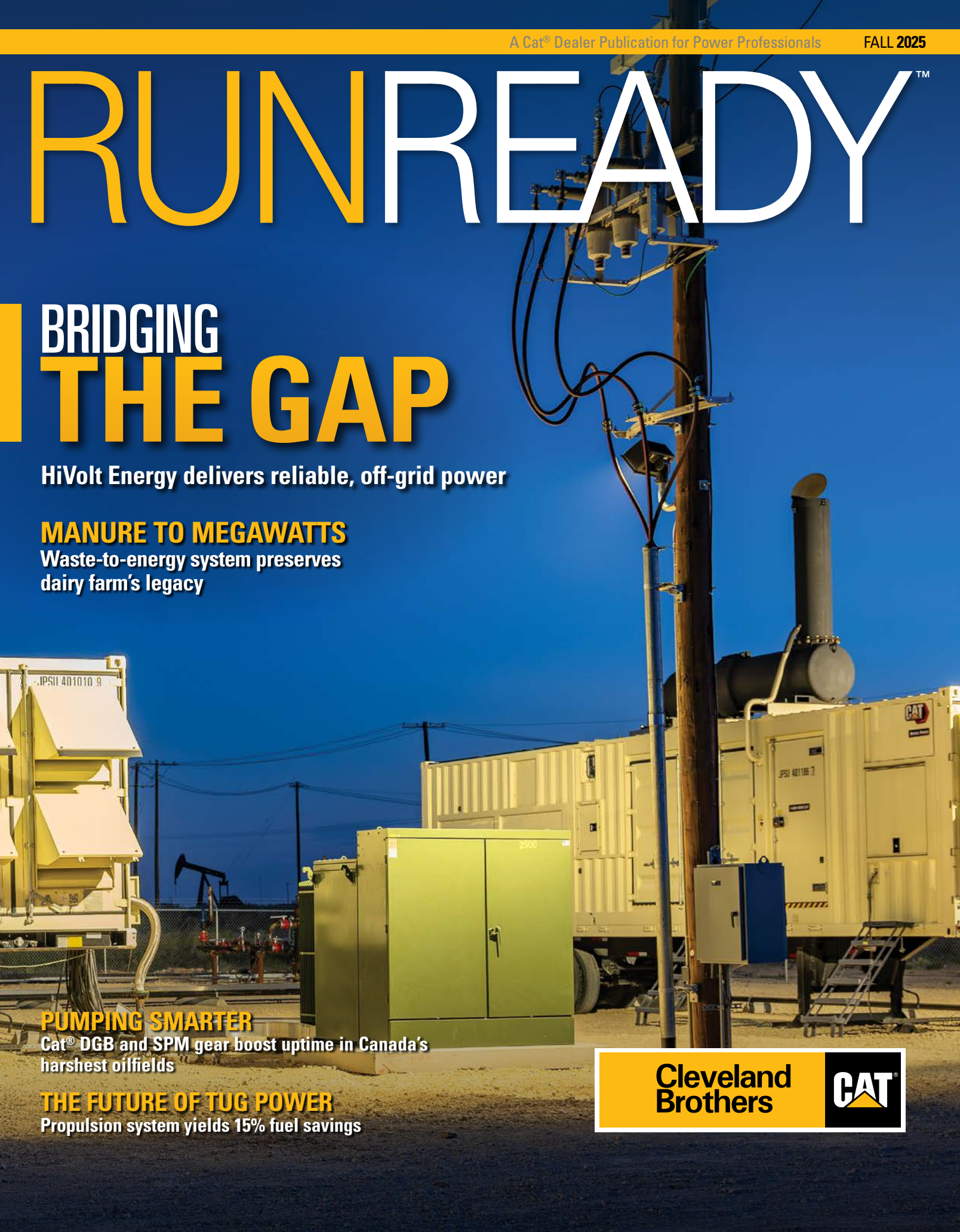
A Cat® Dealer Publication for Power Professionals FALL 2025

RUNREADY™



BRIDGING THE GAP

HiVolt Energy delivers reliable, off-grid power

MANURE TO MEGAWATTS

Waste-to-energy system preserves dairy farm's legacy

PUMPING SMARTER

Cat® DGB and SPM gear boost uptime in Canada's harshest oilfields

THE FUTURE OF TUG POWER

Propulsion system yields 15% fuel savings

Cleveland Brothers

CAT®

Beyond the Grid

The Fall issue of ***RunReady*** takes you behind the scenes with two very different customers who have one thing in common: they refuse to leave reliability to chance.

In West Texas, HiVolt Energy is establishing a new standard for independent power production. Born from the challenges of remote operators struggling with limited or no access to utility power, HiVolt has carved out a niche as a long-term supplier of off-grid power. With a growing list of installed power solutions, and ongoing support from a Cat dealer, they're not just keeping rigs running—they're building microgrids hardened for the long haul. Whether it's oilfields or data centers, HiVolt's philosophy is simple: own it, operate it, and never compromise on uptime.

At Wanner's Pride and Joy Farm in eastern Pennsylvania, the Wanner family has turned cow manure into megawatts for the last 18 years. By installing a methane digester and pairing it with an old Cat engine powering a generator, the family has transformed a waste challenge into an energy solution that benefits the environment, the community, and the bottom line. Nine generations into their family legacy, the Wanners are proving that sustainability and tradition can thrive side by side.

And because designing the right power solution is just as important as operating it, the new Cat Power Hub is also featured. Think of it as "build-your-own genset"—a user-friendly online configurator that makes choosing the right model, features, and specs quick and simple. No guesswork. No waiting. Just power solutions made easy.

DID YOU KNOW?

HERE'S A FEW INTERESTING FACTS YOU MAY NOT KNOW:

- The first electric generators in the 1800s were nicknamed "dynamos"—a word we still used today to describe powerful people.
- The U.S. currently receives over 20% of its electricity from renewables sources—double the share from just 15 years ago, according to the U.S. Energy Information Administration.
- Solar panels are made of silicon, the same material used in computer chips—and the sun provides more energy to Earth in one hour than humanity uses in an entire year, according to the U.S. National Renewable Energy Laboratory.
- Wind turbine blades can be longer than a football field, and a single modern turbine can generate enough electricity to power 1,500 homes, a report from the Wind Technologies Office of the U.S. Department of Energy says.

CATERPILLAR PROVIDING 4 GW OF CHP POWER FOR UTAH AI DATA CENTER

Caterpillar and Cat dealer Wheeler Power Systems have finalized an agreement with project developer Joule Capital Partners to supply 4 GW of power capacity for Joule's High Performance Compute Data Center Campus in central Utah.

The CHP and prime power package will include Caterpillar's latest model G3520K generator sets and related equipment to provide electricity and capture waste heat to power and cool the high-density servers. In addition, the solution will include 1.1 GWh of grid-forming battery energy storage along with other backup power from diverse fuel sources, interconnecting with the Intermountain West grid system and directly connected to the Joule Data Center Campus.

"This project represents the core of Joule's mission—to deliver artificial intelligence (AI) ready compute capacity by pairing world-class data center campuses with reliable, on-demand power," said David Gray, President of Joule Capital Partners.

"By combining Caterpillar's advanced energy systems with Wheeler's local expertise, we can bring gigawatt-scale capacity to market faster and more efficiently than ever before, ensuring our tenants have the power and reliability they need to thrive in the next generation of high-performance computing."

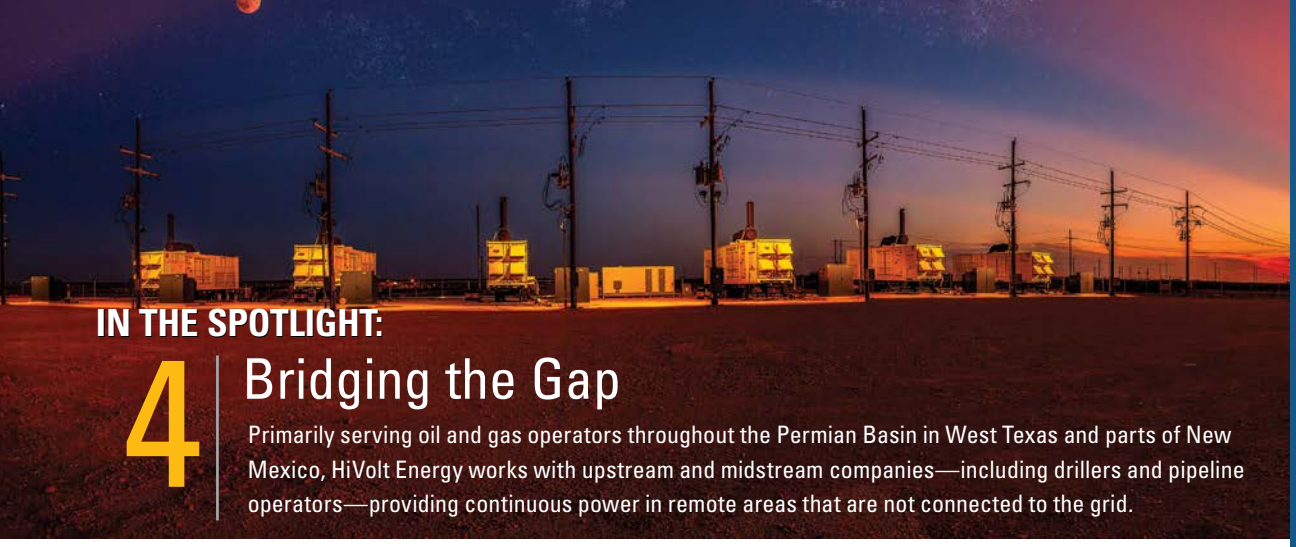
The CHP, battery storage and distributed generation arrays will be enabled with control systems, switchgear and inverters. Caterpillar and Wheeler will assist with technical services including power system design, installation, integration, testing and commissioning.

"This project is a perfect example of how we can deliver fast, reliable power generation to our customers through integrated energy solutions," said Melissa Busen, senior vice president of Electric Power at Caterpillar Inc.

The Joule Data Center will span 4,000 acres in central Utah 145 miles south of Salt Lake City, and is being designed to handle artificial intelligence-driven data workloads. Forecasts from Goldman Sachs, Bloom Energy and Deloitte predict that the U.S. data center and AI boom will need perhaps 125 GW of new capacity during the coming decade.

The data center developer anticipates launching its initial computing capacity during 2026.

CONTENTS

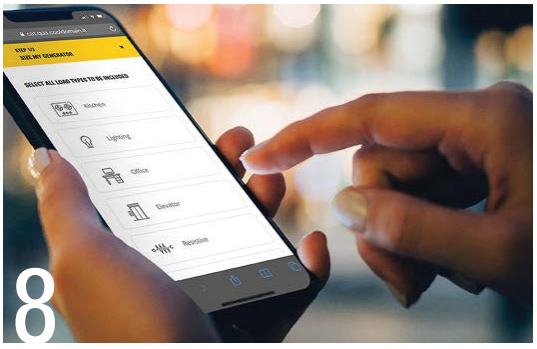


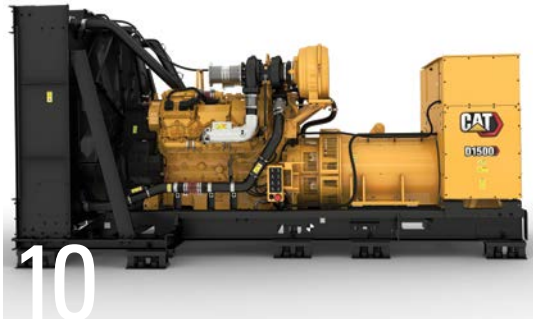
IN THE SPOTLIGHT:

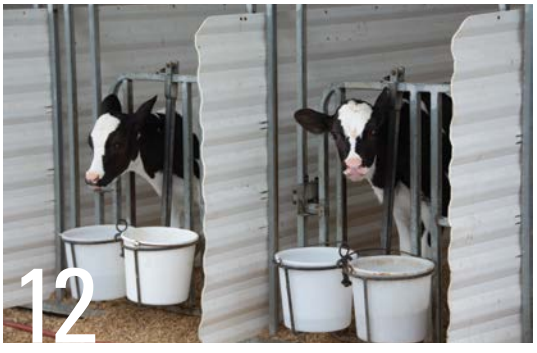
4 Bridging the Gap

Primarily serving oil and gas operators throughout the Permian Basin in West Texas and parts of New Mexico, HiVolt Energy works with upstream and midstream companies—including drillers and pipeline operators—providing continuous power in remote areas that are not connected to the grid.

FEATURES







8 Power Hub
Design Your Genset in Minutes

10 New D1500 Genset
More power in a compact size

11 Energy As A Service
Power without asset ownership risk

12 Manure To Megawatts
Waste-to-energy system preserves dairy farm's legacy

OIL & GAS AND MARINE SECTION

16 Pumping Smarter
Cat® DGB and SPM gear boost uptime in Canada's harshest oilfields

18 The Future of Tug Power
Propulsion system yields 15% fuel savings

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BRIDGING THE GAP

HiVolt Energy delivers reliable, off-grid power

In a world increasingly shaped by electrification and industrial growth, HiVolt Energy is a Midland, Texas-based, power-solutions provider and independent power producer (IPP).

HiVolt is an early mover that has quickly earned a reputation for developing custom solutions delivering reliability, operational excellence, and forward-thinking—particularly in support of industrial applications.

HiVolt Energy was formally launched in 2021, but its roots trace back to 2019 when the company was founded. It was born from a clear and growing need: to deliver scalable, reliable power to industries—especially oil and gas. HiVolt CEO and founder Josh Evans, a veteran of Burns & McDonnell and a power consultant, saw firsthand the challenges large industrial users faced when trying to secure quality power in remote locations.

"I was seeing large power customers in the oilfield building and operating their own electrical systems out of necessity," Evans recalls. "The utility business model wasn't able to respond quickly to remote, large, dynamic, and transient industrial demands. And scalable on-site solutions are temporary and expensive to operate."

That recognition sparked a new idea—why not develop an emission-conscious, regulatory-compliant model able to deliver reliable and efficient long-term power, independent of utility constraints? Thus, HiVolt Energy was born to bridge the power gap.

Developed by engineers, HiVolt's solutions focus on delivering alternatives by leveraging the best available technologies to meet customer needs.

"We found most technologies were designed for temporary applications, or prime power in parallel with grid support," says Tyler Beard, Chief Operating Officer at HiVolt. "To serve long-term power on an island, there are many variables to consider including emissions, transient load response, sparing,

CUSTOMER PROFILE

HIVOLT ENERGY

Location: Midland, Texas

Cat® Equipment: Gas gensets: XQ1475G, XGC1900, G3520; PGS1260 Energy Storage System

Cat Dealer: Warren Cat

"Warren Cat and Caterpillar have been instrumental to our success, they understand what we're doing, and they've helped us build this from the ground up."

JOSH EVANS, CEO, HiVolt Energy

and response. It's a much more challenging application."

With collective team experience in the electric utility, consulting, upstream and midstream markets, the HiVolt team understands the broad set of challenges facing producers, and the technologies available to optimize energy-related operations and expenses, Evans says.

"Our experience crosses the transmission, distribution, substation and generation spectrum—including planning, design, construction, operation and maintenance."

By leveraging this experience, HiVolt Energy provides a unique approach to electrical infrastructure modeled from the midstream industry.

Markets served

Today, HiVolt primarily serves oil and gas operators throughout the Permian Basin—a region that includes both West Texas and parts of New Mexico. HiVolt works with upstream and midstream companies, including drillers and pipeline operators, providing continuous power through isolated and hardened microgrids. But the company's capabilities extend well beyond oil and gas.

"We're applying the experience gained operating isolated microgrids to data centers and other sites," Evans says. "We provide solutions for customers who need large blocks of continuous power on highly utilized systems with both steady and transient load profiles. That's where we shine."

HiVolt's business model is straightforward: Every facility is built, owned, and maintained by HiVolt. This independent model ensures customers don't have to worry about anything related to power, including permitting. In a market sector where downtime is costly, HiVolt delivers where it counts: continuous, dependable power when and where it's needed.

"We only build facilities that we own and operate," Evans adds. "It's part of what makes us different—and it's how we deliver results."

Cat® generators provide power backbone

HiVolt Energy is currently operating multiple facilities, with many more in development. These aren't short-term or mobile setups—they're long-term, or semi-permanent installations with hardened systems required to meet reliability and resilience demands.

"Our primary goal is to be the microgrid provider of choice when it comes to delivering reliable results," Evans notes. "These aren't just temporary fixes. Our facilities are engineered for longevity and with reliability in mind."

At the heart of these systems are Cat® generator sets—which provide durability, performance, and adaptability. HiVolt leverages Cat natural-gas engines in continuous prime-power applications, an ideal solution for remote, off-grid energy needs.

"We looked at multiple technologies to fit our customers' needs, and Caterpillar was the clear choice," Evans says.

HiVolt's early installations used the Cat XQ1475G, a natural gas generator well-suited for continuous load applications. As solutions evolved, the portfolio was expanded to include the more powerful XGC1900 and customized G3520 gensets. The custom G3520s are currently being integrated into new skid packages through Warren Cat, HiVolt's dedicated Cat dealer.

"We just took delivery of the first custom G3520s,"

Continued on page 6

Evans says. “Warren Cat developed a custom skid package for us, which will be deployed moving forward.”

The relationships with Caterpillar and Warren Cat have been more than transactional—they’re strategic.

“Caterpillar and Warren Cat are critical partners of ours,” says Evans. “Warren does the packaging and prep work. They deliver the gensets to sites, help with commissioning, and provide ongoing maintenance alongside our in-house technicians.”

Warren Cat also handles warranty work and major maintenance, sending technicians on site as needed. Their flexibility enables HiVolt to scale operations quickly and reliably—a must in the demanding, high-stakes realm of industrial power.

Uptime and remote monitoring

HiVolt’s operations team is laser-focused on reliability. Customers run 24/7/365, and downtime is not an option.

“We’ve built our systems around reliability by incorporating available technologies and implementing proprietary means and methods developed through our operating experience,” Evans says.

Team members monitor and manage everything through a combination of on-site operations and utilization of remote monitoring technology, using Cat Connect and additional PLCs layered over the system, Beard says, adding: “We don’t man sites 24/7, but our team responds quickly and visits locations daily.”

Cat Connect helps HiVolt remotely monitor engine health and schedule preventive maintenance. For control and power dispatch, HiVolt overlays its own systems for remote login and full operational visibility and control.

“Our customers experience an easy power solution, but delivering the desired outcome is a lot harder than it looks,” Evans emphasizes. “Most anybody can buy a generator and get it to run. Integrating multiple generators and operating them continuously with high reliability—that’s where our experience and a great team really pays off.”

Batteries and advanced microgrid control

HiVolt is also innovating ways to utilize battery storage, integrating units like the Cat PG260—a 1MW/30-minute battery—into its microgrids. These batteries actively support transient load swings, especially when electrically operated drilling rigs (E-rigs) are involved.

“E-rigs introduce large transient loads. The battery helps stabilize the system,” Beard says. “We’ve developed proprietary controls to apply battery technology to increase customer reliability exponentially.”

While they’ve yet to fully adopt the Cat ECS 400 Energy Control System, it’s on their radar. For now, custom PLC-based systems provide needed functionality—but HiVolt expects to incorporate more Cat microgrid solutions in the future.

A growing future

Looking ahead, HiVolt is applying its power solutions to the booming data center industry. These operations, like oil and gas, require continuous, resilient power for large transient loads—but with even stricter uptime and redundancy requirements.

“We’re actively working to develop several data center projects,” Evans says. “It’s an interesting space, and we’re being very strategic about which opportunities to pursue.”

The company’s focus remains on delivering utility-grade power solutions—independent of the utility

grid. Whether it's a remote oilfield or a high-density data center, HiVolt's value proposition is the same: Unmatched reliability, operational excellence and turnkey power solutions.

HiVolt's commitment to owning and operating its own assets sets it apart in a landscape filled with temporary solutions and service providers.

"There are very unique things about HiVolt that nobody else is doing, and we tend to keep a low profile," Evans notes. "There are many companies chasing mobile demand and providing temporary solutions—and many are shifting to a longer-term model. HiVolt has focused on being a long-term dependable answer since day one, which has given us a tremendous advantage in solving very difficult operating challenges."

This cautious, yet confident approach has paid off. Many of HiVolt's customers are repeat clients, resulting in expanded facilities or referrals to those in need of reliable remote power.

"When customers really understand the challenges of developing a reliable, isolated power system, it becomes an easy conversation," Evans says. "We become part of their battle-tested approach to solving complex problems, and any concerns about the lack of grid power quickly fade into the background."

Caterpillar partnership

Evans is quick to acknowledge the critical roles that Caterpillar, and specifically their market development specialist, Denzil Cotera, have played in HiVolt's success.

"In this market, generators are in high demand," Evans says. "Denzil helps us get ahead—finding availability, balancing deliveries, and keeping us in the loop on new technologies. He's been a fantastic partner."

"Warren Cat and Caterpillar have been instrumental to our success," Evans states plainly. "They understand what we're doing, and they've helped us build this from the ground up."

HiVolt Energy represents a new breed of independent power producers—nimble, customer-centric, and fiercely reliable. With a foundation in the demanding oil and gas industry and an eye toward new opportunities, the company is poised for sustained growth.

"We've developed the tools to be the best customized microgrid power provider in the business," Evans says. "Whether it's oil fields, data centers, or other critical facilities in need of consistent, reliable power—we deliver results."

POWER HUB

DESIGN YOUR GENSET IN MINUTES

Have you ever tried to spec a genset from scratch? If yes, you know it involves choosing from hundreds of features. When faced with these choices, many prefer to consult with a trusted rep who understands your application and can help design your genset. But if you want to explore your options on your own, with no phone calls, no waiting, and no pressure, then the Power Hub is the best resource for you.

Just like car shopping has moved online, where you can build the exact model you want from your couch, genset configuration has entered a new era. Power Hub—an online configurator at **power.cat.com**—enables you to tailor a model for your application. It's a streamlined, efficient process that puts you in control. You'll identify exactly what you need. Here's how it works:

STEP 1: Start with your Energy Goals. And the Rest Will Follow.

It's easy to jump straight into picking a product, eager to move fast. But what if a smarter approach could serve you even better? Begin by asking yourself a simple question: What am I trying to achieve? >>>>>>>>>

> **BOOSTING YOUR POWER CAPACITY?**
> **SECURING RELIABLE ENERGY DURING STORMS?**
> **REDUCING YOUR ENERGY COSTS?**

This guided specification tool makes it simple. Just answer a few quick questions, and you'll be matched with an optimized energy solution tailored to your specific needs. It's the easiest way to ensure you're not just choosing a product, but choosing the right one. Now, it's time to find the right genset. Power Hub makes it easy to explore Cat® genset models that match your requirements. From 30kW to 3000kW, choosing the right model is critical.

From there, you can filter models by application type, such as permanent or temporary power, and by fuel type, like diesel or natural gas, where available. If you already know your exact requirements, simply enter them to narrow your options. And if you're not quite sure what size genset you need, the "Help Me Calculate" sizing tool will guide you. You can also reach out to your Cat dealer for personalized support.

STEP 2: Easily Customize Your Options

Once you've selected a model, you're ready to begin tailoring it to your site and specs.

That's where Power Hub sets itself apart from other sizing tools or manufacturer websites. Now you can start choosing the features you want for your genset. The configurator organizes them into categories such as general features, electrical, mechanical, enclosures and tanks. As you move through the experience, if you aren't sure whether you need the feature or what benefits it provides, descriptions will help you make a more informed choice. As you choose options, the configurator dynamically updates to show what's available for your model. No irrelevant choices or dead ends, just a smooth path to the right solution.

Another plus: You can save your configuration and refer to it anytime. There's no danger of losing your work or having to redo it.

STEP 3: Download the Right Docs

Other websites require you to search through endless spec sheets and drawings to find the ones relevant to your genset, but not Power Hub. After you've completed your feature selections, the configurator instantly serves up documentation tailored to your specific build, including 2D and 3D drawings and detailed specifications. It's all in one place, ready to download and print when you need it.

STEP 4: Need Power Now? Instant Access to Available Inventory.

Once you've built your ideal configuration in Power Hub, the tool instantly checks Cat dealer inventories for available units. Even if there's not a perfect match, Power Hub highlights "percentage-match" models that meet 80–90% of your specs and are ready to ship. If speed matters, you can choose an in-stock option to get up and running quickly. Prefer a custom build? Your exact configuration can be built at the factory.

STEP 5: Request A Quote and Timeline

Is it time to buy or build? With just one click, Power Hub sends your complete genset configuration, including every detail you've selected, directly to your local Cat dealer. There's no need to re-explain your power requirements, fuel preferences or feature selections. All information goes straight into the dealer quoting system, so your Cat dealer can pick up right where you left off. A dealer rep will reach out to you to provide pricing and availability with no time lost retracing your steps.

Designing the perfect genset shouldn't be complicated. From start to finish, Power Hub's online configurator makes the process quick and hassle-free. That means you spend less time searching and more time focused on what matters: identifying the right power solution for your needs.

To get started, visit: POWER.CAT.COM

NEW D1500 GENSET

MORE POWER IN A COMPACT SIZE

The new Cat® D1500 diesel generator set provides best-in-class power density by delivering 1.5 MW of standby power from a compact 32.1-liter (1959 cu. in.) C32B engine. It occupies up to 13 percent less floor space and is up to 32 percent lighter than the previous model at this power rating, making it ideal for applications where space is constrained.

The reduced weight provides economic benefits, including lower shipping and installation costs, and it can also reduce setup and structural support requirements. Now available at Cat dealers in North America, the D1500 is designed for a wide range of 60 Hz applications.

Superior Performance for Standby Power Applications

The D1500 generator set offers numerous features, making it ideal for supplying standby power. It conforms to ISO 8528-5 steady state and transient response requirements, thereby ensuring that operational continuity is maintained during power outages or peak load times.

The genset complies with NFPA 110 Level 1 Type 10 standards for fast power restoration during outages. It is UL 2200 3rd-edition certified for both the US and Canada, providing enhanced safety assurance. It also meets the U.S. EPA Tier 2 emission standard for stationary emergency use.

"In this evolving energy landscape where space is frequently at a premium, the D1500's compact size and high power density make it an ideal choice for customers looking to add reliable standby power," said Melissa Busen, senior vice president for Caterpillar's Electric Power Division.

Asset Monitoring and Energy Management:

Customers can remotely monitor, locate, and manage the Cat D1500 generator set through an easy-to-use web interface or mobile app. Available with a subscription, the genset enables users to track performance and troubleshoot remotely, ultimately avoiding costly downtime.

The generator set is equipped with a standard controller that automatically starts the unit during a power outage to deliver reliable backup power. For greater control and efficiency, the D1500 can be configured with a Cat Energy Control System (ECS), which provides enhanced monitoring, remote access, and load management capabilities. Cat ECS controllers also support paralleling and seamless integration with power management systems, making them ideal for more complex standby power applications.

For more information about the new D1500, contact our dealership.

Cleveland Brothers CAT

www.clevelandbrothers.com

CAT® INSPECT

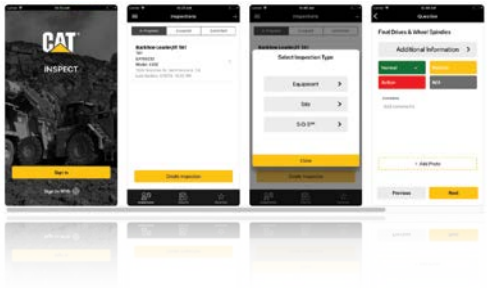
MAKE INSPECTIONS EASY, RIGHT IN THE PALM OF YOUR HAND

This easy-to-use application enables users to download and complete inspections and include additional information such as pictures, comments, and ratings. With engine- specific Preventive Maintenance (PM) checklists, performing recommended services at the appropriate intervals has never been easier. Never lose another paper inspection—complete and share your inspections electronically with Cat Inspect.

- Digital inspections provide real-time information for review, retention, and printing
- Secure inspection results for Cat and non Cat assets in one place
- Red, Yellow or Green ratings provide quick identification of actionable items
- Prioritize repair spend and budget based on inspection results and status
- Help screens available within the inspections provide applicable information
- Assign inspections and review results from various employees
- Add ratings, make comments, and take pictures during inspections
- Integrate with other systems like VisionLink® for a big picture view of your installation

Simplify the inspection process

There is no cost to download the mobile app. The app is available for:

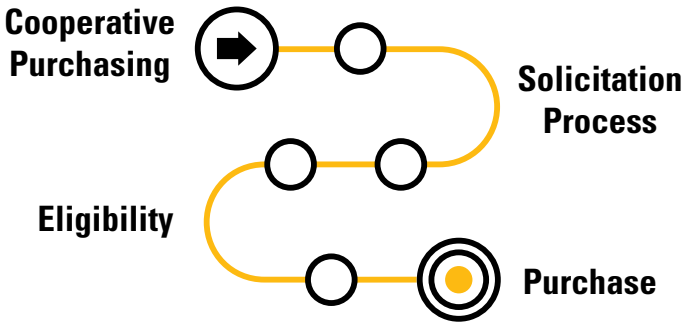


Apple devices on iOS 10 and newer, and Android devices on version 5.2 and newer.

Watch the tutorial videos to get started using the Cat Inspect mobile app or Cat Inspect web at ***cat.com/en_US/support/maintenance/cat-inspect.html***

BUY CAT® ELECTRIC POWER SOLUTIONS FROM SOURCEWELL

CATERPILLAR®



- **Cooperative Purchasing:**
  Enables agencies to access pre-negotiated contracts, streamlining procurement and achieving cost savings through group buying power
- **Solicitation Process:**
  Sourcewell's solicitation process involved public RFPs, ensuring competitive pricing and compliance, then awarding contracts accessible to member organizations nationwide.
- **Eligibility:**
  Available to all government, education and non profit entities.
- **Purchasing:**
  Scan to register with Source**well**, find contract and contact Cat dealer.

EP PRODUCTS

Register to view more inventory

Cat® GC18 DG500

Cat® C2.2 Diesel

Cat® C32

Cat® C7.1 Diesel

WHAT IS IT?

- Offers solutions to completely solicited contracts for government, education, and nonprofits
- Assists in meeting specific needs which are more efficiently delivered cooperatively than by an entity individually

TOP VENDOR

- Caterpillar is the #1 vendor on Sourcewell
- Contract #092222-Caterpillar provides access to all electric power generation equipment

#092222-CAT

OUR DEFINITION OF WINNING

- **Reliable:**
  Trusted process, satisfy bidding steps, high quality Cat products
- **Quick:**
  No-cost registration, completes steps for you, finds the best bid
- **Informative:**
  Control cost, manage risk, full catalogs, buying power of 50,000 agencies, volume discounts

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CAT® CVA GENERATOR SERVICE CONTRACT

Industry studies show that nearly 90% of the time, generator failures could have been prevented—and that's money out of your pocket.

Protect your generator set investment and peace of mind with a service contract designed to ensure your power equipment performs. With a Cat® Customer Value Agreement (CVA), you get a tailored generator service agreement between you and our dealership for a hassle-free ownership experience.

You benefit from individualized solutions for your power system, such as parts, services, and digital enablers. Our CVAs range from convenient planned maintenance to total cost performance guarantees.

CVA customers develop a relationship with their Cat dealer to optimize their generators and operations. Partner with a team that keeps your costs down and your power up with customized options. Modify your CVA service contract at any time.

Coverage without interruption-Extended Service Coverage

- Protect your investment with coverage for parts and labor expense on covered components.
- Avoid unexpected repair costs caused by unscheduled repairs.
- Budget for unexpected repairs and lock in costs up front.
- Ensure repairs are done right the first time, with factory-trained technicians using genuine Cat parts.
- Return your electric power systems to their original operating specifications, meeting all requirements for safe use and environmental compliance.
- Combine extended service coverage (ESC) with a Customer Value Agreement for complete maintenance and repair protection.

A variety of coverage options

New ESC: Coverage for electric power prime generator sets is available in 24- to 60-month terms (24- to 120-month terms for standby generator sets and automatic transfer switches), if purchased before the end of your factory warranty.

Advantage ESC: Coverage is available in 12- to 60-month terms after the end of the factory warranty period and before the first overhaul. Coverage can be extended up to 25 years from delivery date for standby generator sets, and up to 10 years for prime.

Overhaul ESC: Coverage is available in 12- to 60-month terms after a qualifying overhaul has been completed by an authorized Cat dealer in accordance with the Overhaul ESC Checklist.

Get more out of your power system by minimizing downtime and extending the life of your generator with our preventative maintenance contract.

Contact out dealership to learn more about coverage level flexibility, allowances and long-term options, or go to: cat.com/epsupport.

ALL THE CAT PARTS YOU NEED. ALL IN ONE PLACE.

With **Parts.Cat.Com**, all the genuine Cat parts you need are just a few clicks away. It's the next evolution in buying parts online, and it's easier than ever.

PARTS.CAT.COM ENABLES YOU TO:

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- CHECK PARTS AVAILABILITY
- COMPARE SPECIFICATIONS
- CHOOSE DELIVERY OR PICK UP FROM YOUR DEALER PARTS STORE
- SHOP CAT REMAN AND CAT CLASSIC PARTS OPTIONS
- VIEW ELECTRONIC PARTS MANUALS

Start shopping today at

parts.cat.com/en/clevelandbrothers

Cleveland Brothers CAT

ENERGY AS A SERVICE

POWER WITHOUT ASSET OWNERSHIP RISK

Energy as a Service (EaaS) is a way to consume energy that can be at little to no cost for your business.

An energy solution, which can include multiple electric power assets such as diesel or gas generator sets and renewable energy sources, is installed at your site(s) but owned by a third-party investor who is responsible for servicing and maintenance.

What's in it for you?

- Your business can benefit financially from the energy savings and income generated by the onsite assets.
- You receive a resilient energy solution that provides emergency backup power.
- Depending on your energy mix, your solution could also help you achieve your sustainability and emissions goals.
- With EaaS, you typically do not own the power generation assets, reducing your energy risk. However, alternative options such as 100% ownership, financing, and rent or try-before-you-buy are available.

Deliver with Cat® AMP

The Cat® Active Management Platform (AMP) is a Distributed Energy Resource Management (DERM) software installed with power generation assets to monitor energy market conditions. It accurately predicts opportunities to lower energy costs for sites with natural gas gensets, renewable power generation, energy storage, or microgrids.

The distributed energy Cat resource management platform has been successfully used for more than a decade by thousands of end users to monitor, manage, and monetize their mission-critical DER assets. The AMP platform in private label format is also used by leading energy providers, including investor-owned utilities (IOUs), municipal utilities, and energy retailers to gain system-wide DER visibility and control using those insights to enhance customer engagement.

Operational Experience

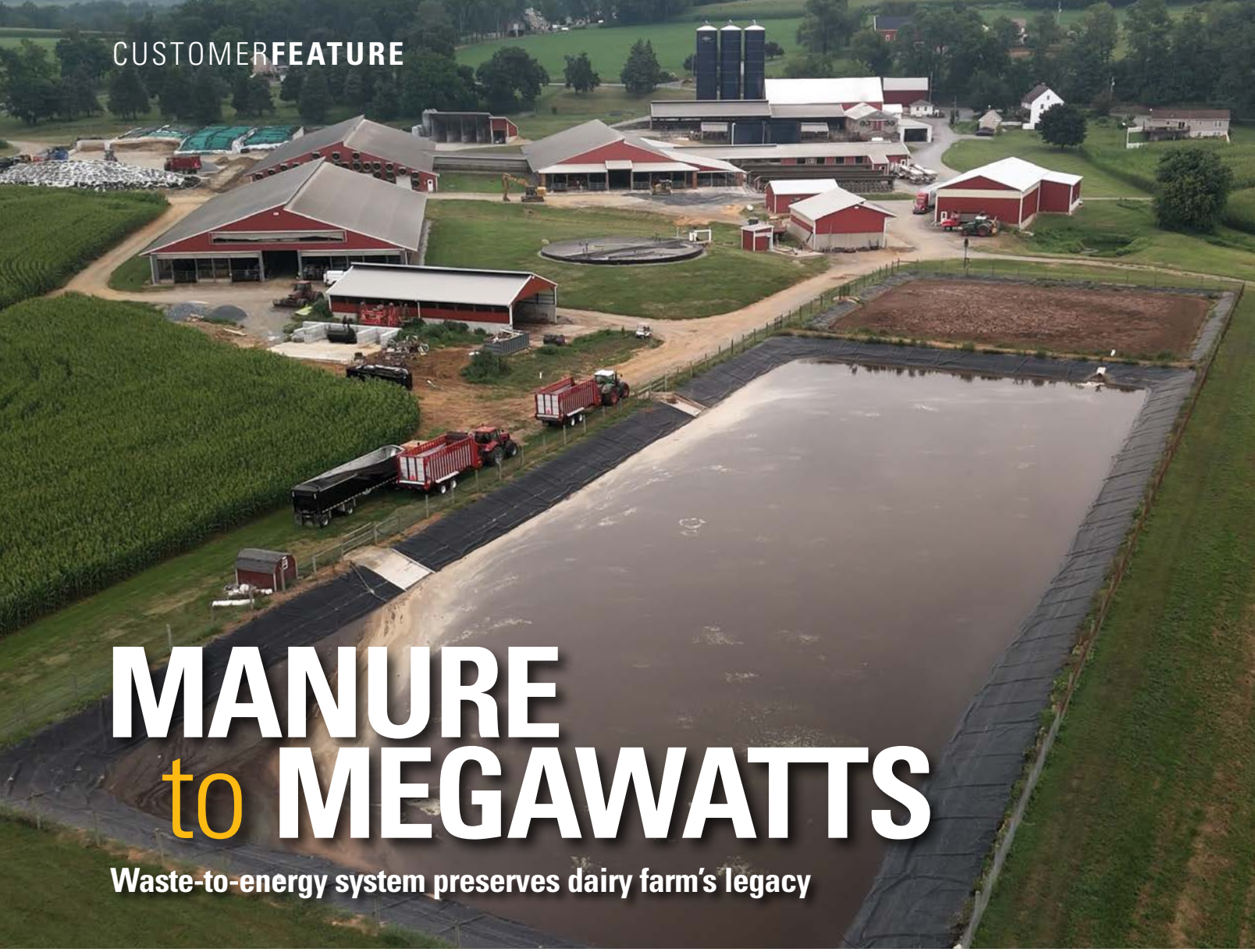
The service areas of energy providers and the energy systems of large commercial, industrial, and institutional energy users are complex, mission-critical resources. Gaining on-site vendor access to these systems, let alone project development approval, can takes years and is beyond the capabilities of many EaaS technology providers.

As a result, many EaaS systems lack the level of DER integration needed to holistically manage and monetize DER systems. For more than 20 years, the Cat AMP team has been a trusted energy solutions provider to some of the world's largest commercial, industrial, and institutional customers.

How it works

When power consumption is high and energy costs soar, Cat AMP can automatically dispatch onsite assets (also known as Distributed Energy Resources, or DERs) so your facility is not entirely running on grid power.

To learn more about how Energy as a Service and Cat AMP can help you save on energy costs, contact the power systems specialists at our dealership.



MANURE to MEGAWATTS

Waste-to-energy system preserves dairy farm's legacy

In the rolling hills of southeastern Lancaster County, Pennsylvania, the Wanner Farm has stood as a fixture of agricultural life since 1840. Known locally as Wanner's Pride-N-Joy Farm, this ninth-generation dairy operation has weathered changes in farming, technology, and economics over nearly two centuries.

The Wanner family's deep roots in the area predate the Civil War. Owner Alfred Wanner, the sixth generation to work the land and tend the herd, recalls the farm's humble beginnings.

"We've moved a couple of times over the years, but this is where our branch of the family has established deep roots," he says. "If Lancaster County were its own state, it would rank fifth in the nation in dairy production. It's a good place to be a farmer and raise a family."

By the early 2000s, the operation had grown far beyond the 60–70 cows Alfred and his wife once managed. His son, John, returned to the farm after college, eager to expand and modernize. That growth, however, raised questions about environmental responsibility and maintaining good community relations.

"We wanted to have a big operation that didn't offend our neighbors," Alfred recalls. "Odor was one of the big things. We wanted to be environmentally friendly and derive an income stream from a waste product."

CUSTOMER PROFILE

WANNER'S PRIDE-N-JOY FARM

Location: Narvon, Pa.

Cat® Equipment: G342C Gas Engine

Waste-to-energy

In the mid-2000s, the Wanner family took a leap that would blend its heritage with cutting-edge sustainability, installing a methane digester and a generator powered by a repurposed Cat® diesel engine to transform cow manure into renewable energy as part of a Combined Heat and Power (CHP) system.

The seed for the project had been planted decades earlier during the energy crisis in the late 1970s.

"I first started reading about methane digestion in 1979," Alfred says. "At the time, it wasn't economically feasible. But when we expanded our farming operation, the timing was right to get serious about it."

John Wanner, who is now the seventh-generation head of the farm, was instrumental in making the digester a reality.

"When I was in college, I took manure management classes and studied environmental sciences," he recalls. "I was really interested in the potential benefits of biogas. As we expanded, I saw an opportunity to capture methane gas, create electricity, and reduce odor. It was a win-win."

The family worked with experts from Pennsylvania and California to design the system, securing financing through grants and the sale of carbon credits.

The farm received state and federal grants that covered about 40 percent of the total cost. The remainder came from a mix of farm capital and revenue from a renewable energy credits (REC) contract with Native Energy, a public benefit corporation.

Cat engine a workhorse

At its core, the Wanner system is fundamentally simple: cow manure is collected from the dairy herd—now about 800 cows—and piped underground into the digester tank. In this oxygen-free environment, bacteria break down the organic material, producing methane-rich biogas. That gas feeds directly into a heavy-duty G342C Cat engine, which was repurposed from its original application powering either a truck or an old D8 Dozer.

"This old Cat engine is a workhorse," John says with a grin. "It's capable of producing 130 kilowatts per hour (kWh), but we run it consistently at about 120 kWh. It runs 24/7, all year long. We're so used to the sound, we don't even notice it anymore."

The Cat engine was originally built for demanding industrial applications, such as powering heavy equipment or hauling freight. Its robust design and tolerance for less-than-perfect fuel make it a perfect candidate for a biogas application.

"This engine is probably one-of-a-kind in how well it runs on biogas," John says. "It's been overhauled a few times for scheduled maintenance, but it's still the original engine we installed in 2007. I dread the thought of ever having to replace it."

Continued on page 14

"When I was in college, I took manure management classes and studied environmental sciences. I was really interested in the potential benefits of biogas. As we expanded, I saw an opportunity to capture methane gas, create electricity, and reduce odor. It was a win-win."

JOHN WANNER, PARTNER
Wanner's Pride-N-Joy Farm

The farm utilizes Cat AMP, a real-time tool for managing distributed energy resources. Cat AMP not only monitors the output from the farm's biogas CHP system, but also real-time energy prices.

John chuckles when asked if the engine has a nickname. "We just call it 'The Cat,'" he says. "It's very reliable. It purrs along, literally. It's been great for us."

Unlike newer systems that require expensive scrubbers to clean biogas before it can be used, the Wanner's old engine runs on what John calls "dirty gas"—moisture and all.

"A newer generator would need pre-treated gas, but this one can handle it," he says. "That makes our operation simpler and more cost-effective."

"Energy prices go up and down, but having our own generating capacity gives us some insulation from that volatility. And with methane digestion, we're reducing the amount of carbon going into the air. People want to buy that benefit. It's why we're able to sell carbon credits."

ALFRED WANNER, OWNER
Wanner's Pride-N-Joy Farm

Waste heat from the engine is used to heat the digester, which enables bacteria to produce methane. The waste heat also warms the farm's milking parlor and shop during the colder months.

As part of its forward-looking approach, Wanner Farm is also utilizing Cat AMP (Active Management Platfrom), a real-time tool for managing distributed energy resources. Cat AMP not only monitors the output from the farm's biogas CHP system, but also the entire facility.

As part of a recent expansion of the utility service, which the generator cannot cover, Cat AMP helps the farm monitor additional energy usage, providing notifications if there are potential peak events in their area. Thus, the farm can reduce its load to avoid those high-priced, peak usage energy charges. Cat AMP also shows real-time energy pricing and forecasts day-ahead pricing, so the farm can make smart decisions regarding its energy usage.

Environmental Benefits

The digester delivers multiple environmental benefits. First and foremost, it prevents methane—a greenhouse gas 25 times more potent than CO_2—from entering the atmosphere.

"With methane digestion, we're reducing the amount of carbon going into the air," Alfred notes. "People want to buy that benefit. It's why we are able to sell carbon credits."

Over the years, Wanner Farm's carbon credits have been purchased by entities ranging from airlines to celebrities looking to offset some of their emissions.

"It could get to the point where farmers might make more money selling carbon credits than selling crops," Alfred speculates.

The digester also dramatically reduces odor.

"When we apply manure to the fields now, our neighbors barely notice," John says. "One neighbor even told me, 'You were hauling manure all day and I didn't even know it.' That's what we want—good neighbor relations."

When it comes to soil health, the process transforms nutrients into more plant-available forms, reducing runoff and protecting water quality.

"The ammonium nitrogen is more readily available to the corn when it needs it in the spring," John explains. "We're keeping nutrients where they belong—on the land, not in the streams."

Financial Impact

From a business standpoint, the digester and generator have made a tangible difference. In the early years, Alfred estimated the farm saved about $35,000 annually on electricity. Today, those savings exceed $50,000. The farm sells all of its generated electricity back to the grid.

"Our power provider cuts us a check for any surplus once a year," John says. "For half the year, we produce four times more power than we need, which offsets the other half when our energy use is higher—especially April through October when fans are running."

While the revenue is important, the Wanners also value the stability it brings.

"Energy prices go up and down," Alfred says, "but having our own generating capacity gives us some insulation from that volatility."

An added benefit to the biogas and CHP solution is that the system provides resiliency if grid power is lost, so that farm operations can stay up and running 24/7.

As the original renewable energy credits contract winds down, the Wanners are exploring new opportunities in the sustainability marketplace.

"We'll be looking at selling credits again," John says. "The value seems to be increasing, and it's a good way to add revenue while doing something good for the planet."

For other farmers considering a similar investment, John offers pragmatic advice: "It's a great idea if you have someone who can manage it. The digester is like a living organism—you're feeding bacteria, just like you feed your cows. And financing can be a challenge. You need to work with lenders who understand the many benefits, not just the hard financial numbers."

From heritage to innovation

The Wanners are also thinking about the next generation of family farms, and how the effective use of technology plays a role. John's grandchildren, who represent the ninth generation, are already growing up on the farm, surrounded by the steady hum of the generator.

In many ways, the methane digester project embodies the Wanner family's approach to farming: Respect the past, but embrace innovation when it serves both the business and the broader community.

As the old Cat engine continues to crank out heat and power, converting manure into megawatts, the Wanner Farm remains a link to Pennsylvania's agricultural past, and a model for its sustainable future.

"We took what was considered a waste product and made it into an energy source," John says. "It's renewable energy, it's good for the environment, and it's good for our bottom line. That's hard to beat."

Methane Digester (Center of photo)

PUMPING SMARTER

Cat® DGB and SPM gear boost uptime in Canada's harshest oilfields

As a full-service provider of cementing, coil tubing and fracturing services, Trican Well Service Ltd. is committed to investing in new and integrated solutions that can help improve operational efficiency and support climate-related objectives. The company strives to pump more each day without increasing costs, and is proactively using natural gas to curb diesel consumption and reduce greenhouse gas (GHG) emissions.

Fuel efficiency and on-site availability are especially important given the remote locations and brutal below-zero temperatures in British Columbia and Alberta where the company operates. With these challenges in mind, Caterpillar Oil & Gas has enabled Trican to continuously modernize operations and embrace alternative fuel, while maintaining reliable performance in the harsh operating conditions.

To improve operational efficiencies, Trican required a comprehensive site solution that would maximize uptime, optimize wellsite performance and displace higher-cost diesel. The company collaborated with Caterpillar Oil & Gas to develop an advanced, comprehensive solution aligned with the company's full-service approach to the oilfield.

Fueling Growth While Lowering Costs

For more than 30 years, Trican has trusted Cat and SPM technologies and services to support pressure pumping operations in challenging conditions, while implementing the latest technology upgrades that support climate-related targets.

Trican was the first to trial the Cat® 3512E Dynamic Gas Blending™ (DGB) engine in its region and has since deployed more than 75 3512E DGB T4 engines across its fleet, making it Canada's largest lower-emissions fracturing fleet.[1]

"As the cost of natural gas is significantly less than diesel, Cat DGB technology helps us substantially reduce fuel spend, ensuring a readily available fuel source on-site, while supporting our transition to natural gas as the company's primary fuel," said Trican's Vice President, Fracturing, Jim Rukin.

CUSTOMER PROFILE

TRICAN WELL SERVICE LTD.

Location: British Columbia and Alberta, Canada

Segment: Well Services

Solution: Comprehensive sitewide solution encompassing DGB T4, transmission, high-performance frac pump and pump consumables as well as frac iron

"DGB technology is fueling growth without the cost," added Ty Sutherland, Hydraulic Fracturing Division Manager for Trican. "We used to bring 30,000 liters of fuel to a site each day, and now we do that every three days. We've also seen improved pump times and efficiency by integrating Cat engines and SPM pumping technologies."

In addition to the Cat 3512E DGB T4 engines, Trican also operates the Cat TH55-E90 transmission in its pressure pumping operations. It's the company's transmission of choice due to its smaller footprint and ability to run 20,000 to 25,000 hours before requiring an overhaul. The well services leader also uses several SPM technologies in the field, including QEM 3000 pumps.

To further enhance operational efficiency from pump to wellhead, the company was the first in Canada to utilize the SPM Large Bore to eliminate excess iron and reduce rig-up time. Trican also uses the high-performance pump consumable SPM EdgeX carbide seats throughout its pump portfolio for extended service life, reduced NPT and lower operating costs.

Consistent, Full-Service Approach

Trican continues to experience long-term benefits resulting from the application of both Caterpillar and SPM innovations working seamlessly as a total site solution for consistent durability, efficiency and longevity.

Cat DGB technology has delivered an average diesel displacement rate of up to 70%, with up to 85% peak diesel displacement under certain operating conditions. This important fuel flexibility has helped Trican decrease its diesel consumption and operating costs in addition to supporting the company's GHG emissions reduction goals.

The DGB engine also enables the well services company to operate near continuous duty under the harshest seasonal operating conditions. Combined with 3,000-horsepower capacity QEM pumps capable of withstanding high pressures ranging from 12,000 to 13,000 psi, operators have extreme confidence in Trican's systematic approach to achieving consistent operational excellence.

"Using a broad range of Cat and SPM solutions enables us to lower fuel consumption and costs without sacrificing high performance, so we can continue to meet growing global energy demands as the industry evolves."

TODD THUE,
COO, Trican Well Service

Poised to Meet Energy Demands Today and Tomorrow

Keeping pace with the oil and gas industry's changes requires a relentless commitment to innovation and continuous improvement. Utilizing solutions that are purpose-built for demanding conditions provides the rugged durability and operational efficiency Trican requires to continuously optimize costs and support climate-related objectives.

"Using a broad range of Cat and SPM solutions enables us to lower fuel consumption and costs without sacrificing high performance, so we can continue to meet growing global energy demands as the industry evolves," said Trican's Chief Operating Officer, Todd Thue.

[1] *Trican Well Services. https://tricanwellservice.com/trican-deploys-canadas-first-low-emissions-fracturing-fleet/*

THE FUTURE OF TUG POWER

Propulsion system yields 15% fuel savings

CUSTOMER PROFILE

SVITZER

Location: Australia

Segment: Tug

Solution: Cat® 3516E with SCHOTTEL SYDRIVE-M

Scope of engine use: Cat® 3516E Engine

Today's tug operators need propulsion solutions that deliver heavy-duty performance, while also meeting an evolving set of requirements. Advanced technology is pivotal to help them achieve those goals.

As one of the world's largest tug operators, Svitzer operates a fleet of 400 vessels that serve approximately 2,000 customers in 141 ports and 40 terminals across 37 countries. The company is committed to the decarbonization strategy it announced in 2022, and notable progress has been made toward a 50% reduction in its fleet's carbon dioxide (CO_2) intensity by 2030.

Collaboration is key to supporting such ambitious objectives. Svitzer and Caterpillar Marine have worked closely together to identify innovative ways to lower the maritime operator's greenhouse gas (GHG) emissions. Svitzer also sought to further modernize its direct-driven vessels and approached SCHOTTEL, a manufacturer of advanced propulsion technologies, to supply a new type of hybrid propulsion system that enables reduced fuel consumption and related emissions.

SYDRIVE-M and Cat 3516E Complement Each Other

SCHOTTEL's portfolio provides hybrid propulsion systems for applications with highly variable power ranges. One of them is SYDRIVE-M, a variable and purely mechanical hybrid propulsion system that connects a vessel's port and a starboard-mounted azimuth thruster. The efficient system enables just one of the main engines to drive both thrusters

during transit, which delivers improved fuel efficiency for the operating engine while the second engine is shut down. This innovation delivers the power needed for the vessel to transit at optimal speeds while increasing fuel efficiency and saving on operating costs due to reduced overall running hours. SCHOTTEL and Svitzer had previously worked together on SYDRIVE-M as a mechanical hybrid solution tailored to Svitzer's requirements.

When it came to customizing Svitzer's new vessel series destined for Australia, two SCHOTTEL Rudder Propellers type 490 ZYFP with this innovative system were selected. As advanced engine technology was needed to support the system and attain the desired outcomes, Caterpillar Marine introduced the Cat® 3516E high-performance marine engine into the project. This engine implements an innovative, sequential turbo air system that can deliver excellent torque at low RPMs, enabling one engine to drive two propellers at normal transit speeds, as well as during firefighting operations. In order to exploit the performance advantages even further, the SYDRIVE-M is equipped with a shaft line that is uniquely tailored to the Cat 3516E engine.

For added system simplicity, 3516E engines are provided with opposite directions of rotation. This unique functionality simplifies the connection between engines and thrusters, eliminating the need for an additional gearbox between the thrusters and a commonly associated energy loss.

A Solution for Azimuth Stern-Drive (ASD) Tugs

Svitzer gained several advantages through pairing the SYDRIVE-M with the 3516E. Significant design and construction modifications weren't required to implement the technology. As the dimensions of the 3516E high-performance engine are very similar to the standard 3516E engine, the space requirement is essentially identical from an engine perspective. The SYDRIVE-M connection between the upper gearboxes by means of the shaft line also required no design or construction modifications.

Following the first series of vessels launched incorporating the 3516E with the SYDRIVE-M propulsion system, tests were conducted onboard the SVITZER BILBY to validate the anticipated results. At a transit speed of eight knots, the tests demonstrated that the system reduced fuel consumption by up to 15%, depending on engine RPMs.

Operationally, the system also enables Svitzer to augment the tug's firefighting capabilities without compromising maneuverability. In firefighting operations, one engine can power both thrusters, enabling full maneuvering capabilities, while the second engine provides power required for the fire pump. In contrast to conventional FiFi Tug setups, this concept eliminates the need for additional, costly components, such as heavy-duty slipping clutches as well as utilization of controllable-pitch propellers.

The improved fuel consumption, maintenance optimization and operational benefits Svitzer has experienced in nine tugs with the successful pairing of the SYDRIVE-M system with the 3516E high-performance engine, means the company is actively looking at installation of this configuration in further new-build tugs for harbor and terminal operations, as part of their wider assessment and decision making process.

SYDRIVE-M: A practical solution

The 3516E engine provides vessel operators with fuel flexibility, enabling ships to be powered by marine gas oil (MGO), renewable diesel (hydrotreated vegetable oil or HVO) or biodiesel (fatty acid methyl ester or FAME), which can further reduce lifecycle GHG emissions.[1] This fuel flexibility empowers vessel operators to modernize their boats while continuing to advance their climate-related objectives.

The SYDRIVE-M mechanical hybrid solution paired with the Cat 3516E engine provides a practical and cost-effective way for modernizing tugs to reduce operating expenses and GHG emissions while improving operational capabilities. The SYDRIVE-M is simple to implement and operate and is ideal for transit distances over five miles (as in this operational profile), and in the case of fire-fighting capacity requirements, without compromising on maneuverability. SYDRIVE-M also is advantageous in light operation modes where the two main engines do not require full power, as well as in full thrust mode where the connection between the engines is disengaged, resulting in a conventional setting with one engine powering one azimuth thruster.

[1]Biofuels do not significantly reduce CO_2 emissions at the tailpipe, but switching to biofuels will reduce lifecycle greenhouse gas emissions compared to diesel. Lifecycle emissions are reduced through the use of biofuels because the source of the carbon is biogenic, meaning carbon emitted from burning the fuel today consists partly of carbon previously captured from the atmosphere by the fuel's source. However, emissions at the tailpipe are essentially the same as diesel.

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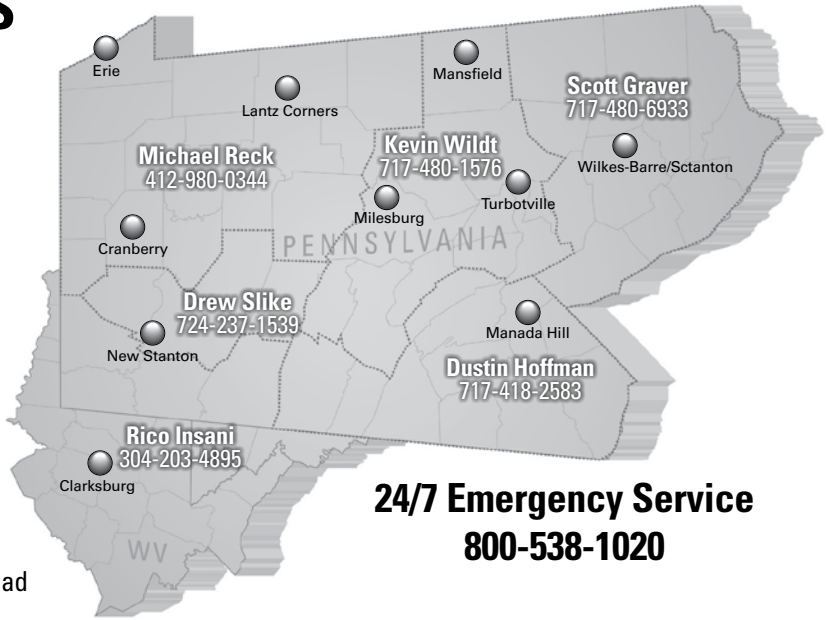

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