprocating engines are widely used across the globe in producing on-demand energy when renewable sources are unavailable.

Alternative Fuels

Caterpillar also provides machines and engines that are capable of operating on alternative fuels such as hydrogen, biogas, hydrotreated vegetable oil (HVO) and biodiesel, while continuing to develop technologies for the future.

COMMITTED TO PROGRESS

As it helps customers build a better, more sustainable world, Caterpillar remains committed to reducing its own environmental footprint. The 2022 Sustainability Report provides an in-depth look at progress over the past year.

Download the Sustainability Report at
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RAPID RESPONSE

CAT® DEALER DELIVERS FOR SENIOR FACILITY

CUSTOMER PROFILE

The Mayflower at Winter Park

Location: Winter Park, Fla.

Application: Standby power

Cat® Equipment: Diesel gensets: C4.4 (2), C7.1 (2), 3412; DG250 GC gas genset

THE MAYFLOWER AT WINTER PARK
Distinctive Senior Living

As a former general contractor in Orlando, Florida, there were times when Ron Branom had to rent mobile generators.

He recalls one such instance when he was handling a big job in a covered arena, and the power source failed.

"They were about to have a horse show, and the power went down," recalls Branom, who now serves as director of facilities operations for The Mayflower at Winter Park, a senior living community with approximately 400 residents. "So I called Ring Power and they literally had a service technician there within 30 minutes. He took care of the problem and power was restored right before all the guests started arriving."

Branom knew who to call for help, as he had remained in contact with someone he worked with 30 years ago and later went on to become a senior vice president at Cat® dealer Ring Power. As a general contractor, Branom purchased a construction machine from Ring, and also rented an all-terrain high-reach lift from The Cat Rental Store.

"I never had a problem with any of the machines I bought from Ring," Branom recalls. "From past experience, I knew they couldn't be beat when it comes to service."

Crisis averted

By the time Hurricane Ian hit Florida last September, he had already purchased four Cat generators from Ring for standby power at The Mayflower. Torrential rains spawned by the hurricane flooded the basement electrical room with eight feet of water, forcing a shutdown that cut off power to portions of the campus. While two non Cat generators that had been in service for 34 years continued to run and supply power to the assisted living area, Branom knew they were running on borrowed time.

"So, I immediately called my friend Chris at Ring Power and told him I was in a boatload of trouble and needed help fast," he recalls. "I knew that everybody

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"After the way Ring Power helped me out in the wake of Hurricane Ian, they just proved their worth yet again—I couldn't ask for a better partner. That experience with Ian convinced me I need to have everything on the entire campus sourced and serviced by Ring Power."

RON BRANOM, Director of Facilities Operations, The Mayflower at Winter Park

and their brother were going to call asking for generators, but I needed something right away."

Within an hour, two Ring Power representatives arrived to assess the situation. A mobile genset was delivered and connected, and three days later, when one of the old generators failed, the Cat rental generator was ready to run.

"Basically, all of our administrative functions were housed in the building that was running on the temporary Cat generator," Branom says. "All of our IT, phones and a full kitchen. So that generator kept that full kitchen and all of our back-of-house functions running."

Altogether, The Mayflower has six Cat generators for standby power, two of which are brand new. All of the gensets are housed in outdoor enclosures, and five of the six generators run on diesel fuel. A 3412 diesel genset now provides standby power to the 90,000 square foot building.

Branom selected a DG250 GC (250 kW) gas genset based on fuel considerations. In severe storms, diesel fuel can become scarce, whereas a steady supply of natural gas remains available through underground pipelines.

"I already had natural gas going to our clubhouse, and we thought if it's a major disaster and we can't get diesel, we always have natural gas already going there," Branom said. "We also wanted to have an area of refuge for residents and still be able to serve them a full meal. So, if something happens and they can't eat in their kitchens, they can come here and the restaurant will be 100 percent up and running."

Recently, the gas genset demonstrated its value when a round of severe thunderstorms temporarily disrupted power to the campus.

"I got a call from the general manager of the Crew Quarters Clubhouse during dinner that all the power went down, and all of a sudden the power came back on," he said. "Our GM said it was amazing—it was literally like 5 seconds that the power came back on. The generator did its job and everybody was able to continue eating."

Standby power mandate

In 2017, 11 residents of a Hollywood, Fla. nursing home died following a

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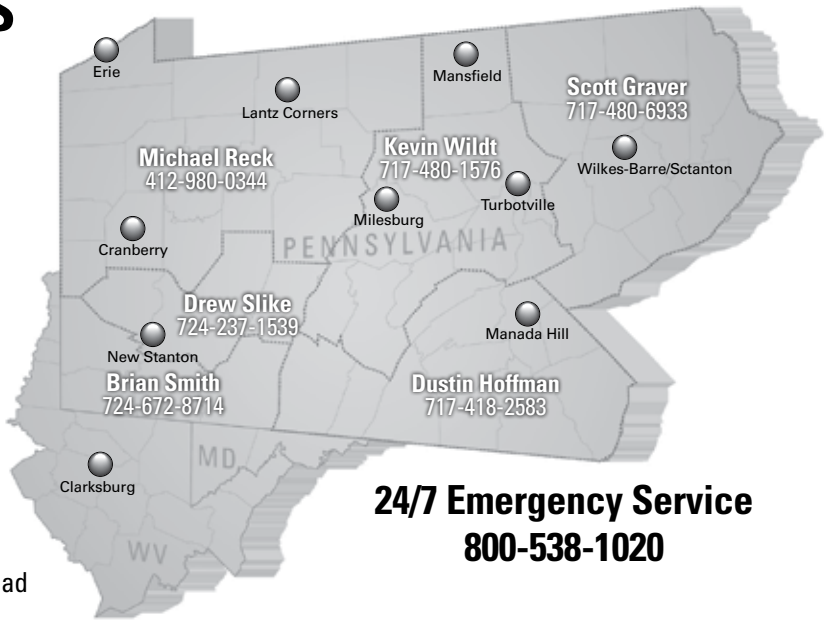

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power outage caused by Hurricane Irma. The hurricane knocked out the facility's air-conditioning system for three days, creating sweltering conditions. In response, Florida Gov. Rick Scott mandated that all nursing homes in the state have standby generators and fuel that can help keep buildings cool for at least 96 hours following a power outage.

Once the governor's mandate became law in 2018, Ring Power partnered with its considerable base of general and electrical contractors and engineers to provide design engineering, as well as full construction and installation of Cat generator sets at more than 100 senior living facilities throughout Florida.

Turnkey solution

"After the way Ring Power helped me out in the wake of Hurricane Ian, they just proved their worth yet again—I couldn't ask for a better partner," Branom says. "So I called up my Ring sales rep (Mark Barbarulo) and ordered new 100- and 150 kW generators to replace the two old ones. That experience with Ian convinced me I need to have everything on the entire campus sourced and serviced by Ring Power."

Ring Power provides maintenance on all six generator sets at The Mayflower through long-term service agreements. That includes scheduled maintenance as well as periodic load bank testing. Ring also provides Branom with the required paperwork to file with the Florida Agency for Health Care Administration (AHCA) that maintenance is up to date and the load bank tests have been completed on time.

"Every year, we have to have a two-hour load bank test, and every three years we have to have a four-hour test," Branom says. "All of the signed service contracts we have with Ring are kept together in a binder for the state to document that we have engaged a qualified power systems specialist to provide regular maintenance and load bank testing. Ring Power takes care of all that for us. They provide us with all the paperwork and we put it in our AHCA file. Boom, done—it's that simple."

Ring technicians will also train The Mayflower facilities staff to conduct routine inspections on the gensets, and also run them at 30 percent load once a month, per state regulations. Making his staff more familiar with the operation of the standby generators will help Branom save time and money.

"I've worked for Turner, Winter Park Construction and had my own GC business, and now I run this facility," he says. I've been around and done a lot of different things. For our facility to have that consistent level of service and reliability, it was an easy decision to go with Cat generators here at the Mayflower."

THE **MAYFLOWER**

The Mayflower at Winter Park is a life plan community just north of Orlando, Fla. where seniors are offered a turnkey package of services that include independent living residences, meal plans and amenities. The Mayflower also offers assisted living residences, memory care, and skilled nursing accommodations.

As a new addition to the 33-acre campus, Bristol Landing features 50 independent living residences, a 9,800-sq.-ft. clubhouse that serves as a social venue, plus a state-of-the-art healthcare building that includes a fitness center.

"Crew Quarters has a full restaurant, bar, media room and a game room, and is our signature building for the entire community," says Ron Branom, director of facility operations. "It has a big patio that sits on a little lake and is the place that everybody congregates. It's kind of the magnet that brings the community together."