A Caterpillar® publication for Power Professionals SPRING **2021**

RUNREADY™

DIGITAL DEMAND

ADAPTIVE DATA CENTER PROVIDER BACKS UP OPERATIONS WITH 56 CAT® GENSETS

VESTED INTEREST
Company supplies complete CHP solution to large-scale greenhouse

PEAK VALUE
Maryland town generates energy savings through peak shaving

CAT®

Power Struggle

Catastrophic events resulting from the loss of grid power from a winter storm in Texas in February underscore the need to maintain a reliable source of backup power.

The mass utilities failure caused by freezing weather in the Lone Star State is a cautionary tale of what can happen when power is lost for an extended period, and serves as a reminder of the critical role power plays in supporting day-to-day life. More than 4.5 million homes and businesses in Texas were left without power, some for several days at time, as rolling blackouts were instituted.

Maintaining power 24/7/365 is critical for hospitals and data centers. For a data center, a power interruption can result in losing hundreds of thousands of dollars in a matter of minutes—not to mention causing serious damage to the reputation of the data center.

Fortunately for Aligned, a Plano, Texas data infrastructure technology company, during the February outage the power stayed on at its Fort Worth area data center throughout the February storm and ensuing days-long grid outage.

Aligned partners with HOLT Power Systems to deliver backup power to its data centers in Utah, Nevada and Virginia. Last year, the Cat® dealer was instrumental in delivering 56 Cat 3516 diesel generator sets within an accelerated time frame to meet the increased demand for data storage and related services that was caused by the pandemic.

This issue also features an independent energy producer that delivers turnkey energy solutions to industry and government. Toronto-based Envest Corp. finances, builds, owns and operates turnkey distributed energy systems tailored to customers' specific objectives. Envest provides the significant up-front capital and operating expenditures required over the lifecycle of the energy systems. This arrangement frees up the end user to focus on the core business, and not be concerned about owning, operating and maintaining an embedded power system.

Meanwhile, a municipal utility on Maryland's Eastern Shore has gone from charging the highest utility rates to the lowest, thanks to its judicious use of peak shaving. Last year, the Town of Berlin added a Cat G3520 to the mix, which made operations more efficient and will serve to enhance cost-saving measures.

We hope you enjoy these real-life success stories.

DID YOU KNOW?

The First CAT® Generators

When they were first introduced in the 1930's Cat® generators quickly became a hot commodity. Much like today, they had the widest range of gensets available, and they were well-known for their power and reliability. The scope of their use began to expand from farming to facilities in every industry, including construction, offices, hospitals and schools.

Photo: Genset weighs 9,200 lbs, built March 1940 for the U.S. Navy. Shipped to Torpedo Station, Goat Island, Newport, Rhode Island as backup electric power at the Navy torpedo factory and research center.

COLORFUL APPROACH TO SAFETY

For the last 20 years, Safe Host has been a pioneer in the design, construction and operation of data centers in Switzerland.

With over 76 MVA of installed capacity across four Swiss sites, Safe Host executives trust Caterpillar and Avesco AG, their local Cat® dealer, to provide turnkey standby power solutions.

A vast amount of electrical equipment associated with grid and emergency backup power is housed in each data center, weaving its way throughout the building from gensets, switchgear, and UPS strings to the power distribution at customers' computer racks.

Safe Host's infrastructure team developed the idea of color-coding each floor of their 36 MW data center in SH2 Gland, as well as all of the equipment that supports each floor, wherever it is located in the facility. This makes service and maintenance safer and faster. The team chose 24 vibrant colors, from hot pink and electric blue to some in more familiar yellow.

Applied during the manufacturing process, the colorful generators turned a few heads at the Caterpillar facility in Lafayette, Indiana as they made their way down the assembly line.

"It's incredible how such a simple idea has added so much value to our health and safety initiatives, and as we continue to expand, we plan to implement this system across all of our facilities," observed Faiz Tandon, sales director and co-founder of Safe Host.

"Caterpillar was very supportive. They share our focus on safety, and their 'Everyone Home Safe Everyday' initiative fits so well with our own efforts and ethos. Caterpillar understood why we needed these colors, and they made it happen."

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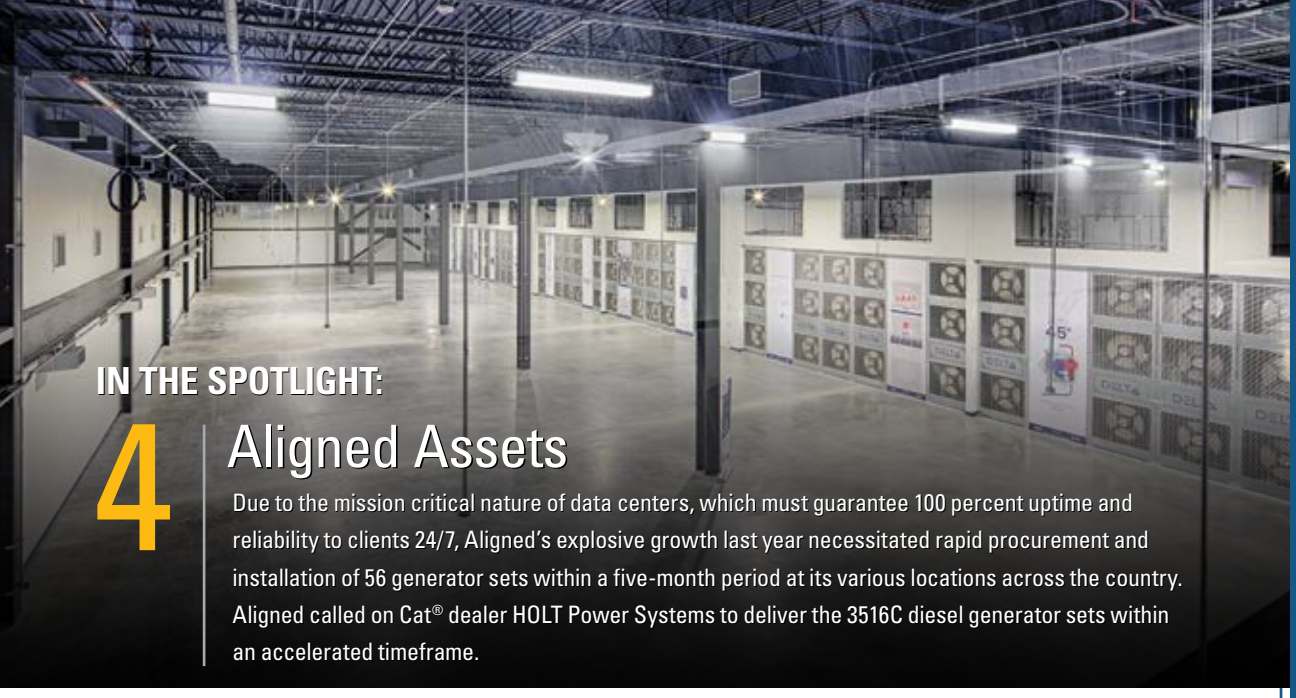

IN THE SPOTLIGHT:

4 Aligned Assets

Due to the mission critical nature of data centers, which must guarantee 100 percent uptime and reliability to clients 24/7, Aligned's explosive growth last year necessitated rapid procurement and installation of 56 generator sets within a five-month period at its various locations across the country. Aligned called on Cat® dealer HOLT Power Systems to deliver the 3516C diesel generator sets within an accelerated timeframe.

FEATURES

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DIGITAL DEMAND

ADAPTIVE DATA CENTER PROVIDER BACKS UP OPERATIONS WITH 56 CAT® GENSETS

In this age of data, about seven billion devices are currently connected to the Internet, and the number continues to grow. Many of these generate large masses of data that must be captured, routed, stored, evaluated, and retrieved. And with the rise of the Internet of Things (IoT) and Industry 4.0, manufacturers are relying on big data and data analytics to enhance the efficiency, productivity, security, and cost-effectiveness of their operations.

Meanwhile, it is becoming increasingly time-consuming and expensive to manage data in-house. More companies are outsourcing their data operations to third-party providers that specialize in data center operations. Colocation data centers are especially popular because they provide physical space, power, and cooling systems for servers and connections to local communication networks.

Last year's sudden and unforeseen COVID-19 crisis revealed what was already becoming obvious—technology has infiltrated almost all aspects of daily life, creating more and more data that needs to be processed and stored, optimally in a purpose-built data center.

When the global pandemic hit, almost instantly a massive number of workers around the world were working from home and needed to stay productive. Patients could no longer visit their doctors in person, so telemedicine use exploded. Students started taking virtual classes that were never anticipated,

CUSTOMER PROFILE

Aligned

Location: Plano, Tex.

Application: Standby power, firming

Cat® Equipment: 3516C diesel generator sets (56)

while social media use greatly increased because of social distancing requirements. Physical retail locations were forced to close as reliance on e-commerce continued its upward trend.

Growth spurt

As data centers continue to proliferate, one company experiencing rapid growth is Aligned. Based in Plano, Tex., Aligned's employee roster has doubled from two years ago, with further growth anticipated this year and next.

With locations in Dallas, Phoenix, Salt Lake City and Ashburn, Va., Aligned is an infrastructure technology company that offers sustainable and adaptable colocation and build-to-scale solutions for cloud, enterprise, and managed service providers.

As a result of the pandemic, the company saw an exponential increase in leasing activity, enabling Aligned to achieve its growth target for 2020 within a 60-day period, according to CEO Andrew Schaap.

"Customers who bought from us a year ago thought they had enough capacity for the next three to five years of growth, maybe even 10 years of growth," Schaap says. "And three months later they ended up coming back to us and doubling their capacity. One of our clients bought from us three more times. They basically tripled the size of their deployment due to continued massive growth of their infrastructure, which meant they needed more capacity inside of our facilities."

Beyond the more visible technologies that are required to run applications that people find on their phones and other devices, there is an enormous unseen realm of business-to-business applications that collect massive amounts of data, such as the building management system at Aligned's headquarters. And all of this data needs to be housed somewhere.

"It's a very diverse group of clients in our facilities," Schaap says. "We have Fortune 100 companies sitting next to companies that you've likely never heard of. And they're big companies that are publicly traded, but not household names because they're involved in business-to-business support functions. And they're experiencing massive growth in their businesses due to the acceleration of everything being pushed online—everything is being digitized."

Massive deployment

Due to the mission critical nature of data centers, which must guarantee 100 percent uptime and reliability to clients 24/7, Aligned's explosive growth necessitated rapid procurement and installation of 56 generator sets within a five-month period at its locations across the country.

The generators provide backup power in the event grid power is lost, or during times when transmission reserves on the utility grid are depleted and power sags.

"You need to have some type of backup energy when renewable energy sources such as solar and wind experience a decline," Schaap says. "And Caterpillar is one of the partners that we rely on to help fill in that gap."

Last year, Aligned called on HOLT Power Systems to deliver the 3516C diesel generator sets within an accelerated timeframe. The Cat® dealer's role is to procure the generator sets, while also providing packaging that includes the fuel tank, emissions aftertreatment system and the generator enclosure.

Growing demand, due in large part to the pandemic and accelerated digital transformation, called for additional generators outside of Aligned's original forecast—delivered and installed within a short timeframe.

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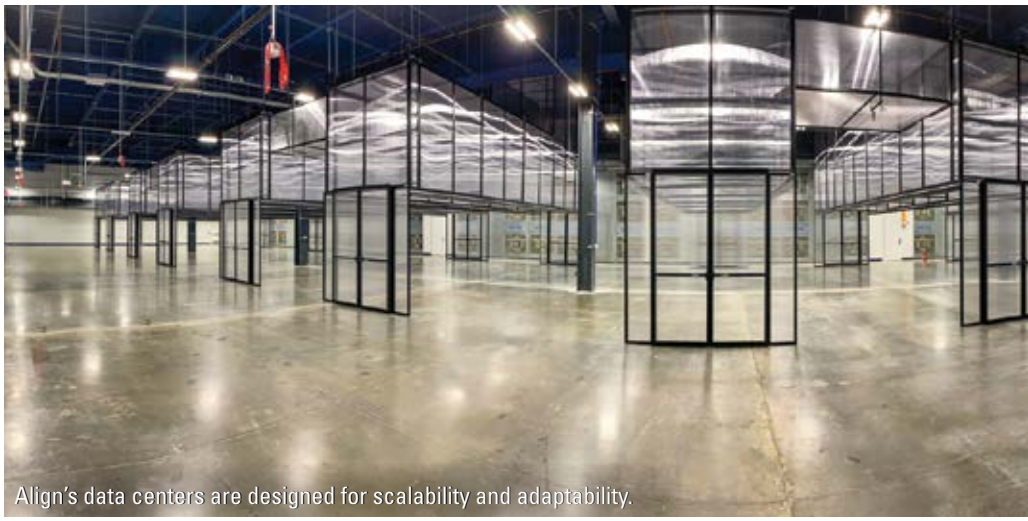
"We had a couple of very large transactions hit last year, and had to call the Cat team to order more generators to accommodate that growth," Schaap said. "Basically, we needed them to help us out on short notice and be especially nimble. It's really a testament to the relationship and the supply chain strength that we have in a partner like Caterpillar."

Having enough inventory on hand was critical for the average 12-week turnaround from generator delivery to installation and commissioning, according to Tom Angotti, power systems manager for HOLT Cat. Another key element is that all of the Cat generators are the same model, which enabled standardization of packaging, as well as parts and service support, Angotti said.

"These generators weren't really part of our original forecast," adds Israel Segura, director of procurement for Aligned. "I'd love to say that we saw this coming, but a lot of these weren't ordered until probably April or May and today they're all fully installed and commissioned, whether it's in Utah, Ashburn, or Phoenix."

Given that Aligned's data centers are spread across the country, they rely on the Cat dealer network to provide preventive maintenance and technical support on an as-needed basis.

"Whether it's HOLT Cat, Empire Southwest or Carter, Caterpillar has a local dealer that's typically there within the same day," Segura says. "Our operations folks have the phone numbers of the technicians, so typically within an hour we're going to have a full report in terms of what's going on and a technician will come out to rectify any potential issue."



Align's data centers are designed for scalability and adaptability.

"The whole Cat® team has the same vision that I do, which is business built on a foundation of great technology and great infrastructure that is executed by great people."

ANDREW SCHAAP, CEO, Aligned Energy

Partnership built on trust

The rapid deployment and installation of such a large number of generator sets was made possible by the partnership between Aligned and HOLT Power Systems. Schaap recalls an initial meeting in 2018 where 10 representatives from Holt and Caterpillar showed up, which signaled a high level of commitment.

"The whole Cat team has the same vision that I do, which is business built on a foundation of great technology and great infrastructure that is executed by great people," he says.

"In our world, everything is mission critical, so what we are engaged in

depends upon establishing higher degrees of trust," Schaap says. "You can have great technology and great infrastructure, but if you don't have great people, you'll get some wins. But eventually you always have hurdles—things that happen in the course of a day or a year. When something like a global pandemic hits, what do you do?

"Things will happen, so you have to have good people that stand behind their products and say 'We're going to work with you as a partner and do whatever it takes,'" Schaap continues.

"The Cat product speaks for itself, but the reason we chose them was because of the high level of commitment from their people.

"Across the board, I couldn't be more thrilled with the partnership, the products and how we work together as a team."

SUSTAINABLE **GROWTH**

Data flows through almost everything we do, from powering smartphones to streaming our favorite shows to networking businesses around the world—and its use is increasing exponentially.

Last September, Aligned, a data center platform focused on adaptable and future-proof technology, closed on a new $1 billion credit facility. For the Plano, Tex. company founded in 2013, it marks the first data center sustainability-linked financing in the U.S.

Aligned's new financing is linked to its core environmental, social, and governance objectives in renewable energy, transparent reporting, and workplace safety. The company currently matches 100 percent of its IT load with renewable energy across the entire data center portfolio. Aligned has a goal of matching 100 percent of its annual energy consumption with zero-carbon renewable energy by 2024.

"The world is becoming increasingly reliant on digital infrastructure, of which we are a foundational part," says Aligned CEO Andrew Schaap. "As a company, we've made the decision to take a leadership role and get out in front, because we think it's the right thing to do."

Beyond utilizing its Cat® 3516C generator sets for backup power in the event of a power outage on the utility grid, Aligned runs the gensets when the available supply of renewable energy on the grid falls off.

"If the wind stops blowing, you need to back that up with something and many times that's being done with Cat gensets," Schaap says. "So, Caterpillar equipment is part of our strategy to support the green energy initiatives we have with these utility companies."

The focus on sustainability has worked to Aligned's advantage.

"Green is sustainability, but green is also total cost of ownership," Schaap told the *Dallas Business Journal*. "Aligned has a wonderful story when it comes to the cost of ownership, being highly efficient in the way we deploy and in the way we operate, which lowers the total cost of ownership.

"Our clients are thinking about it all the time and being held to high standards on their own sustainability goals, so we become a component of their overall sustainability strategy and story," Schaap says. "And our focus has been received incredibly well. We think being green is good for our bottom line, and also good for our customers and our partners."

GET **CONNECTED**

TEMPORARY CONNECTION BOXES OFFER A FLEXIBLE SOLUTION FOR MOBILE GENERATOR SETS

A flexible new family of Cat® temporary connection boxes for mobile generator sets provides an easily accessible docking station to quickly connect a rental generator set to a building's electrical system. Temporary power is delivered in a matter of seconds.

Permanently mounted on the outside of a building, Cat temporary connection boxes feature a NEMA 3R weatherproof, wall-mounted enclosure with a door for cable access. Four configurations are offered to meet a range of needs.

The boxes provide a simple connection for a mobile generator set or load bank, assuring facility management has a solid mechanism for maintaining and testing permanent assets without interrupting backup power capabilities. A prime example is legally required emergency systems that provide power to hospitals and many other locations where reliable electric power is critical to ensure the safety of building occupants.

Typical markets include healthcare, pharmaceutical, industrial, manufacturing and light commercial construction.

"Understanding where and how to connect to your facility's emergency power system is an essential component of a well-designed contingency preparedness plan," said Tom Caldwell, a Caterpillar rental power general manager.

The new Cat temporary connection boxes are designed with ancillary connection options, ensuring that Cat XQ mobile generator sets, which are immediately available through the Cat dealer network and at Cat Rental Stores, can be safely and quickly connected to supply critical power during emergencies or when performing service on existing permanent units.

The new Cat temporary connection boxes are designed to help facility managers comply with recent updates to the U.S. National Electric Code (NEC) standards for emergency and standby power systems. The NEC requires facilities with an emergency generator set permanently installed in a standby application to provide an alternate source of electrical power in the event that the normal electrical power source is disabled for maintenance or is otherwise unavailable.

Various options suited to meet individual needs can be selected in order to facilitate ease of use with Cat XQ mobile generator sets. For safety, a phase reversal relay provides a visual indication of correct phase rotation.

A remote-start signal connection is also available so that the temporary generator set can be called on by the facility's existing transfer switch; and a block heater shore power receptacle includes two 30-amp twist-lock receptacles wired to an internal disconnect to keep the mobile unit pre-warmed and ready for any outage.

Cat dealers have the ability to provide and install rental generator sets that may be quickly connected via these connection boxes in the event of a non-scheduled service need involving the facility's permanent generator set.

For more information, contact the power systems experts at our dealership.

VESTED INTEREST

ENVEST SUPPLIES COMPLETE CHP SOLUTION TO LARGE-SCALE GREENHOUSE

As an independent power producer delivering private utility energy solutions to industrial and governmental customers in North America, Envest Corp. provides clean, distributed energy systems using renewable and natural resources.

The Toronto-based company delivers turnkey energy systems tailored to meet customers' specific objectives and power requirements in mission critical environments.

Envest's turnkey model includes financing, building, owning and operating a power system for the end user. It invests the necessary up-front capital and operating expenditures required over the lifecycle of its energy systems to the benefit of its customers.

Envest's primary focus is the generation of combined heat and power (CHP or cogeneration) using natural and renewable fuels. In addition to cogeneration facilities, Envest has developed distributed energy projects such as microgrids, as well as bioenergy operations in North America.

Green and growing

Since December 2017, Envest's staff has operated and maintained all aspects of an onsite power system for CannTrust, one of Canada's leading licensed producers of cannabis under the Health Canada Access to Cannabis for Medical Purposes Regulation (ACMPR) program. Since its inception in 2014, CannTrust has been a major player in the Canadian market by producing pharmaceutically standardized product.

Envest currently supplies 75 percent of the power and heat to CannTrust's 430,000 square-foot greenhouse operation in the Niagara region of Ontario. CannTrust is currently working to expand the electrical system so that Envest's cogeneration will provide 100 percent of the facility's energy load by the second quarter of this year.

The Niagara facility is a state-of-the-art hydroponic greenhouse with computer-controlled irrigation and full supplemental lighting. The facility is equipped with a perpetual harvest system which produces cannabis 365 days a year, and results in a continuous production capacity.

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CUSTOMER PROFILE

Envest Corp.

Location: Fenwick, Ontario Canada

Application: CHP for greenhouse

Cat® Equipment: G3520H gas generator sets (4)

ENVEST

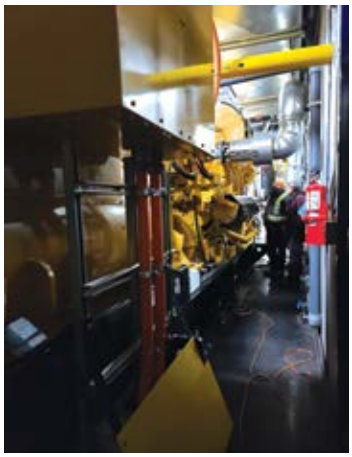
The location of the greenhouse in Fenwick, Ontario meant that CannTrust's electrical needs could not be fully met by the utility provider, Hydro One. After looking into all available options, it was decided that cogeneration utilizing natural gas generators was the best fit, says David Hamby, vice president of grow operations for CannTrust.

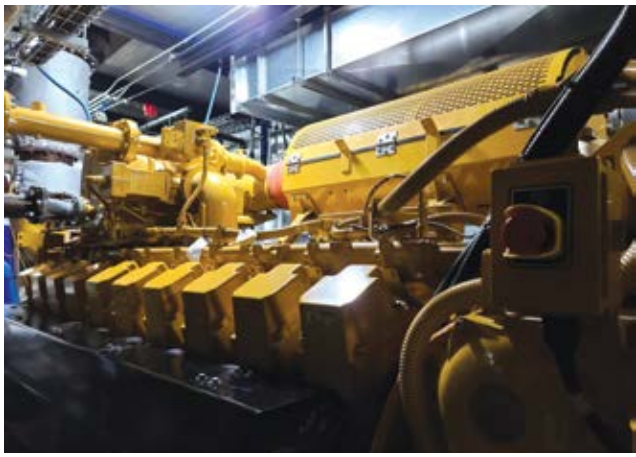
Four Cat® G3520H gas generator sets are capable of producing 10 MW of electrical energy that powers the facility's grow lights 24/7/365. The generated energy also powers some product processing and drying equipment.

The gas generator sets are equipped with jacket water heat recovery systems. System heat recovered as hot water from the jacket water circuit is collected in an on-site thermal storage tank from which heat is supplied to the entire greenhouse. The energy recovered from the CHP plant offsets 100 percent of the natural gas previously used to heat the existing boilers.

"As an islanded facility, maintenance and uptime are critical to our off-taker's operations," says Jason Moretto, Envest president and CEO. "We have two operators dedicated exclusively to this system, as well as other support staff."

To date, the CHP system has achieved 97 percent uptime, according to Roger Tiessen, general manager of operations for Envest.





The greenhouse has faced some energy challenges, especially during the summer months, when it comes to the quality of power received from the public utility, which has led to equipment-related and operational issues.

"The power quality received from the CHP is high quality and consistent, so much so that our off-taker is currently evaluating using the CHP for base load power supply going forward," Moretto says. "In addition to providing low-cost electricity and offsetting natural gas consumption in the boilers, the CHP system also provides a reliable and stable source of electricity."

As electricity rates in Ontario continue to rise, the business case for the project centers on significant savings in electricity costs realized by CannTrust. Cultivating cannabis at scale, even in a greenhouse, requires significant amounts of supplemental heating and lighting—which are among the grower's highest operating costs.

Envest's CHP solution provides energy cost certainty for the greenhouse operation, and was a deciding factor for CannTrust when evaluating future electricity rates forecasted in the province of Ontario.

"There is a substantial cost difference with our cogenerated electricity versus buying power from the grid," Hamby says. "An added cost savings is realized

by utilizing the heat from the generators to heat our greenhouse, which limits the use of boilers."

If there is a power outage on the 1 MW base load provided by the public utility (Hydro One), the greenhouse facility is equipped with automatic transfer switches to switch the base load power supply to the cogeneration facility. The Envest system is capable of powering the entire greenhouse facility in the absence of grid power. This includes grow lights, computer servers, processing equipment and emergency/ critical loads.

Dealer support is critical

Envest has a 15-year association with Cat dealer Toromont Power Systems developing natural gas, biogas, syngas and battery storage projects. Toromont provided essential input and equipment expertise in the developmental stage of the CannTrust project, and was also involved in final commissioning.

"Both Toromont and Caterpillar have been critical to Envest's success," Moretto says. "They have been a team member at the early development stages of potential projects. Their early support on opportunities is invaluable to our initial evaluation of a project's viability from a technical perspective.

"We have also worked closely with Cat Financial for over a decade, and their support has been invaluable," Moretto adds.

Envest and Toromont complement each other in providing energy solutions to the Canadian marketplace, Moretto says. Toromont is able to provide its customers with a unique financing alternative by offering a third-party ownership model through Envest. Therefore, the customer may realize immediate savings and hassle-free operations as Envest invests the significant up-front capital required for a turnkey energy system. Envest also funds the operating expenditures over the life cycle of the energy system.

The turnkey business model enables CannTrust to focus on its core business.

"Extending the Caterpillar offering with a prolific parts and service network backed by a strong local dealer like Toromont, we believe our energy services have been designed for the highest possible quality and uptime for our end user."

JASON MORETTO, President & CEO, Envest Corp.

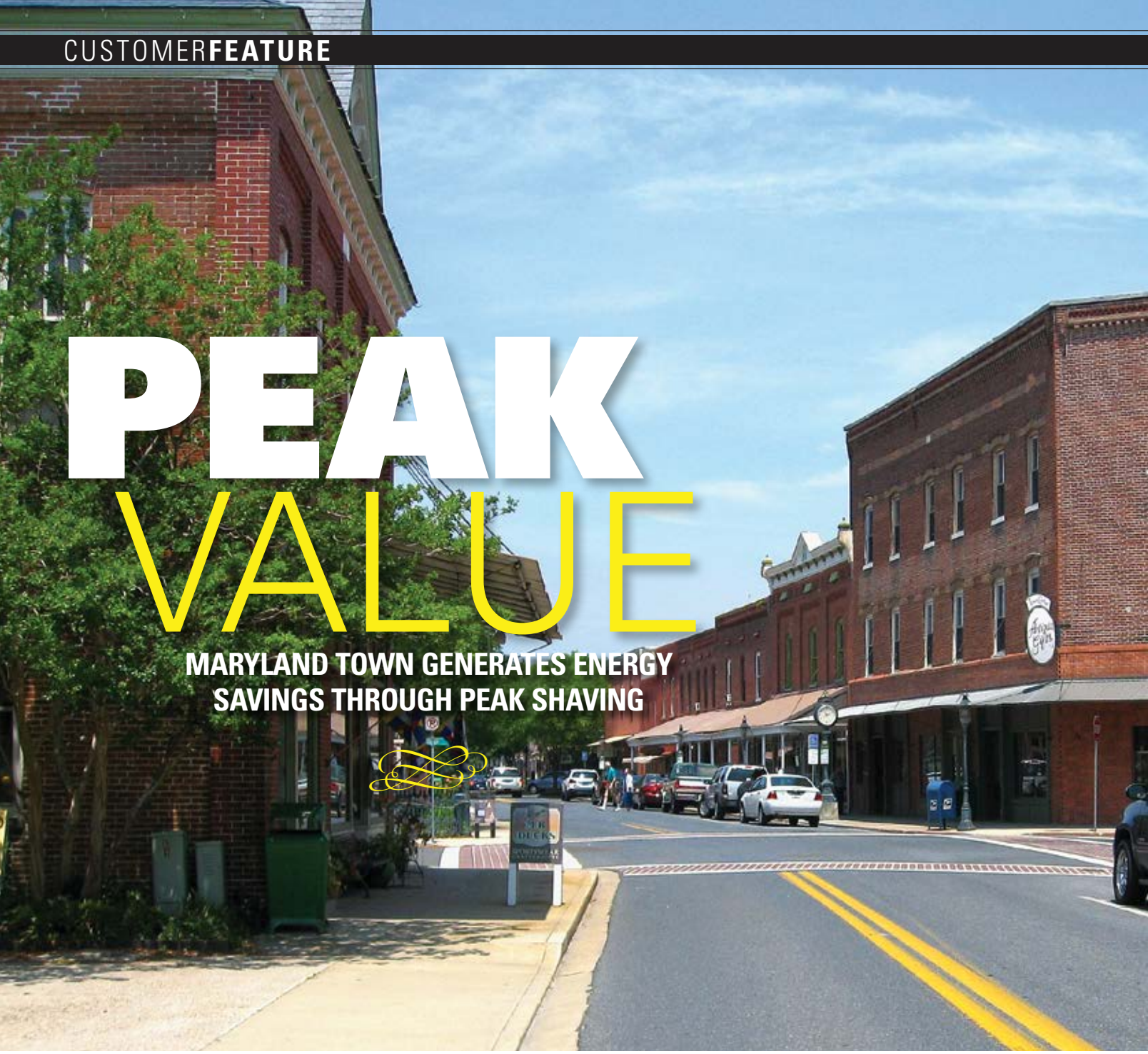
"The Envest operators and engineers are professionals and are experts in their field," Hamby says. "They do an outstanding job in providing clean, uninterrupted electricity to our greenhouse operations. We at CannTrust feel we are professionals in the field of growing cannabis and producing exceptional products for our patients. Our focus has to be on our core values and our patients. Envest and CannTrust have a great partnership, and working in our respected fields together, we optimize the efficiencies of our grow operations."

Envest maintains all aspects of the onsite cogeneration system at CannTrust, including system operation and routine maintenance and repairs to the four G3520H gensets. It works closely with Toromont for parts and more complex troubleshooting and repairs.

"Toromont has a tremendous depth and network of service personnel and locations in their territory," Moretto says. "Parts and service availability is vital to uptime, which directly relates to project economics over the course of a long-term energy contract."

Moretto says Envest is pleased with the performance and reliability of the Cat CHP system to date, noting that the system operator has not met with any material challenges since commissioning the cogeneration plant in July 2019.

"We believe that Caterpillar is a world leader in manufacturing and supporting its energy generation products," Moretto says. "Extending the Caterpillar offering with a prolific parts and service network backed by a strong local dealer like Toromont, we believe our energy services have been designed for the highest possible quality and uptime for our end user."



PEAK VALUE

MARYLAND TOWN GENERATES ENERGY SAVINGS THROUGH PEAK SHAVING

CUSTOMER PROFILE

Town of Berlin

Location: Berlin, Md.

Application: Peak Shaving

Cat® Equipment: G3520 gas generator set

Located on the Delmarva Peninsula in Worcester County, Maryland, the quaint town of Berlin is only eight miles from nearby Ocean City. In 2014, the town was voted "America's Coolest Small Town" in a nationwide contest sponsored by *Budget Travel Magazine.*

With a population of approximately 4,700, Berlin has been the setting for two major motion pictures. In 1998, Berlin was the location for the filming of "Runaway Bride" starring Richard Gere and Julia Roberts. Then in 2001, Berlin became the fictional setting for "Tuck Everlasting" starring Sissy Spacek, Ben Kingsley, and William Hurt. Downtown Berlin was transported back to the turn of the century, complete with dirt roads, horses and carriages, and period costumes.

The town's historic Main Street boasts over 60 retail shops, galleries, antique stores, more than 15 dining establishments, live music venues, coffee

shops, bakeries, a butcher and a local seafood market. Owing to its rich history that dates back to the early 19th century, 47 structures are listed on the National Register of Historic Places. Downtown Berlin's thriving and diverse community was named the Best Town for Shopping by *USA Today* in both 2018 and 2020. Berlin was twice named a Top 10 Great American Main Street.

Berlin's electric system has been in operation for over a century. Established in 1907, it now serves more than 2,580 total meters, with a system peak of 10 MW. The utility is separated into two divisions: generation and distribution. The electric utility operates a power plant on William Street that generates about two-thirds of the town's energy load during times of peak demand, while purchasing the majority of its power from outside sources.

Although Berlin once had some of the highest electric rates in the country, dedication and thoughtful planning transformed the town's rates from the highest on the Eastern Shore of Maryland to the lowest in the area.

When Berlin's rates hit a peak high in 2007-2008, the town implemented a number of cost and energy-saving initiatives. One of the most significant energy savings initiatives involved working with the town's electric utility consultant, Booth & Associates, to implement peak shaving to support the town's electrical load.

The adjustment worked well, and in 2012, Berlin was able to reduce residential and commercial rates by 11.5 percent.

When presented to the Maryland Public Service Commission, which approves rates in the state, "Nobody at the commission could ever remember dealing with a rate decrease," said former Berlin Mayor Gee Williams.

Shaving the peaks

In order to offset the high cost of power, Berlin runs its fleet of three generators behind the meter during times of peak demand on the grid. The goal is to run during five peak periods in a year, which results in substantial savings, says Berlin Utility Director Tim Lawrence.

"The cost of electricity is like mountains and valleys," Lawrence says. "The peak is when they jack the charges through the roof. So by running our generators during these times of peak demand, we're taking the top off of that

Continued on page 14

mountain and leveling it off. Instead of buying 8.7 MW of power and paying those high transmission charges, we'll start our generators and put 5.7 MW into our local distribution system to offset the higher cost of energy."

Based on his previous experience as an electric line superintendent in Manassas, Va., Lawrence recommended that the Town of Berlin join a power consortium to realize even greater energy savings.

In 2015, the town became affiliated with American Municipal Power (AMP) to help identify favorable power purchase contracts. AMP personnel assist member electric systems in assessing and filling the power supply needs of their communities, using a variety of resources to achieve the most economical and reliable blend of energy sources.

The principal advantage of being a member of AMP is the favorable rate it receives when it purchases power on the open market, Lawrence says.

"AMP represents about 140 municipalities throughout the country, so it gives us a stronger bargaining position when we purchase power," Lawrence says. "Before, we were paying close to $77 per megawatt of power we received from the grid, and now we're down to $35 per megawatt."

Even though Berlin made substantial progress in lowering its electric rates in the years before joining AMP, the town's approach to peak shaving still required some fine tuning. The old way of peak shaving was done "from the hip," as the generators ran around the clock when peak periods were anticipated, Lawrence said.

In consultation with AMP and Booth Associates, Berlin has developed a more targeted approach to peak shaving. This involves analyzing both historical and real-time data to forecast peak events. Instead of running its generators as many as 23 times a year to capture five peak demand periods in a year, as it has in the past, the municipal utility can now achieve that in as few as six attempts. This saves on the cost of fuel, and also results in less emissions and fewer operating hours accumulating on the generator sets.

The net result is that Berlin saves up to $550,000 a year in energy costs through peak shaving, says Town Administrator Jeff Fleetwood.

"The one thing that we're proud of is our rates are at the rock bottom price compared to the other utilities here on the shore," Fleetwood says.

Switching to natural gas

Last year, one of the diesel generator sets in Berlin's aging fleet failed. Lawrence contacted the power systems specialists at Cat® dealer Carter, who suggested installing a natural gas genset.

"Natural gas is a cleaner source of fuel, and it reduces the emissions by about 30 percent compared to the previous diesel generator," Lawrence says. "I reached out to the Maryland Department of Environment and told them we wanted to get away from the diesel engine and go to natural gas, and their response was pretty much like: 'Here's your permit, go ahead and do it.'

"And the Maryland Energy Authority is encouraging the use of natural gas

versus running with diesel fuel," he continues. "So it made sense to go with a natural gas engine—it burns cleaner, requires less maintenance and has a longer operating life. And the cost of natural gas is less than diesel fuel. All things considered, it was just the right thing to do."

The Cat dealer recommended that Berlin install a G3520 generator set, which is ideal for use in peak shaving applications. The Cat G3520 is the first

"This Cat gas generator set offers the reliability and low total owning and operating costs that will benefit the town's finances and utility customers' rates for years to come."

TIM LAWRENCE, Berlin Utility Director, Town of Berlin

U.S. EPA-certified natural gas generator set rated at 2.0 and 2.5 MW for use in 60 Hz power markets.

Designed to minimize installation costs and commissioning time, the Cat G3520 generator set features a high-power density 20-cylinder engine that offers market-leading load acceptance and transient response. It is engineered to meet a wide range of critical market standards, including quick starting and loading capability.

Berlin's new Cat generator was commissioned last September as part of a ribbon cutting event. It is expected to run a total of 70 hours per year during the coldest part of the winter and on the warmest days in the summer.

For the first year the G3520 is in operation, technicians from Carter Power Systems will provide all routine and preventive maintenance, as well as any necessary repairs, while Berlin's utility plant operators become more familiar with operation of the Cat genset.

"From the minute we started the project until it was totally completed, they were always on schedule," Lawrence says of the working relationship with his Cat dealer. "They worked with me and kept me updated constantly on any issues that they had to overcome, and they did a fantastic job. And now if we have any issues, I can call them and they'll be here in a day."

The Town of Berlin takes pride in offering the lowest prices for electricity on Maryland's Eastern Shore, Lawrence says.

"And this Cat gas generator set offers the reliability and low total owning and operating costs that will benefit the town's finances and utility customers for years to come."

CONTINUOUS EFFORT

Over the last 20 years, the Town of Berlin has garnered numerous regional and national awards for its idyllic charm and small-town setting.

Its selection of a Cat® gas generator set last year illustrates the community's wider efforts to preserve the natural beauty of Maryland's Eastern Shore.

For example, the town operates two spray irrigation facilities that recycle 100 percent of the town's treated wastewater. The system naturally filters out nutrients and other organic compounds, preserves local groundwater levels, and eliminates adverse effects on protected waters downstream.

The town has been recognized for its efforts. In 2012, Berlin was the first-ever recipient of the Sustainable Maryland Certification. The town was also honored in 2015 by the Environmental Finance Center at the University of Maryland. Some of its sustainability initiatives include an award-winning wastewater treatment facility, stormwater management, new sidewalks and other pedestrian-friendly measures.

In 2016, the Berlin Electric Utility Department was cited by the American Public Power Association with the RP3 Gold level designation for exceptional reliability, safety, workforce development and system improvement.

"The citizens of the town of Berlin recognize that in the 21st century, environmental stewardship and economic development are equally important sides of the same coin. They're critcal for any community that's going to develop a vibrant, diverse and sustainable quality of life for multiple generations," said former mayor Gee Willams.

CAT® QUALITY
CAT PERFORMANCE
EXCEPTIONAL VALUE.

By designing the new **Cat GC** models specifically for stationary standby applications, it allowed us to really focus on incorporating only the key options required for your business, making the quality and reliability of Cat power more affordable than ever.

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