A Cat® Dealer Publication for Power Professionals SPRING 2026

RUNREADY™

POWERFUL Mission

Cat® generators support homeless campus dedicated to transforming lives

CHP FOR DATA CENTERS

Reusing waste heat for cooling through absorption technologies can increase system efficiency 80 to 90%

CAT® 3516E DIESEL GENERATOR

High power density in a compact footprint that ships and installs with ease

Cleveland Brothers CAT®

FROM THE EDITOR

POWERING CHANGE

This issue of ***RunReady*** explores two powerful dimensions of energy: its role in sustaining human lives—and its potential to reshape the future.

In San Antonio, a 22-acre campus that supports homeless people and returns them to a more stable existence is redefining what resilience looks like. Haven for Hope operates as a 24/7 mission where stability includes something fundamental: reliable power. As detailed in our feature, Cat® generator sets—supported by dealer HOLT CAT®—ensure that critical systems remain online, safeguarding more than 1,400 residents and enabling life-changing services to continue without interruption.

From there, we turn to Saint Paul, Minnesota, where innovation is advancing at utility scale. In collaboration with District Energy St. Paul and the U.S. Department of Energy, Caterpillar successfully demonstrated a 2.0 MW combined heat and power system operating on 100% hydrogen—marking a significant step toward lower-carbon, fuel-flexible energy solutions.

Together, these stories capture the evolving role of power: delivering certainty in moments of vulnerability, while driving progress toward a more sustainable energy landscape. Whether supporting communities in need or pioneering new fuel pathways, the common thread is clear—reliability today, readiness for tomorrow.

DID YOU KNOW?

NERC WARNS OF 2028 CAPACITY SHORTFALLS

With peak demand set to surge over the next decade, The North American Electric Reliability Corporation (NERC) continues to sound the alarm about the health of the country's power grid, warning of potential grid shortfalls as early as 2028.

Regions at the highest risk of energy shortfalls include those managed by the Midcontinent Independent System Operator (MISO), PJM Interconnection, the Electric Reliability Council of Texas (ERCOT) and significant portions of the Western Electricity Coordinating Council (WECC).

"Electricity peak demand and energy growth forecasts over the 10-year assessment period continue to climb higher than at any point in the past two decades," the report said.

NERC now forecasts that summer peak demand will grow by 224 GW over the next 10 years— an increase of more than 69% compared with its 2024 predictions. It expects winter peak demand to swell by 246 GW during the same timeframe.

Much of the demand growth is expected to come from data centers, which are being built rapidly to support the expanding use of AI-powered applications. Cryptocurrency, hydrogen fuel plants and other large loads were also cited as contributing to increased demand.

2 GW OF GAS GENERATION FOR WEST VIRGINIA DATA CENTER

Caterpillar has signed an agreement to supply 2GW of fast-response natural gas generation capacity to American Intelligence & Power Corporation (AIP) for its flagship Monarch Compute Campus in West Virginia.

AIP has ordered Cat® G3516 fast-response natural gas generator sets to support the initial phase of the Monarch Compute Campus in Mason County, Va. Deliveries are scheduled from September 2026 through August 2027. On-site support will be provided by Boyd CAT.

The fast-response generation equipment will be augmented with battery energy storage systems designed to handle the extreme load swings of AI data centers. The Cat equipment and battery systems are expected to be commissioned and ready to deliver power within a few months of equipment delivery, supporting Monarch's accelerated time-to-market strategy that meets rapidly growing power demand from data centers.

"This strategic alliance reflects a shared commitment to delivering reliable, scalable, and capital-efficient power solutions on an accelerated timeline," said Daniel J. Shapiro, CEO of AIP. "Our design is purpose-built for AI data center operations, combining fast-response natural gas generation with battery energy storage to manage rapid load variability and deliver consistent power quality at scale."

Further phased expansion is planned over time, with total capacity expected to reach up to 8GW. The Monarch Compute Campus is designed as a fully self-supplied, behind-the-meter power platform, generating electricity onsite without the need for incremental utility transmission or distribution infrastructure.

Cat G3516 fast-response natural gas gensets are well-suited for behind-the-meter data center applications due to rapid start capability, load-following performance, and high reliability in continuous-duty operation. The G3516 platform can ramp up from zero to full load in approximately seven seconds, supporting AI-driven workloads characterized by rapid load fluctuations and stringent data center power quality requirements.

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Just like a transformer turns raw power into livable power, Haven for Hope turns raw survival for those experiencing homelessness into a meaningful next chapter—not in a flash, but through a system designed to convert instability into forward motion.

FEATURES

Cover Photo: Marie Langmore

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POWERFUL Mission

Photo: Marie Langmore

Cat® generators support homeless campus dedicated to transforming lives

The first thing you notice about Haven for Hope is the scale of the 22-acre campus, which looks like a small town. The multi-faceted homeless shelter located on the western edge of downtown San Antonio is designed to help people stabilize their lives and start over.

"Our job at Haven for Hope is to work with people who are unhoused and move them either from the streets or from unstable living situations into new housing and, frankly, new lives," says Rhonda Mundhenk, president and CEO. "We believe that we are in the business of transformation."

By way of analogy, think of an electrical transformer as the quiet piece of infrastructure that makes power usable. On the grid, electricity is like raw potential—high voltage, moving fast, dangerous to touch, and not something a building full of people can plug directly into. A transformer doesn't create the electricity. It steps it down, stabilizes it, and shapes it into a form that's safe and practical—the kind of power that can light hallways, run HVAC, and make a building feel secure.

In a very real way, Haven for Hope plays that same role in people's lives.

People don't arrive here as blank slates. They arrive carrying negative energy—pressure, trauma, chaos, exhaustion, and sometimes fear. Not bad people. Just lives running at a level that isn't sustainable without help. Haven doesn't generate hope out of thin air. It receives people where they are in life, then provides the steady, step-down process—safe shelter, a real address, ID support, healthcare, workforce pathways, child care, basic dignity—so that what's already inside someone can become stable, focused, and useful again.

Just like a transformer turns raw power into livable power, Haven turns raw survival into a meaningful next chapter—not in a flash, but through a system designed to convert instability into forward motion.

"It's all of the things that you need to live your life, in a small community," Mundhenk says.

CUSTOMER PROFILE

Haven for Hope

Location: San Antonio, Texas

Cat® Equipment: D1000 GC & D600 GC diesel gensets

Application: Standby Power

Cat Dealer: HOLT CAT®

A 24-hour mission

But there's a requirement that sits underneath every service, every safe bed, every hot meal, every next-step appointment on this Texas-sized campus: the lights have to stay on.

Haven for Hope operates around the clock because hardship can arrive at any time. The campus receives individuals and families directly from the streets—including children and older adults—often at the exact moment the weather turns challenging and dangerous.

"We are a 24-hour mission," Mundhenk says. "Homelessness does not have a schedule, so we always need to be ready to receive people without a home and serve their basic human needs."

That readiness depends on reliability. For Peter Ramirez, director of facilities and logistics, the definition of acceptable downtime is simple: "We serve children and families—they come to Haven because they are in need of help—so our downtime must be zero."

When power is interrupted, the impact isn't just operational—it's human. A sudden outage can be unsettling for people already carrying the weight of experiencing homelessness, and it can compromise the feeling of safety that Haven staff works diligently to provide.

"Our dorm can't go offline; that could create some trauma for our clients," Ramirez says.

The campus has critical systems that can't go dark—security, HVAC, IT infrastructure and day-to-day building operations. Based on recent experience, the risks have only become more real.

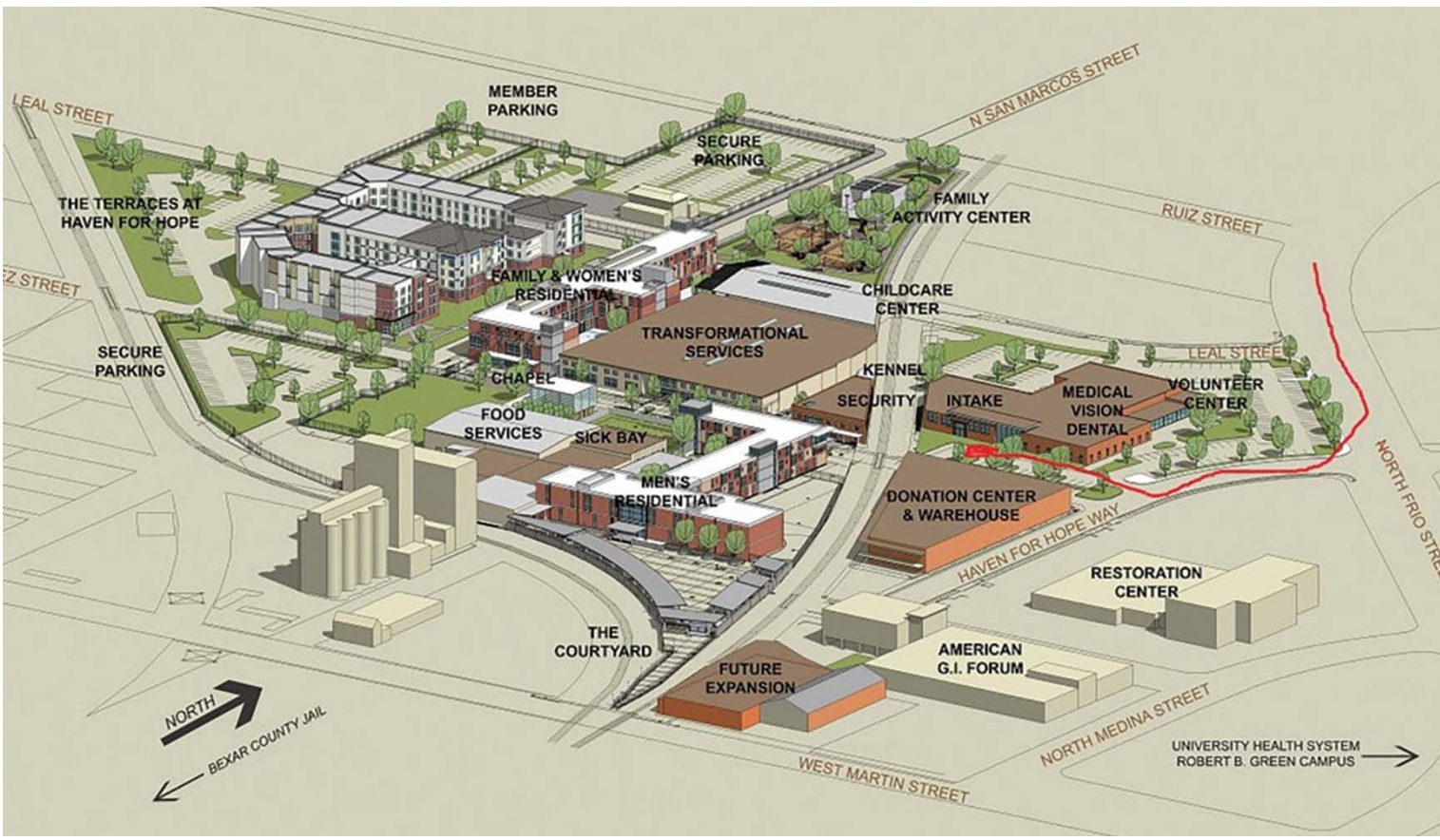
> **"The Cat generators help us keep that promise of providing a 24-hour mission, and a place for people to come that is safe, welcoming and restful."**
>
> **RHONDA MUNDHENK,** PRESIDENT AND CEO
> Haven for Hope

"We've had some past outages," Ramirez says, pointing to a recent transformer outage that affected the facilities. He also noted unpredictable weather events that have hit South Texas, such as Winter Storm Uri in 2021, which created havoc across the state.

The impetus for establishing Haven for Hope was Hurricane Katrina, which caused many evacuees impacted by the devastating 2005 hurricane in New Orleans to temporarily relocate to San Antonio.

"At the time, a number of community leaders began to ask the question, 'If we can do this for strangers who are coming

Continued on page 6



into the community, why can't we do something for folks who live here, who are unhoused and living amongst us?'" Mundhenk said.

With help from public leaders and private donors, Haven for Hope was established in 2010. Two years ago, Haven took steps to strengthen its resilience by installing two Cat® standby diesel generators, supported by the people who know the community best, HOLT CAT®.

1.6 MW of reassurance

The Cat dealer has supported Haven for Hope through various charitable donations. But this project demonstrates Holt's commitment in iron-clad terms. The dealership donated a D1000 GC diesel generator set that provides backup power to the dormitory wing. The 1 MW unit is designed to keep the facility operational when utility power fails. Another Cat genset, a D600 GC, provides backup power to the food bank.

For electric power business manager Tom Angotti, it's not a one-time donation. It's part of how HOLT CAT sees its role in the community.

"HOLT CAT is a values-based organization, and we're here to serve the communities that we work and live in," he said. "We believe that uplifting individuals and providing pathways toward self-sufficiency is a key part of our dealership's mission."

Angotti points to the scale of Haven's mission—more than 1,400 people live temporarily in the complex—as a reminder of what's at stake when the grid goes down.

"This generator set is just one of those items that helps ensure that the 1,400-plus people who are here are able to continue receiving the help and education they need to be successful in life," he says.

When the grid falters, the mission doesn't. Backup power can feel like an abstract investment—right up until the moment it's needed. Mundhenk recalls one recent instance when Haven needed them.

"In the relatively short time that I've been here, we had one instance in which the generators demonstrated their value, and they kicked on beautifully," she recalls. "It was actually during a recent cold snap, and that backup power kept our families warm."

The best part, she added, is that the transition was smooth and seamless.

"The response was instantaneous and uninterrupted, and nobody knew that we had an interruption except our facilities department," Mundhenk says.

That's the goal at a campus like this: making sure a power outage doesn't become a life-altering event.

Aftermarket service

A generator's value isn't measured on the day it's commissioned. That's why HOLT CAT's involvement didn't stop when the equipment arrived on site.

"There is a Customer Value Agreement (CVA) attached to that generator set," Angotti says, referring to a service agreement designed to keep maintenance routine and reliability high. "It's mechanical, so it needs maintenance,

and a CVA enables that piece of equipment to ensure the reliability for the life of that generator set."

Ramirez credits the HOLT CAT team for understanding the environment they were walking into—and adjusting its approach accordingly.

"HOLT CAT understood our requirements and our turnaround times," Ramirez said. "They were very cautious, knowing that we serve children and families. They worked after hours during a weekend, with very little disruption to our clients."

Providing seamless power

Installing backup power at a site that can't pause its mission requires more than equipment—it requires coordination. Chris Martinez, owner of contracting firm Central Electric in San Antonio, said his team approached the job as a design-build effort focused on keeping critical facilities online.

One decision delivered a bigger win than expected: Rather than backing up only one building, the team configured the solution to support a broader portion of the electrical distribution that included the women's and families dorm.

"It was actually cost prohibitive to only back up the women's and families dorm," Martinez said. "So we opted to back up the entire distribution, and it actually cost less to go this route than just backing up one building."

Martinez said the entire process, from installation to commissioning, was seamless.

"In our industry, Cat generators are known for being the premier units. And partnering with Holt in this endeavor was just an awesome experience. From the technicians, to sales and project management, it was just a great team to be a part of—there were no hiccups."

A haven needs more than walls

Haven for Hope's model is built on the belief that homelessness can be addressed more effectively when services are co-located and barriers are removed. Mundhenk described how losing a fixed address can turn routine problems into dead ends—and how rebuilding stability requires simultaneously accessing many services in a short timeframe.

"If you have no fixed address, any problem that takes longer than a day cannot be easily resolved," she said. "If you do not have an ID, you can't begin the process of looking for housing, searching for a job, improving any of the things that would help lead you out of homelessness."

Haven exists to reverse that reality—to make the next step easier to reach, and to give people the chance to choose a successful path forward. Over time, the campus has become a cornerstone in the city's response system. Over the last 15-plus years, it has served more than 52,000 individuals.

For Mundhenk, the work is also personal. She's seen homelessness up close in her own family, and that perspective fuels her determination to keep the campus ready—especially when the community needs it most.

When backup power sits ready in the background, it's easy to forget it's there. But that's exactly what Mundhenk and Haven staff want: Power resilience that stays quiet, while the mission continues uninterrupted.

"Because we are receiving people directly from the streets, including families, children and the like, we always want to represent what our name is, which is a haven."

"HOLT CAT is a values-based organization, and we're here to serve the communities that we work and live in. We believe that uplifting individuals and providing pathways toward self-sufficiency is a key part of our mission."

TOM ANGOTTI, ELECTRIC POWER BUSINESS MANAGER
HOLT CAT®

Peter Ramirez (L), director of facilities and logistics, reviews the performance of the D1000 GC genset with a HOLT CAT technician.

CHP FOR DATA CENTERS

Reusing waste heat for cooling through absorption technologies can increase system efficiency 80 to 90%

As energy demand from data centers grows exponentially, with around 50% of total energy consumption linked to cooling, cogeneration is emerging as a strategic solution to reduce the amount of grid power required, says Thomas Smith, senior director of energy development for Caterpillar.

Based on a new report about combined heat and power (CHP) for data centers, Smith says that generating electricity while reusing waste heat for cooling through absorption technologies can increase overall system efficiency from the current 40% to as much as 80 to 90%, delivering both environmental and economic benefits.

The key challenge is to accelerate the adoption of CHP and rethink traditional data center cooling models, says Smith, who is also President of the Cogen World Coalition and Combined Heat and Power Alliance.

"Like anything else, when an industry considers something new, it takes a little bit of time to adapt," Smith said. "There hasn't been a lot of adoption of combined heat and power by data centers. Until recently, data center demand has been modest, and electric utilities, for the most part, have been able to meet that demand.

"One of the great things about combined heat and power is customers can generate electric power, and take the waste heat through technologies like absorption chilling and turn that into chilled water that can be used by data centers," Smith said during a CHP conference in Brussels, Belgium. "Chilling is making this technology something that should be considered for data centers.

"A combined heat and power system increases overall systems efficiency from somewhere around 40%—assuming you're looking at simple cycle generation for electric power—capturing that heat and increasing the system efficiency to 80 - 90%," Smith said. "This really reduces your emissions as well as providing an economic benefit to the data center."

Traditionally, data centers have been able to source electric power from the grid, but now demand has increased to the point that the grid alone cannot support it. Implementing efficient behind-the-meter generation that includes CHP can efficiently generate the electric power needs of data centers to run computer chips, as well as cool them through absorption, Smith said.

"Now that we're seeing more demand than supply, I think that data centers are considering it," he said. "It's going to require a little bit of a change to how they view the cooling side of the business—maybe going away from a centrifugal chiller that uses electric power to facilitate chilling via an absorption chiller which utilizes the waste heat coming off a CHP system."

A STEP AHEAD

Battery storage & Cat® AMP deliver cost savings for municipal utility

Municipal utilities across the country face mounting pressure from electrification, growing demand and more stringent regulatory requirements.

To meet these challenges, Danvers Electric—one of Massachusetts' longest-serving municipal utilities—has integrated a new battery energy storage system (BESS) for long-term energy cost management using the Cat® AMP asset management platform. This innovative solution positions the utility to reduce costs and support its climate action plan.

Developed in collaboration with Tangent Energy Solutions, a wholly owned subsidiary of Caterpillar, the 4.99 MW / 15 MWh system operated by Cat AMP moves Danvers Electric a step ahead in providing cost-efficient power to the community of more than 30,000 residents and businesses.

Meeting rising demand

For Danvers Electric, ensuring energy security for the next decade while keeping costs down for customers was a primary driver behind this project. Danvers received a fully integrated, end-to-end solution with the project executed, operated, and completely financed as a single streamlined package.

"With so many uncertainties around electrification, nobody really knows what the next five to ten years will look like," said Clint Allen, Utility Director at Danvers Electric. "Preparing our grid for the surge in heat pumps and EV charging stations—while making sure we can supply reliable and affordable energy—is a top priority. This project helps us move forward on all of these fronts."

Cost and climate benefits

Using Cat AMP, a proven distributed energy resource management system (DERMS) that monitors and analyzes electric grid data, the solution delivers economic benefits by either dispatching the BESS into energy programs, or reducing the town's load when the grid is strained during high energy consumption periods.

"This project started as a way to manage our exposure to costly peak energy," Allen said. "When the town adopted its climate plan, the battery system was integrated perfectly into it. Not only is it providing a significant financial benefit to the town, it's also helping the Danvers Electric team meet our carbon-reduction goals at the same time."

The project required minimal capital expenditure from Danvers and the financing solution provided by Cat Financial ensured that Caterpillar covered all the costs, including equipment, construction and development of the project, which includes a 15-year agreement to operate the facility. The Danvers project marks an innovative way of delivering affordable and flexible customer solutions to meet increasing power demands and environmental responsibility.

"Through Cat AMP software and our expertise in predicting grid peaks, we're able to ensure that Danvers' battery discharges at the right times to reduce costs and maximize value," said Steve Gupman, Director of Energy Services at Caterpillar. "That structure directly benefits the community and demonstrates how energy assets can deliver both economic and environmental advantages."

IMPLEMENTING DERMS WITH A PEAKING PLANT

A Guide for Municipalities Leveraging Power Solutions to Serve Their Communities

A peaking plant is a power facility designed to start up quickly and run reliably to meet sudden spikes of electricity demand. When integrated with a Distributed Energy Resource Management System (DERMS) solution, the peaking plant helps optimize local generation and storage, reducing reliance on expensive grid purchases, while improving budget efficiency.

Deploying a DERMS alongside a peaking plant may sound complex, but it doesn't have to be. From planning to integration and commissioning, you can leave the heavy lifting to the Caterpillar team. The power systems experts at our dealership can handle the full process, so you can focus on serving your community.

Scalable to your needs

Building a peaking plant doesn't need to mean installing towering turbines. These plants can be compact, modular, and tailored to your municipality's specific needs. Whether its generators, battery energy storage systems, renewables, or turbines, we can scale your plant to match your energy goals.

Introducing Cat® AMP

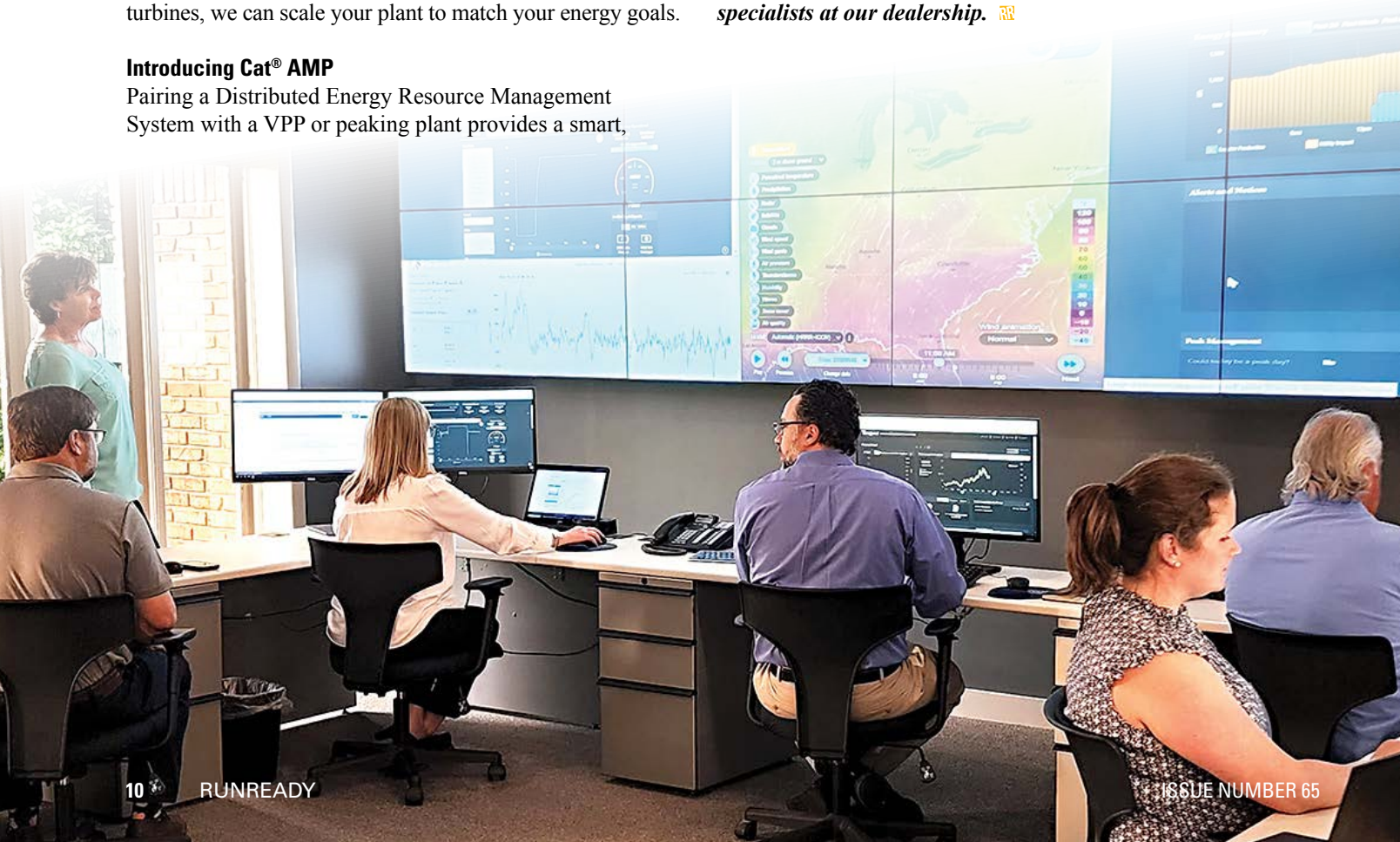
Pairing a Distributed Energy Resource Management System with a VPP or peaking plant provides a smart, scalable way to manage energy demand and reduce costs. Cat AMP is the advanced DERMS solution that makes this possible.

Cat AMP is a DERMS solution 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.

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.

Cat AMP helps you reduce energy costs by lowering transmission and capacity charges through smarter use of onsite assets. It also enables participation in energy market programs where you can earn revenue by making your DERs available to support the grid during peak demand.

To learn more about Cat AMP, contact the power systems specialists at our dealership.



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CAT® INSPECT

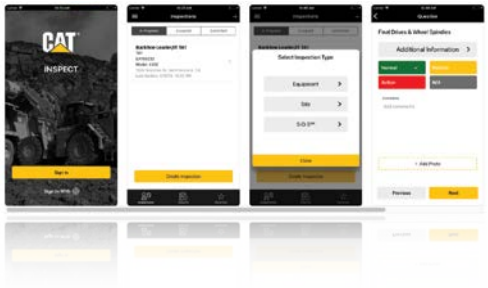
MAKE INSPECTIONS EASY, RIGHT IN THE PALM OF YOUR HAND

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.

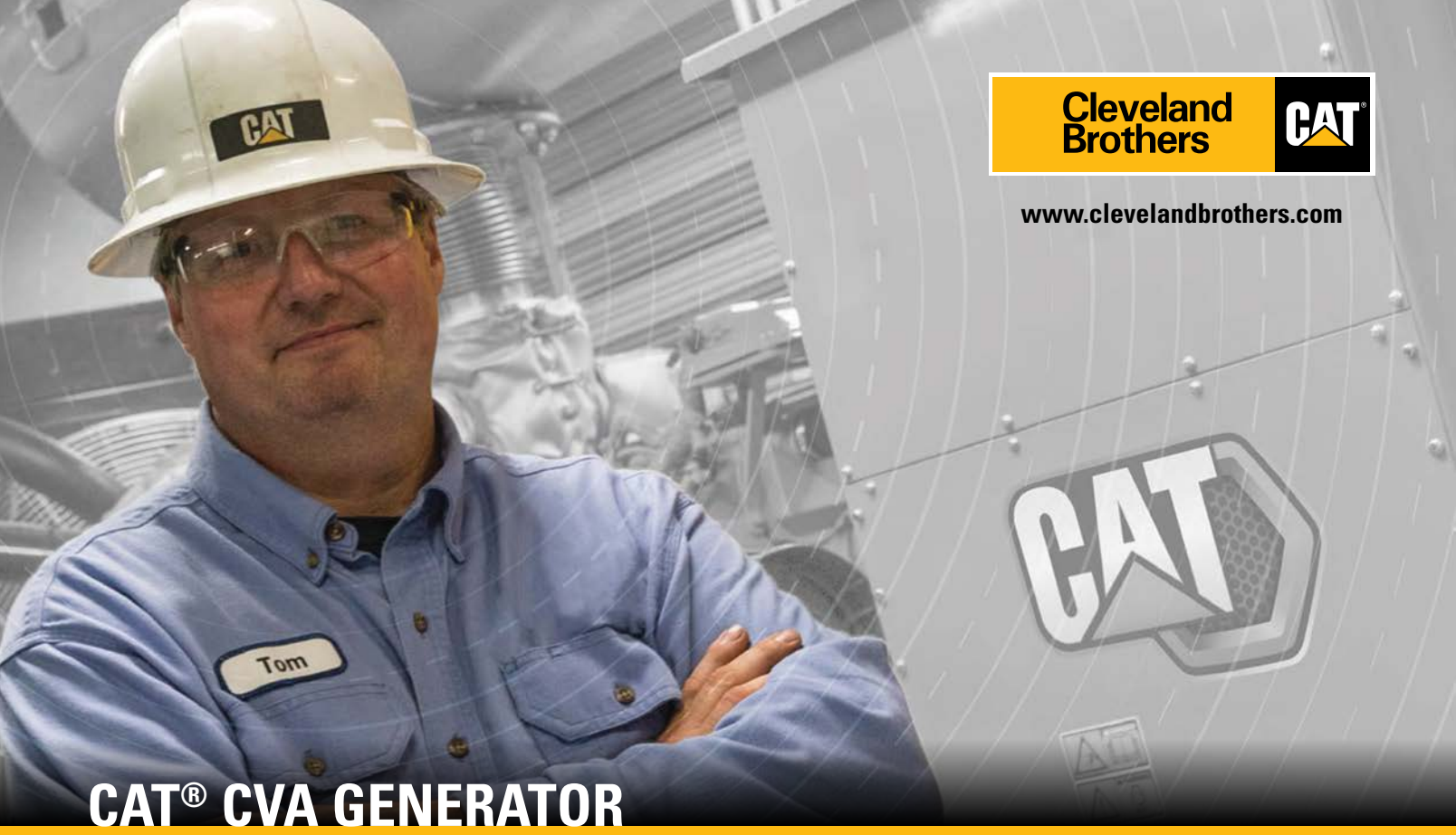
- Digital inspections provide real-time information for review, retention, and printing
- Secure inspection results for Cat and non Cat assets in one place
- Red, Yellow or Green ratings provide quick identification of actionable items
- Prioritize repair spend and budget based on inspection results 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***



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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.

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NEW ENERGY CONTROL SYSTEMS

ECS 300 & 400 HELP SCALE ENERGY SOLUTIONS

Two new Cat® Energy Control System (ECS) solutions, the ECS 300 and ECS 400, provide advanced benefits that seamlessly integrate with sites using singular or multiple power generation assets such as generator sets, battery storage, and renewable sources.

Designed to deliver reliable power and enhance energy efficiency, these solutions enable customers to optimize energy management and achieve cost savings.

The ECS 300 features mains/utility paralleling, enabling customers to monitor and control up to four power generation assets concurrently, with or without the utility. This capability provides the flexibility to utilize on-site power generation assets more effectively, such as during hours of high energy consumption.

Additionally, the ECS 300 provides closed transition with soft load/unload, or open transition with mains/utility operation for emergency standby, providing reliable backup power in the event of a grid failure.

The ECS 400 is engineered for advanced microgrid solutions, with the capability to monitor and control up to 32 power generation assets. This system not only enables customers to expand their existing sites by managing additional power generation assets, but also helps maximize the use of renewable energy sources, leading to reduced fuel consumption and lower overall energy costs.

Extensive and integrated solutions

The expansion of the Cat ECS portfolio underscores Caterpillar's commitment to delivering comprehensive, customer-focused solutions that encompass equipment, controls, technology, and local support. This holistic approach includes power generation assets, remote-monitoring technology, distributed energy storage management systems (DERMS), switchgear, controls, and local expertise, all focused on helping you secure reliable and affordable power.

"As the energy landscape evolves and energy needs become more complex, customers are developing plans to secure power for both the near-term and the future" said Melissa Busen, senior vice president for Caterpillar's Electric Power Division. "The Cat ECS portfolio helps customers scale and future-proof their sites, as these control systems are designed to adapt and grow in support of their future needs."

Expanding Cat ECS range

The new controllers join two existing ECS solutions, the ECS 100 and ECS 200, already on the market. The Cat ECS 100 delivers a valuable control system for new standby, fast-response and prime power generator sets.

All controllers are now available at Cat dealers worldwide with retrofit kit options for the ECS 100 and ECS 200. Caterpillar also offers services for control customization, including system design and hardware and software configuration, providing solutions for site-specific needs.

For more information contact the power systems experts at our dealership, or visit cat.com/catecs.

POWER, AIR, & TEMPERATURE CONTROL

WHEN YOU NEED MORE THAN A GENERATOR

From disaster relief to scheduled power system maintenance, often customers need advice, recommendations, and, in some cases, additional products such as:

- Battery Energy Storage
- Air Compressors
- HVAC units (Temperature Control)

To keep operations running smoothly, our trained experts and extensive dealer network are ready to create a power design that can be fully optimized for your application.

Battery Energy Storage System
Combine traditional mobile rental power with a new mobile battery energy storage system equipped to provide uninterrupted power for a wide range of applications.

Air Compressors
Air compressors are often referred to as the "fourth utility," joining electricity, natural gas and water as an essential service in most industrial and commercial facilities.

Temperature Control
Air conditioning, humidity control, heating, and air handling systems are just some of the vital requirements needed for residential, commercial, industrial and governmental facilities.

Expert Guidance & Support
From fast installation and easy setup to site survey quality, the power systems specialists at our dealership are standing by to ensure your rental solutions are effective and save you time.

To learn more, contact the power systems experts at our dealership.

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www.clevelandbrothers.com

Cat® 3516E
Diesel Generator

Enhanced transient response

Four billion hours. That's the accumulated operational run-time of Cat® 3500 series engines across the toughest heavy-duty applications, and the foundation behind the 3516E Enhanced Transient Diesel Generator Set.

Engineered for facilities where "unexpected" is part of the daily routine, the 3516E provides:

- 3,500 kVA output with >50% block-load acceptance
- Compact 242 sq. ft. footprint for space-critical installations

Good for data centers

Downtime is not an option. That's why data centers rely on Cat gensets such as the 3516E, with up to 4 MW of reliable backup power that keeps things running during unexpected outages. It's fuel efficient, built for long service intervals and designed to help you cut costs without cutting corners.

The 3516E delivers high power density in a compact footprint that ships and installs with ease—helping you reduce time and cost.

With remote monitoring and an intuitive control panel, you're always in control wherever you are. Protect your uptime, and talk to your Cat dealer today and keep your data center powered with confidence you need.

3516E diesel generator sets have been developed to meet your standby and prime applications and match the power standards that you've established.

Saves up to 11% installed space

Requires less space for installation

Weighs up to 31% Less

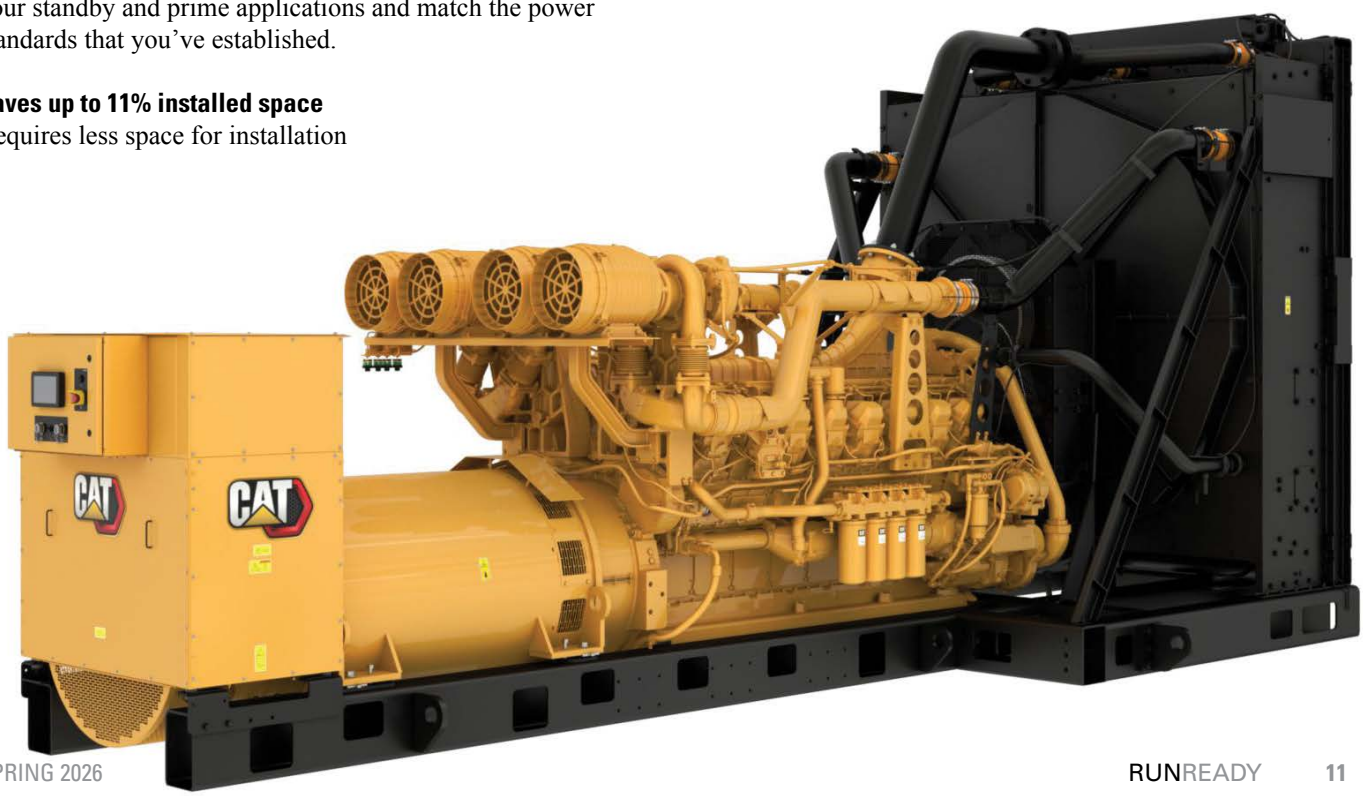
Reduced amount of structural support required

Full Power up to 131°F Ambient

Provides full power even on the hottest days of summer

- Accepts 100% block load in one step and meets NFPA 110 loading requirements
- Conforms to ISO 8528-5 steady state and transient response requirements
- Field-proven in thousands of applications worldwide
- Four-cycle diesel engine combines consistent performance and excellent fuel economy with minimum package weight
- User-friendly interface and navigation make it easy for you and your team to navigate
- Scalable system to meet a wide range of installation requirements
- Expansion modules and site-specific programming to meet your requirements.

To learn more about the 3516E Diesel Generator performance benefits, contact our dealership.



Fueling the FUTURE

Caterpillar conducts successful hydrogen test

A landmark demonstration project in Saint Paul, Minnesota has quietly set the stage for what could be a pivotal shift in a district energy system's transition toward net-zero emissions.

Led by Caterpillar—in collaboration with District Energy St. Paul and supported by the U.S. Department of Energy (DOE)—the initiative successfully demonstrated a 2.0 MW combined heat and power (CHP) system operating on 100% hydrogen fuel—believed to be a first-of-its-kind, real-world customer application.

A Cat® G3516 gas generator set, which is part of Caterpillar's expanding portfolio of fuel-flexible energy systems, operated for 200 hours on natural gas and another 200 hours running on 100% hydrogen. The test was fully integrated with the utility-scale energy grid of District Energy St. Paul. Power and heat generated during the demonstration were fed directly into the city's distribution network, supplying customers with real energy.

The project validated the operational viability of a hydrogen-fueled CHP system, demonstrating performance metrics — including efficiency and durability—comparable to conventional natural gas systems.

Natural gas validation of the engine/generator set and CHP took place from March through September 2024. The hydrogen testing took place in February and March of 2025.

"This is a first-ever CHP 2000 with all Cat parts," said Jas Singh, CHP Hydrogen Project Manager at Caterpillar. "And this is capable of running on 100% hydrogen, 100% natural gas, as well as blends of those two fuels."

Long history of innovation

As a nonprofit utility, District Energy St. Paul provides energy services to downtown Saint Paul. The heating and cooling network serves more than 200 buildings in the central business district and across the Mississippi River to a secondary area of commercial, light industrial, and residential development. The customer base includes higher education, hospitals, Fortune 500 companies, and multi-family residential, as well as hotels, entertainment, and sporting venues.

CUSTOMER PROFILE

District Energy St. Paul

Location: Saint Paul, Minn.

Cat® Equipment: G3516 gas generator set

Cat Dealer: Ziegler Power Systems

Developed as a public-private partnership, District Energy St. Paul has worked closely with the City of Saint Paul, the Saint Paul Port Authority, local businesses leaders, and civic partners to offer competitive energy solutions and cost-based rates that have played a critical role in development initiatives for the City of St. Paul.

District Energy St. Paul provides energy to the downtown area and the adjacent west side neighborhood. Through district energy infrastructure, hot water and chilled water are sent to customers' buildings to meet all of their heating and cooling needs. When adjusted for inflation, heating and cooling customers pay less for energy today than they did when the system started.

The system is the largest hot water district system in North America, and an industry leader in system integration featuring biomass-fired cogeneration, thermal storage, and

solar thermal technology. District Energy St. Paul has been recognized by the United Nations Environment Programme as one of three systems in the United States serving as an international model for best practices.

With a long history of innovation, District Energy St. Paul was a natural partner for this pilot. The organization has integrated renewables through solar thermal and biomass for years, and reduced greenhouse gas emissions (GHGs) by 77% since the late 1990s, and has committed to achieving carbon neutrality by 2050.

The partnership with Caterpillar and Certarus—a hydrogen logistics and low-carbon energy solutions provider—was another milestone in District Energy St. Paul's ongoing innovation journey, said Luke Gaalswyk, President and CEO of District Energy St. Paul and Ever-Green Energy.

"At District Energy St. Paul, there's a long history of integrating new and renewable sources of heat into our system, and this demonstration project is another step in that journey," Gaalswyk said.

"Hydrogen, we know, will play a role in the evolving energy landscape," he added. "We're proud to be able to work with this diverse stakeholder group to demonstrate the viability and potential of hydrogen as a fuel source in a district energy application."

The integration also delivered practical value. "This is a real-world site," Singh said. "We're not only providing electricity, we are also providing heat that's recovered from the Cat engine."

Mike Burns, Senior Vice President and Chief System Operations Officer at District Energy St. Paul, noted the importance of this dual benefit.

"The fact that we have a district energy system that heats the City of Saint Paul enables us to take the waste heat that's normally just thrown away, collect it, utilize it into our hot water system, and heat the city on chilly mornings," Burns said.

"At District Energy St. Paul, there's a long history of integrating new and renewable sources of heat into our system, and this demonstration project is another step in that journey. Hydrogen will play a role in the evolving energy landscape."

LUKE GAALSWYK, PRESIDENT AND CEO
District Energy St. Paul

Real-world hydrogen

While Caterpillar provided the technology, and District Energy St. Paul offered the infrastructure and integration, Certarus made the hydrogen logistics possible.

The Calgary-based company, known for its expertise in lower-carbon energy delivery, handled the hydrogen supply chain end-to-end. This included compression, storage, pressure regulation, and transport—all while maintaining the stringent safety and quality controls required by such a high-profile demonstration.

Certarus ensured that the hydrogen fuel—critical to the project's success—was delivered on time and on budget.

"The high-quality execution differentiates Certarus, earning

Continued on page 14

customers' trust to collaborate on high-stakes projects like this one," the company stated in its project summary.

Scaling up hydrogen readiness

One of the goals of the demonstration project was to automatically and seamlessly respond to variations in electric power generation caused by renewables to assist in maintaining base-load operation of the facility, while also serving as a backup generation asset for the facility should grid power be lost.

For District Energy St. Paul, participating in the project enabled its team members to advance their know-how about hydrogen fueling storage systems, and operating CHP systems using hydrogen as fuel.

The DOE co-funded program helped Caterpillar:

- Gain insight into microgrids with a hydrogen-based CHP system and how they can enhance stability and improve air quality, particularly for carbon-intensive sectors.
- Expedite production release of hydrogen capable flex-fuel gensets that can provide 100% hydrogen capability while retaining fallback capability to partial or full natural gas fueling in times when the hydrogen supply is not adequate or readily available.
- Develop and test cost-competitive electronics and controls for easy "plug-n-play" flexible CHP system integration with a variety of distributed energy power systems.
- Gain and document understanding of how a hydrogen power profile would compare to that of traditional fuels (e.g., diesel, natural gas) and futuristic power systems (e.g., fuel cell, battery) in terms of power density, efficiency, transient response, GHG emissions profile, and total cost of ownership.

The demonstration not only serves as proof-of-concept, but as a blueprint for broader deployment. Caterpillar already has a broad range of commercially available generator sets—from 400 kW to 4.5 MW—capable of operating on natural gas blended with up to 25% hydrogen by volume.

The gensets feature numerous hardware and machine control changes to accommodate the unique properties of hydrogen, such as low ignition energy, low energy density and a smaller quenching distance. Material incompatibilities have also been addressed.

Caterpillar also supports gas turbines running with hydrogen blends as high as 80%.

"As the energy transition continues to unfold, our customers with sustainability initiatives are eager to test hydrogen-fueled generators, so they can determine what makes the most sense," said Steven Parente, a Hydrogen Infrastructure and Integration engineering specialist for Caterpillar.

The project was also notable for its collaborative spirit.

"The collaboration has been fantastic," said John Feucht, Vice President and General Manager for Caterpillar's large

power systems division. “We’re very proud of what the team has delivered.”

That team included the U.S. Department of Energy’s Office of Energy Efficiency and Renewable Energy (EERE), the National Laboratory of the Rockies, and local dealer Ziegler Power Systems—all of whom played pivotal roles.

Dealer assistance

Paul Meyer, an engineering manager with Ziegler, served as an onsite project manager for the duration of the trial.

“Paul has extensive experience in gas and diesel power generation, and he was able to serve as a liaison between Caterpillar and some of the onsite personnel, as well as communicating with the onsite supporting contractor, Egan Company—a mechanical and electrical contractor and trusted partner that we work with,” said Kyle From, General Manager for Ziegler Power Systems.

“Paul was in on many of the meetings from the beginning, helping with items such as the interconnects, design codes and local conditions that had to be considered,” From said. “In a cold weather climate such as ours, that adds some additional factors. So, we utilized that local expertise to ensure that this would run at all the extremes—during the summer months, in the rain and wind, and then most importantly, during the cold weather months.”

Ziegler technicians assisted with installation, commissioning and startup, engine performance support, and helped the Caterpillar team transition from running on the natural gas fuel source to hydrogen.

Looking ahead

While hydrogen remains a nascent fuel in terms of infrastructure and widespread use, its potential is considerable. For companies like Caterpillar and Certarus, the message is clear: the groundwork for successful implementation is being laid now.

“One of the key things our customers are asking for today is, how are we going to future-proof our product as their sustainability goals evolve?” said Rick Osborne, Vice President and General Manager for large electric power solutions at Caterpillar. “We’re doing that by providing these innovative products.”

More than just a product showcase, the demonstration underscores Caterpillar’s strategic commitment to supporting diverse energy pathways. As the infrastructure for hydrogen continues developing, Caterpillar will continue to pioneer products that are ready to meet the challenge.

“Whether you have the infrastructure for hydrogen today or in the future, we will have products that are ready to meet that challenge,” Osborne said. “This project is a very exciting example of bringing innovative technologies to market.”

Overcoming Grid Limitations with a CUSTOMIZED MICROGRID

Customization for every oilfield application

Global climate-related objectives continue to reshape the operational landscape. Carbon capture technologies introduced during the 1970s have evolved to support GHG emissions reduction in oil and gas operations through recovery, storage and utilization methods. However, challenges remain for gas compression operators who are focused on balancing increased energy demands with climate-related objectives.

With this in mind, the Caterpillar Carbon Capture Solutions team tested a unique environmentally benign molecular (mole) sieve technique on an active gas compression site in Northwest Texas running a Cat® G3606 1,875 horsepower engine. The 1,000-hour pilot program confirmed the evolved approach achieves economical CO_2 capture at a higher efficiency than other methods. The project also demonstrated that effective utilization of the engine's waste exhaust heat can increase carbon capture performance without harmful byproducts or carcinogens.

It was additionally noted that the system's inherent modularity provides the flexibility to meet unique capacity and layout requirements for a wide range of greenfield and brownfield sites.

Customization for Every Oilfield Application

Successful microgrid implementation requires understanding each wellsite's unique power profile across different operational phases: drilling typically requires 4 MW; completions surge to 25 MW; and production requires only 0.5 to 1 MW per well for long-term operations.

Due to these variations in power and site-specific needs, three distinct approaches are possible:

- Off-grid microgrids serve remote locations across all major basins, where grid access is unavailable or cost-prohibitive. Modern gensets with integrated controls optimize fuel consumption and eliminate manual synchronization to provide reliable power.
- Hybrid microgrids combine natural gas gensets with battery energy storage systems, delivering faster transient response than diesel-only configurations. Sites using natural gas with energy storage can reduce fuel costs up to 30% and CO_2e emissions up to 11%. When utilizing field gas, those savings can increase dramatically and curb fuel costs up to 85% and CO_2e emissions up to 7%, with NO_x reductions reaching up to 80%.[1]
- Grid-connected microgrids supplement utility power with on-site power generation. Historically, this approach works particularly well for sites with steady, predictable load profiles that align with utility companies' preferences for stable power delivery.

For sites with aggressive, high-transient loads that could destabilize grid connections, integrating Cat controls and experience enables drill rigs to blend on site generated power with grid power. These systems can buffer sudden load changes while the power management system coordinates between utility power and gensets, ensuring seamless operation without exceeding utility thresholds.

Real-World Success in the Permian

A recent Permian Basin implementation demonstrated the power of deploying customized microgrids in the oil patch. The operator required 25 MW for completion operations, but could only access 10 MW from the local utility grid. Rather than relying entirely on on-site generators, Caterpillar Oil & Gas created a grid-connected microgrid that harvested the available 10 MW of utility power and supplemented the remaining 15 MW with natural gas gensets.

As a result, the operator reduced on-site power generation by using just six gas-fueled gensets rather than 10: a 40% reduction. A sophisticated power management system orchestrated multiple power sources, preventing site blackouts, while maintaining protection thresholds required by the utility. This configuration helped deliver immediate fuel cost savings and GHG emissions reductions, while supporting the operation's aggressive power demands.

The Path Forward

Competition for grid power will intensify in the future, with U.S. data center demand expected to grow 10% annually through 2030, requiring an estimated 47,000 MW of additional generation capacity[2]. As the industry continues to electrify, oilfield microgrids will provide the flexibility

to adapt to evolving power landscapes and industry requirements, while keeping operations running efficiently and reliably.

A customized microgrid approach enables oilfield companies to fulfill operational and sustainability goals today, preventing delays caused by grid infrastructure delays. By combining utility power with on-site gensets and energy storage systems, GHG emissions and operating costs can be decreased while maintaining the 24/7 demands of modern oilfield operations.

[1,2]*Martinez, A. Dominguez. "A Permian Microgrid Case Study - Keys to Successful Implementations." Paper presented at the SPE Annual Technical Conference and Exhibition, New Orleans, Louisiana, USA, September 2024. doi: https://doi.org/10.2118/220763-MS*

BUILDING FOR TOMORROW

Battery Hybrid Powertrains & Fuel Flexible Solutions Reduce (GHG) Emissions Without Sacrificing Performance

As interest in offshore wind farms increases across Asia Pacific, Dong Fang Offshore has set its sights on being a leading provider of offshore maritime services for the sector in Taiwan and beyond.

The vessel operator began in 2019 with a small number of crew-transfer vessels (CTVs) to provide regular transportation of maintenance staff and supplies, ensuring timely replenishment and personnel rotation. Dong Fang's excellent reputation for reliability and cost efficiency enabled the company to quickly grow to a fleet of 14 vessels capable of performing a variety of functions including tug survey, construction support and service operations.

Serving offshore wind farms subjects vessels to extremely rough conditions. Ensuring they are up to the challenge is crucial, as any unplanned downtime can result in lost opportunities. This is why Dong Fang depends upon Cat® C32 propulsion engines alongside C4.4 and C7.1 auxiliary engines and gensets to power its CTVs, while 3516 and 3512 engines underpin the operator's service operation vessels (SOVs).

Guided by a strong commitment to reducing its fleet's greenhouse gas (GHG) emissions, Dong Fang sought the guidance of Caterpillar Marine and Taiwanese Cat dealer Capital Machinery Limited (CML) to ensure its new builds and current ships can reduce GHG emissions while meeting performance requirements. CML collaborated with Norwegian dealer Pon AS to draw on their extensive experience implementing Cat power solutions for numerous offshore vessels.

CUSTOMER PROFILE

Dong Fang Offshore

Location: Taiwan

Dealer: Capital Machinery Limited (CML) and PON AS Norway

Product: Cat® C32 and 3500 series engines, and C7.1 and C4.4 auxiliary and gensets

Industry: Offshore Wind

Standardizing On Fuel Flexible Solutions

The C32, C4.4, C7.1 and 3500 series solutions not only provide reliable power, but also support Dong Fang's goal of operating with energy-efficient, low GHG emission powertrains. The technologies easily run on lower-carbon intensity fuels such as biodiesel and hydrotreated vegetable oil (HVO).[1]

Additionally, the 3500E engines are methanol ready. Employing these particular power solutions provides Dong Fang important fuel flexibility that the vessel operator can leverage when these diesel alternatives are more readily available in Taiwan's ports. These solutions also enable Dong Fang to incorporate electrification options to further reduce future GHG emissions.

For these reasons, Dong Fang, Caterpillar Marine, CML and Pon AS collectively decided to standardize on the four engine models. Standardization affords the vessel operator important cost savings as it increases the number of common parts fleetwide. As Dong Fang scales, it's able to not only increase its stock of spare parts but also spare engines, which helps ensure maximum fleet availability at all times.

CML supports and streamlines Dong Fang's parts inventory by carefully planning service and related parts needs in advance. Maintenance intervals, such as overhauls, are strategically scheduled to reduce disruption, and required parts are stocked at CML's local facility to ensure availability. Additionally, CML's close proximity to Dong Fang's operations enables the dealer to deliver parts within 24 hours should immediate needs arise.

"As we serve the renewable energy industry, we strive to not only maximize our fleet utilization but also ensure our vessels reflect our climate-related goals," said Ben Darrington, Chief Operating Officer at Dong Fang Offshore. "Standardizing on the C32, C4.4, C7.1 and 3500 series engines helps us achieve both objectives. We value our collaboration with Caterpillar Marine and CML, and we'll benefit from the support of the global Cat dealer network as we expand."

Investing for the Long Term

Three new commissioning service operation vessels (CSOVs) are contracted with VARD, and will be equipped with four Cat 3512Es to enable Dong Fang to eventually utilize methanol fuel. Further, one offshore subsea construction vessel is contracted with VARD, equipped with five Cat 3516Es, which takes the Dong Fang Offshore fleet to 18 vessels once the current new build program is complete. All existing CTVs feature C32 engines to provide primary power and auxiliary C4.4 and C7.1 gensets, positioning Dong Fang to use lower-carbon intensity fuels for those vessels.

This will enable Dong Fang to continue to derive the benefits of engine standardization while layering GHG emissions reduction technologies for maximum results.

"At Dong Fang, we are investing for the long-term," Darrington adds. "We purchase best-in-class vessels equipped with best-in-class equipment and operate them with the best people internationally to deliver reliable, cost-effective services each day. Working with Caterpillar Marine, CML and the broader Cat dealer network creates valuable synergies that support our growth and help our team remain competitive."

[1]Lower-carbon intensity fuels have greenhouse gas emissions at the stack that are essentially the same as traditional fuels.

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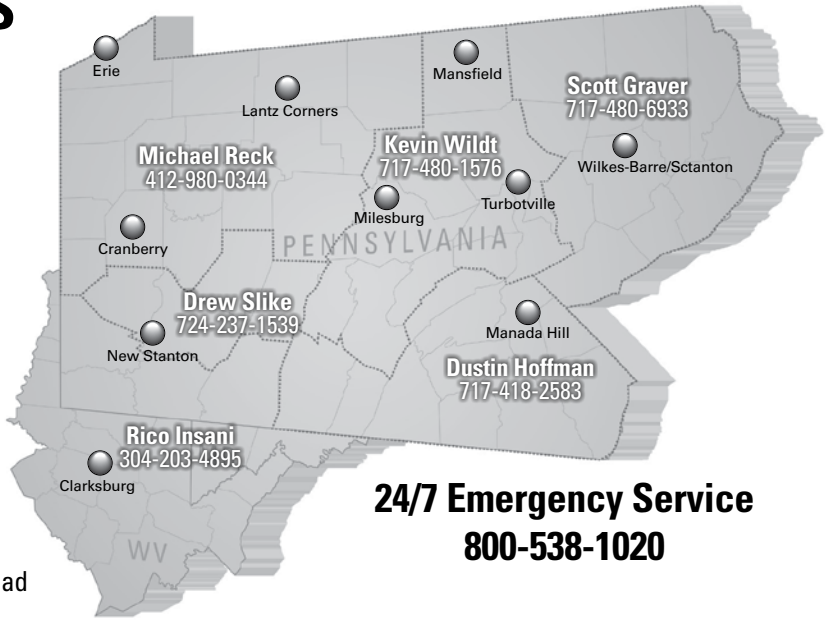

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