

# RUNREADY™

## FLOATING A NEW CONCEPT

MICROGRID REPLACES DIESEL  
GENERATORS AT MARINA

### AN INTEGRATED SOLUTION

New standby power system enhances  
airport resiliency

### A PLATFORM FOR SAVINGS

Utility uses energy management  
software to hold down rates

**Thompson**  
Power Systems



# Taking Action

As the energy transition builds momentum, moving from talk to action, businesses and critical service providers are deploying solutions from Caterpillar that help meet their sustainability goals.

This issue of **RunReady** highlights a cutting-edge municipal utility in Massachusetts that strives to meet its energy obligations while holding down electric rates by deploying a variety of renewable sources, and effectively managing everything with data analytics.

A state climate bill establishes specific targets for utilities to lower their carbon emissions by 2030, and meet progressively higher thresholds until attaining zero emissions by 2050. This is causing the Reading Municipal Light Department (RMLD) to act now. One of its primary tools is Cat® AMP software, which monitors energy market conditions and capitalizes on opportunities to dispatch assets during predicted premium-price hours. This analytic capability enables RMLD to pass lower costs on to its customers.

Also in this issue, an off-the-grid marina at an Arizona reservoir has developed a solution that dramatically reduces its reliance on diesel-powered generators. A new microgrid featuring solar power and Cat battery energy storage technology is expected to reduce diesel fuel consumption by 95%, while also cutting emissions.

And finally, in Albuquerque, New Mexico, the airport has buttoned up its critical standby power system with the addition of four new Cat C27 generator sets—plus a significant upgrade to the switchgear—all of which help guard against crippling outages.

We hope you find this issue informative.

## DID YOU KNOW?



### ENERGY TRANSITION INVESTMENTS TOTALED \$1.8 TRILLION IN 2023

Global investment in the energy transition increased 17% in 2023, reaching a new high of \$1.8 trillion, according to a new report from BloombergNEF (BNEF).

The report, *Energy Transition Investment Trends 2024*, finds that electrified transport is now the largest sector for spending in the energy transition, growing 36% in 2023 to \$634 billion. This figure includes spending on electric cars, buses, two- and three-wheelers, and commercial vehicles, as well as associated infrastructure.

Electrified transport overtook the renewable energy sector, which saw an 8% increase to \$623 billion. This figure reflects investments to construct renewable energy production facilities, such as wind, solar, and geothermal power plants, and biofuels production plants. Power grid investment was the third-largest contributor at \$310 billion.

There was also strong growth in emerging areas such as hydrogen (with investment tripling year over year), carbon capture and storage (near-doubling), and energy storage (up 76%).



## TREE VS. GENERATOR

Cat® genset withstands Florida Panhandle storm

When storms battered the Florida Panhandle in early January, wreaking havoc on power lines and leaving many communities in the dark, a critical lifeline remained operational thanks to a sturdy Cat® 100 kW generator and the quick response of the Ring Power Tallahassee team.

A powerful squall line that produced 70-80 mph wind gusts tore across North Florida on Jan. 9, spawning tornadoes ahead of it. The line of storms, which spun off a tornado, downed trees and damaged structures in the Panama City and Marianna areas, and passed through Tallahassee, according to the National Weather Service.

The Leon County Health Department, which serves as a vital emergency shelter for the community, faced a power outage due to fallen trees. One of these trees even took aim at the department's standby generator, landing on its protective enclosure.

But just as nature threw its worst, the Cat engine roared to life, safeguarding the building's essential functions throughout the morning and into the afternoon.

Why is this significant?

Beyond offering shelter during emergencies, health departments hold a crucial responsibility: they store vital medical supplies, including vaccines, that require strict temperature control. A prolonged power outage could have meant the loss of these life-saving resources.

That's where Ring Power's Tallahassee team stepped in. Within 20 minutes of receiving notification, generator technician James 'JR' Hostetter was onsite. He swiftly assessed the situation, ensuring the generator could safely continue powering the building until City of Tallahassee crews restored the grid.

The outcome underscores what it means to run ready. When nature throws its worst, dedicated partners with the right equipment can keep critical services operational, protecting the health and well-being of communities.



IN THE SPOTLIGHT:

# 4 Floating A New Concept

Since its inception in 1995, Bartlett Lake Marina has operated without access to the utility grid in its remote desert location by running diesel generator sets. But last fall, the marina in the Tonto National Forest switched from diesel power to a hybrid microgrid, which supplies about 95% of the facility's power needs with renewable energy.

FEATURES



8

# 8 Battery Energy Storage Systems

Maximize resiliency and savings



9

# 9 An Integrated Solution

New standby power system enhances airport resiliency



12

# 12 A Platform for Savings

Utility uses energy management software to hold down rates

Visit the **Cat Electric Power YouTube™** page to find out why Caterpillar and Cat® dealers are market leaders in providing comprehensive power solutions in nearly every application.

[youtube.com/@CatElectricPower/videos](https://youtube.com/@CatElectricPower/videos)

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# FLOATING A NEW CONCEPT

## MICROGRID REPLACES DIESEL GENERATORS AT MARINA

**B**artlett Lake is an Arizona reservoir that was formed by constructing a dam on the Verde River during the late 1930s. Located 48 miles northeast of downtown Phoenix in the Tonto National Forest, the Bartlett Reservoir area is noted for spectacular vistas of the desert mountains and the plentiful Sonoran plant life.

Part of the west side of the 12-mile-long, 2,815-acre reservoir is devoted to camping and picnicking. Bartlett Lake has been a favorite with anglers since Bartlett Dam was constructed in 1939. Several state-record fish have been caught there. Bartlett Lake also has a five-acre beach area.

The lake has become a popular recreation area thanks in large measure to Bryan Church, an entrepreneur who launched Bartlett Lake Marina in 1995.

On the recommendation of a neighbor, Church first traveled to Bartlett Lake during a 1984 visit—four years after a construction accident left him paralyzed from the waist down

at the age of 20. At the time, the only way to access the undeveloped lake was via a seven-mile dirt road.

On that first visit, Church envisioned what the lake could become. Soon after, in a letter typed on an old Smith-Corona manual typewriter, he declared his intention to the National Forest Service to build a marina there. A more detailed bid was finally accepted in 1990. It would take another three years to secure the necessary financing, as obtaining credit was made more challenging by the Savings & Loan crisis.

Some doubted Church’s ability to construct a marina in a fairly remote location that was not connected to the utility grid.

“I kind of felt like Noah... when he was building something, and everyone made fun of him,” Church recalled in a local newspaper account. “It was kind of

like people were saying, ‘That’s a good thing for Bryan to occupy his time.’”

But Church persevered, ultimately turning the lake into a destination. Now in its 30<sup>th</sup> year, Bartlett Lake Marina draws more than half a million visitors annually. More than 220 covered boat slips store a variety of watercraft from jet

### CUSTOMER PROFILE

#### **BARTLETT LAKE MARINA**

**Location:** Carefree, Ariz.

**Application:** Prime power

**Cat® Equipment:** Energy Time Shift (ETS1500) module, Master Microgrid Controller (MMC), 400 kW diesel genset



skis to 70-foot houseboats, and a boat club enables members to rent boats at affordable rates. A full-service, sit-down restaurant opened seven years ago.

“And 30 years later, we’re still a work in progress,” Church laughs. “The good Lord, I think, has taken care of us from the get-go. But honestly, if somebody laid this in my lap today, after all the experience I had developing the marina, I’d say you’re crazy.”

### Off the grid

Several aspects of the marina are notable. First, it floats, so when the lake level rises—as it tends to increase in the spring when the Verde River headwaters to the north swell from melting snow—the marina rises too.

Perhaps more significant, to this day, no utility lines extend to the lake or the marina. When it comes to supplying power, Bartlett Lake is on its own. Therefore, Church has always operated his own distributed energy system.

Until recently, the power came from diesel generator sets, which ran almost continuously, burning a lot of fuel and requiring additional support from rental gensets when periodic repairs and maintenance were needed.

“Last year, we spent \$250,000 on diesel fuel and roughly another \$100,000 on repairs, maintenance, and rental generators,” Church says, “There were times when we were spending anywhere from \$30,000 to \$40,000 a month on diesel fuel. We were burning 1,500 gallons per week when the cost of fuel was five dollars a gallon. So yeah, it was a lot of money.”



*Continued on page 6*



# CUSTOMERFEATURE

But a solution was in the offing. Several years ago, Church was approached by someone who kept a boat at Bartlett Lake about converting the marina to run on solar power.

“A little over four years ago, I started coming to the lake every Thursday with a group of friends, and I slowly got to know the owner. He had been looking into renewable energy for about two years,” recalls Steve Jew, commercial director for Nerd Power in Gilbert, Ariz., which designs residential and commercial solar installations throughout the Southwest.

“Before that, no company could get the funding pulled together for him. But we found a solution.” Jew says. “It took about a year and a half to get the design and the financing finished up. And then in a pair of flip flops and board shorts, we penned the deal, and then I got started on designing and building the project.”

Nerd Power partnered with Cat® dealer Empire Southwest early on to design a microgrid energy system. While there were some delays launching the project due to the coronavirus pandemic, once underway it took about 18 months from start to finish, with final commissioning taking place last fall.

## Microgrid components

The microgrid consists of a 400 kW solar array with 895 solar panels mounted on the roof of the boat slips. The array provides power to the marina. A cable carries the current generated by the solar panels a short distance across the water and uphill, where the power feeds into a Cat Energy Time Shift (ETS1500) module—a scalable, rapidly deployable energy storage system consisting of a bank of lithium ion batteries and a Cat BDP1000 inverter housed inside a 22' by 8' by 9.5' container that provides 1,518 kilowatt hours of power.

The stored energy from the batteries is released when the solar panels are not providing sufficient power to the marina. Additionally, a 200 kW Cat XQ230 clean-burning Tier 4 mobile generator set runs when the battery is low and more power is needed.



A Cat Master Microgrid Controller (MMC) acts as the brain of the microgrid, integrating the photovoltaic system, generator set, and energy storage system to maximize penetration from renewable energy sources and enhance system reliability.

## Solving multiple issues

The microgrid solves multiple issues for Bartlett Lake Marina. “It’s a complex system, but really it’s a big battery box that provides stored energy to the lake, and we (Empire)



“There are a lot of benefits to having a system like this. We’ve reduced the noise, as well as the emissions from the old diesel generators. We expect to save anywhere from \$30,000 to \$40,000 a month with this new system.”

**BRYAN CHURCH**, Owner  
Bartlett Lake Marina

support and maintain all of those systems here locally to make sure that the marina has power when its needed,” says Brett Tolman, a power systems sales engineer for Empire Power Systems.

“We check the batteries once a year just to get our eyes on them and make sure everything is performing like it should,” he says. “The battery has a monitoring system that notifies us if any issues are detected. The batteries and the inverter are fairly low maintenance.”

The main issue for Church was the cost of diesel fuel, as well as the reliability of the mobile diesel generators that were supplying power to the lake, Tolman says.

“But the cost of the diesel fuel was the main pain point. The solar option is a great solution, but the sun only shines during the day, and things are going on at the lake overnight. So that’s where the batteries extend the benefit of solar beyond the sunlight hours.”

Adds Steve Jew of Nerd Power:

“There were a bunch of issues that we were trying to solve with this project. It started with trying to reduce their diesel fuel costs, and whether we could offset the property’s entire load with solar panels. Another one was eliminating the noise from the diesel gensets.

“And then as the project progressed, it turned into an emissions problem that we were trying to solve, which we were able to do by trading emissions credits with a major manufacturer.”

Under the emissions trading program, purchasers and suppliers trade in emissions allowances, which results in a market price for CO<sub>2</sub>. Trading emissions credits put the project over the top, providing Church with the necessary funding he needed to proceed with design and construction. Jew worked with Empire Power Systems to source the components for the microgrid.

Nerd Power has designed and installed thousands of solar projects throughout the Desert Southwest, and has more



projects in the pipeline where it could partner with Empire Power Systems and other Cat dealers.

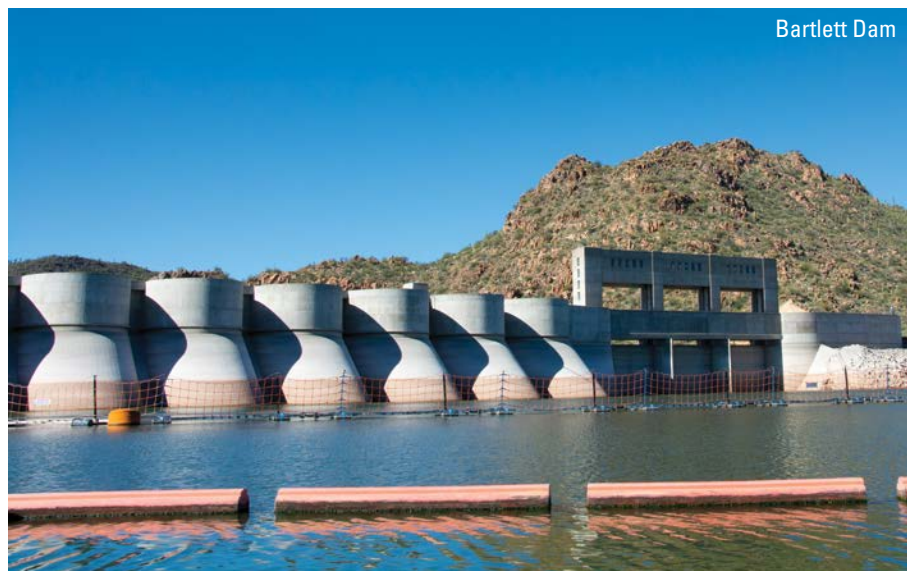
“This was our first project with Caterpillar and Empire,” Jew says. “Now that we have worked with them, there are a couple of other projects in the pipeline that we’re going to collaborate with them as well.

“They have a built-out network of technicians and people in the field. Having the ability to make one phone call and find out who’s in charge of that market is super convenient for us and our customers.”

The new solar-battery storage configuration provides the marina with about 95 percent of its energy, with the generator supplying the remainder.

“There are a lot of benefits to having a system like this,” Church says. “People nowadays are more environmentally conscious, so this could be an incentive to visit Bartlett Lake and keep their boats at the marina. We’ve reduced the noise, as well as the emissions from the old diesel generators.

“But the biggest benefit is the long-term savings,” Church says. “We expect to save anywhere from \$30,000 to \$40,000 a month with this new system. And after years of committing a lot of our operating budget to the old diesel generator system, that’s all the benefit I need.”



Bartlett Dam

# BATTERY ENERGY STORAGE SYSTEMS

MAXIMIZE RESILIENCY AND SAVINGS



**H**ybrid energy solutions (HES) are microgrids that involve a combination of power sources. They can combine proven, cost-effective renewable energy from wind or solar sources with conventional diesel- or gas-fueled generation. They can also utilize energy storage to add power system stability and enable additional energy cost reduction.

**Distributed energy resources (DERs)** are typically small-scale microgrids or hybrid energy solutions that are usually situated near sites of electricity use, bringing energy generation closer to the point of use.

## Battery Energy Storage Systems (BESS)

Energy storage systems are a key component in a hybrid microgrid and guarantee short-term backup power. Caterpillar can provide on-site energy storage systems to help stabilize transient loads, supply and absorb alternating current (AC) power, increase renewable energy source utilization, and transfer energy from time-of-generation to time-of-use. Stored energy can also be used to participate in grid services markets to avoid costs or receive financial compensation.

## Benefits of Battery Energy Storage Systems

- Robust and pre-engineered containers that are easily installed on-site
- Able to operate in tandem to provide increased power output and/or increase the battery energy capacity
- Enable optimized generator set operation
- Integrate renewable power
- Suitable for grid integration and genset transient assist
- System design integration with enhanced safety features
- Factory prepackaged and tested
- Reliable, modular, and scalable

*Contact the power systems experts at our dealership to learn more about the various BESS models, including Power Grid Stability (PGS), Mobile Power Grid Stability (PGS HD), Energy Time Shift (ETS), and Energy Capacity Expansion (ECE), as well as Compact ESS available for rent or purchase.*



# AN INTEGRATED SOLUTION



## NEW STANDBY POWER SYSTEM ENHANCES AIRPORT RESILIENCY

The Albuquerque International Sunport is New Mexico's largest commercial airport, welcoming 5.4 million passengers annually. Owned and operated by the City of Albuquerque, the Sunport averages more than 15,000 daily passengers who arrive and depart on over 400 flights through 22 gates.

A power outage can significantly disrupt an airport's operations. Like many of the nation's airports that are enhancing their ability to withstand and rapidly recover from power disruptions, the Sunport determined it needed to do the same following a widespread outage in 2019 that completely shut down the airport for five hours, resulting in the cancellation of 30 flights and creating a domino effect which resulted in flight delays across the country.

On March 19, 2019, an electrical connection inside a manhole failed due to dry rot. Standby generators backing up the passenger gates failed to start in the proper sequence. That caused paralleling controls to trip, which further prevented the generators from starting.

On the ticketing side, the standby generators started, but the circuit breaker feeding the uninterruptible power supply (UPS) that serves the airport's information technology system tripped, knocking out all communications.

"It was like a perfect storm of issues that cascaded, and it took a while for an electrician to get out here because it was later at night on a weekend," recalls Richard McCurley, director of aviation for the Sunport. "The national air space is severely impacted when you have an airport that shuts down."

That event—and several others of lesser magnitude—served as the catalyst for developing a comprehensive plan to replace the Sunport's aging standby power system. The following day, the aviation department engaged a local engineering firm, Molzen Corbin, to develop a solution.

The initial planning phase involved collaborating with the local utility provider to identify necessary improvements to the utility infrastructure, streamlining the communication processes in the event of an outage, and assessing the Sunport's emergency power system.

The planning phase, which included coordination with more than 15 separate entities, was completed within nine months.

### All Cat® solution

Fast forward to January 2023, when an award-winning design on a new standby power system was commissioned. It includes four new Cat® C27 diesel generator sets, Cat

### CUSTOMER PROFILE

#### ALBUQUERQUE INTERNATIONAL SUNPORT

**Location:** Albuquerque, New Mexico

**Application:** Standby power

**Cat® Equipment:** C27 diesel gensets (4), ISO Switchgear, ATS

*Continued on page 10*

ISO Switchgear, a new flywheel UPS system and automatic transfer switches (ATS). To enhance reliability of the system, Public Service Company of New Mexico provided new underground cables/terminations and built a new substation.

The previous configuration included four 450 kW natural gas gensets located within the main terminal building, as well as outdated switchgear.

Providing approximately twice the capacity as the previous generators, the hospital-grade Cat C27 generators occupy a 50 percent smaller footprint than their natural gas generator equivalent, and start within 10 seconds of an outage. The added standby capacity can facilitate future expansion that would provide 100 percent of the gate-side power.

The new setup features side-by-side containerized gensets that are positioned outside the terminal on the edge of the tarmac in two locations. The switchgear, UPS and ATS are housed in adjacent buildings.

The diesel generators were 60 percent less than the cost of their new natural gas counterparts. They were also seen as more reliable than gas gensets in the event of a natural disaster such as an earthquake, which could rupture the single natural gas line that serves the entire airport.

The role of the standby generators is doubly important in that the Sunport serves as an emergency shelter. A huge space that was once a ticketing office was reconfigured in 2016 and designated as a shelter for any sort of public emergency, including major weather delays, a plane crash, or a terrorist attack.

## Reliability is key

During the planning phase of the new standby power system, the main goal was to improve reliability and resiliency, said Daniel Gonzales, vice president of electrical engineering for Molzen Corbin.

“We went around the airport and looked at everything, and the biggest issue we found was how many different components were out there,” Gonzales said. “With the old standby system, the biggest issue was multiple upgrades had



been made to the controls over the years, so when power interruptions occurred, a weak point with the paralleling gear was exposed.”

Molzen Corbin worked hand-in-hand with Cat dealer Wagner Power Systems to determine the available options for designing an integrated package.

“A stipulation of the project was to provide a manufacturer’s solution, so it’s all Cat products—everything works seamlessly and together,” Gonzales said. “The main emphasis was: How do we design a system so that there’s no gap in power when an outage occurs?”

The switchgear was built at the Cat Switchgear facility in Alpharetta, Georgia. A factory witness test was conducted, then the switchgear was shipped to Albuquerque, said Rodney Sanchez, a senior sales engineer for Wagner Power Systems.

“The switchgear has an intuitive operator interface, so you can view status of the generators, and the overall system as well,” said Clint Forest, a general foreman with U.S. Electric who helped perform the installation.

Several representatives from Wagner, including Sanchez and project manager Allison Ehlert, assisted contractor U.S. Electric with the installation and startup phase.

Construction activities had to be carefully coordinated to minimize downtime at the airport, including working late-night hours between flight operations. The Cat dealer provided additional manpower, rental gensets and cabling as the new system was being set up.

## Sustainable solution

The new Cat C27 gensets are rated U.S. EPA Tier 4 Final, and have a lower emissions profile than the previous generators, enabling the Sunport to remain within the parameters of its existing air quality permit.

“Even though they are bigger engines with higher displacement, they still have cleaner emissions than the older 450 kW generators,” Gonzales said. “The C27s have much lower emissions over their life cycle compared to the alternatives we considered.”



**“As far as what we see in our industry, Wagner has made a big investment in New Mexico. They have an impressive new facility that helps support a lot of our clients, and we like working with them when we specify equipment for projects.”**

**DANIEL GONZALES**, Vice President of Electrical Engineering,  
Molzen Corbin



The units are capable of operating on jet fuel in an emergency, and are capable of running on biodegradable Hydrotreated Vegetable Oil (HVO)—a diesel-like fuel that can be produced without fossil resources by processing renewable waste lipids—which can reduce CO<sub>2</sub> greenhouse emissions by up to 90 percent.

The City of Albuquerque has a goal of achieving more sustainable, green solutions, and the new Cat gensets are part of the overall equation as the aviation department implements other carbon reduction measures across the airport, including solar energy. The Sunport is seeking accreditation from Airports Council International (ACI), an internationally recognized program that provides a framework for carbon management.

#### **Nearby dealer support**

One of the deciding factors in specifying the Cat gensets and switchgear was the ongoing support provided by Wagner Power Systems, Gonzales said. Even though the former standby system included various equipment brands, Wagner was always the first call when help was needed.

“From the aviation department’s perspective, ongoing maintenance of the standby system is a high priority, and we wanted to ensure that they would continue receiving that dedicated support,” he said.

The Sunport has a long-term service agreement with Wagner Power Systems that includes preventive maintenance and handling any repairs. The dealership is located five miles south of the airport, and provides prompt service when needed.


“I’ve been here four years, and the Wagner technician (Phillip Burns) was here before I arrived,” said airport facilities manager David Urioste. “His institutional



knowledge of our airport emergency power system and our utility provider, combined with his knowledge of Cat products, makes him an ideal fit.”

Adds Gonzales: “As far as what we see in our industry, Wagner has made a big investment in New Mexico. They have an impressive new facility that helps support a lot of our clients, and we like working with them when we specify equipment for projects.

“There were some pretty interesting challenges as part of this retrofit,” Gonzales adds. “But change orders resulting from unforeseen developments were only 1.5 percent, which from a national average standpoint is phenomenal for a complex project like this.”

*The new Cat® standby power system was recognized as the project of the year in 2023 by the New Mexico Society of Professional Engineers.* 





**UTILITY USES ENERGY MANAGEMENT SOFTWARE TO HOLD DOWN RATES**

# A PLATFORM FOR SAVINGS

Established in 1894, Reading Municipal Light Department (RMLD) is a municipal electric utility serving nearly 80,000 residents in the towns of Reading, North Reading, Wilmington, and Lynnfield Center. Located 15 miles north of Boston, the utility has the largest electrical load among the 41 municipal light departments in Massachusetts.

With more than 32,500 meter connections, residential customers comprise approximately 40 percent of RMLD’s electricity sales, while commercial and industrial customer segments account for 30 percent each. RMLD serves more than 4,000 commercial and industrial customers in its service area.

Not only does the utility consistently receive high marks for customer satisfaction, but RMLD has developed a reputation

for implementing leading-edge technologies and methods to hold down electric rates.

“We’re a microcosm of the greater Boston area, and are close to a lot of technology and development centers,” says RMLD general manager Greg Phipps. “We’ve basically positioned ourselves as a sandbox for solution providers to come here and try out new technologies in a real-world environment.”

### Navigating the Energy Transition

EPA restrictions and marginal economics have caused a significant number of generation plants to announce retirements in New England. Municipal electric utilities in the



Northeast region have faced significant energy cost increases in recent years due to the retirement of older generation plants, and the impact that shifts in the sourcing of generation have on transmission infrastructure that must handle more and smaller distributed generation assets.

In 2017-2018, ISO-NE customers in the Northeastern Massachusetts (NEMA) region saw capacity rates increase more than four-fold to \$180,000 MW-Year.

And three years ago, the Massachusetts Clean Energy and Climate Plan for 2050 was signed into law, establishing specific targets for utilities to lower their carbon emissions by 2030, and meet progressively higher thresholds until attaining zero emissions by 2050.

Given that energy for the region is supplied mostly by natural gas—more than 50 percent—the climate bill will have a “seismic impact” for utilities that must replace natural gas as the primary energy source, Phipps says.

The bill also mandates a move toward the use of electric air source heat pumps for residential customers, who currently are 95 percent fueled by natural gas and oil.

“We’re in a situation where we’re going to double the electrical load over the next 25 years, while half of the current supply (natural gas) is going to drop down to just 10 to 15 percent,” Phipps says. “We’re at the beginning of a massive energy transition in terms of how we operate our business, how our power is generated, how we interact with our customers, and importantly, how we help our customers optimize their energy utilization.”

“It’s a massive change in terms of figuring out how to make it work,” Phipps continues. “We’re looking at utilizing a lot of different technologies, such as geothermal, carbon capture, fuel cells, experimentation with hydrogen and battery storage, while also incorporating data analytics. The good news is, we’re taking action now.”

### Reducing peak demand

The utility purchases power from a variety of sources for distribution to its customer base. With a peak demand of nearly 170 megawatts and rising capacity and transmission

costs representing 40 percent of the cost structure, peak demand reduction is a constant focus in order to reduce power supply costs and maintain competitive electricity rates.

“We want to help our customers reduce their demand when our peak is high so that we can reduce overall system costs,” says Bill Bullock, Director of Integrated Resources for RMLD.

High-value hours occur when prices increase and charges related to critical peaks are assessed. Independent system operators (ISOs) and regional transmission organizations

### CUSTOMER PROFILE

#### READING MUNICIPAL LIGHT DEPARTMENT

**Location:** Reading, Mass.

**Application:** Peak Shaving

**Cat® Equipment:** AMP software, 3520H gas generator set

*Continued on page 14*

# CUSTOMERFEATURE

(RTOs) have an obligation to reliably meet their regions' energy needs, even during the highest periods of energy use. To plan for these periods, power pools need to determine “how high is high” when it comes to the need for electricity.

When the system-wide need for electricity is at its peak, the ISO determines how much each energy provider has contributed to that peak and assesses them accordingly. The installed capacity (ICAP) Tag is assessed during the single highest hour of system-wide electricity usage during the year. Energy providers, including municipal utilities, are assessed a share of the peak load based on the energy usage in their service area during the ICAP Tag hour.

Because municipal utilities have to pay this cost, they have no choice but to pass it on to customers based on each customer's demand contribution to the system-wide peak when the charges are assessed. On the surface, reducing these demand charges seems as simple as reducing energy usage across the service area during critical peak periods. But in practice, it's harder than it sounds, says Dean Musser, a managing director for Caterpillar Energy as a Service.

## Data-driven energy management

Distributed Energy Resource Management System (DERMS) software from Caterpillar remotely monitors energy system signals, analyzes data, and accurately predicts opportunities to reduce energy costs for sites with natural gas and renewable power generation, storage, and microgrids.

By using Cat® AMP software, investor-owned and municipal utilities gain increased visibility into the customer-side assets in their service areas, making it easier to incorporate these resources into their planning and programming.

By monitoring energy market conditions and capitalizing on opportunities to dispatch assets during predicted premium price



hours, utilities such as RMLD can lower costs that are passed on to customers.

“The Cat AMP technology really enables us to deploy a solution for our customers that helps us reduce costs on our system. In turn, we can share the benefits with them,” Bullock says. “It’s an out-of-the-package solution that works without a lot of upfront investment on our part.”

Caterpillar’s DERMS offering provides municipal and cooperatively owned utilities with the ability to meet their customers' expectations for new programs. The software platform works through, rather than around utilities, to increase customer engagement without getting between utilities and their customers.

“The package enables us to alert customers when these peaks are occurring, so they can turn down motors or reduce energy consumption in other ways,” Bullock says. “By monitoring their usage and integrating it with their systems, we not only give them the information they need to shift energy use to a time that's more convenient for them, we can also share the benefit of reduced costs. And, it's a very transparent system.”



**“A big part of the value Caterpillar provides is the physical assets—whether it’s energy storage or reciprocating generators—but also the software systems and the data analytics... the fact that Caterpillar has integrated those assets makes it easier for us.”**

**GREG PHIPPS**, General Manager  
Reading Municipal Light Department



Internally, RMLD utilizes the Cat software platform in a variety of ways, Phipps says. This includes:

- Internal analysis of meter data
- Monitoring solar energy generation
- Historical analysis
- Dispatch of peak shaving assets, including generators and battery storage

“Our integrated resources group uses the data for analytical purposes, because the system provides a lot of useful data,” Phipps says. “We use it for power supply management and rate setting. Our grid assets team uses it to track different parts of our network. And our control operators use it to monitor the status of our battery storage and generation systems. So Cat AMP technology is embedded deep into the organization.”

For utilities and multi-site customers, Cat AMP provides automated asset dispatch capabilities, and unrivaled asset monitoring that aggregates views across energy systems, or drills down to the status of individual assets at targeted locations.

The Cat AMP system tells RMLD when to run its Cat G3520H generator set to help supply power during peak demand periods on the grid. When the software notifies the utility that a peak is imminent, it automatically dispatches the Cat genset, and then shuts it off once the peak passes. Since the Cat genset was installed in 2016, Phipps says it has resulted in over \$4 million in net savings to RMLD ratepayers.

### **Technical sophistication, plus local support**

Since late 2014, RMLD has worked with Cat dealer Milton CAT Power Systems when it engaged in discussions to purchase its Cat generator set. Involving the Milton team early in the process helped RMLD reduce its energy needs, while also helping meet its environmental, social and governance (ESG) obligations, says Scott Martel, vice president of power systems for Milton CAT.


“From the dealer perspective, we bring the understanding of local marketplace regulations that are important to our customers,” Martel says. “A lot of the customers we’re serving today, maybe we’ve sold them a piece of construction equipment in the past, or we’re helping maintain some of the generators at their facilities. By having that local presence, we not only know who the customer is, what they do and how they operate, but it’s something that really couldn’t be done from somewhere else.”

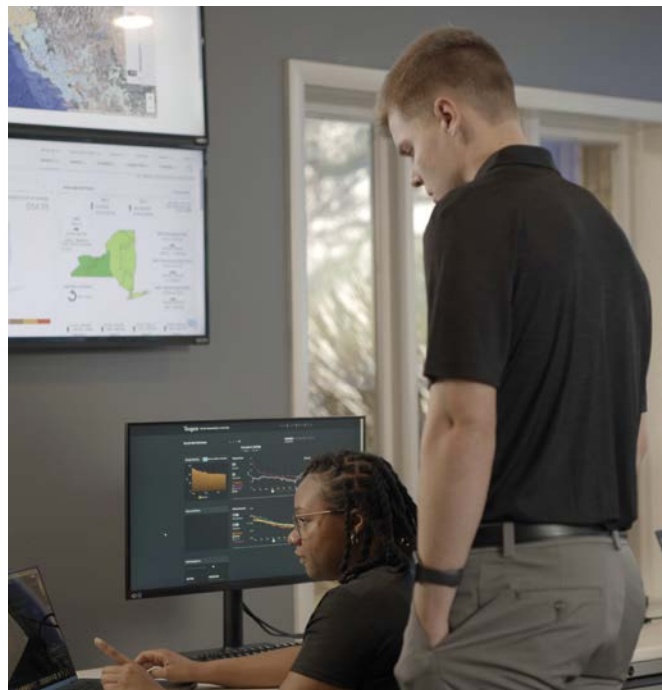
Phipps appreciates the level of technical sophistication provided by Caterpillar, backed by local Cat dealer support.

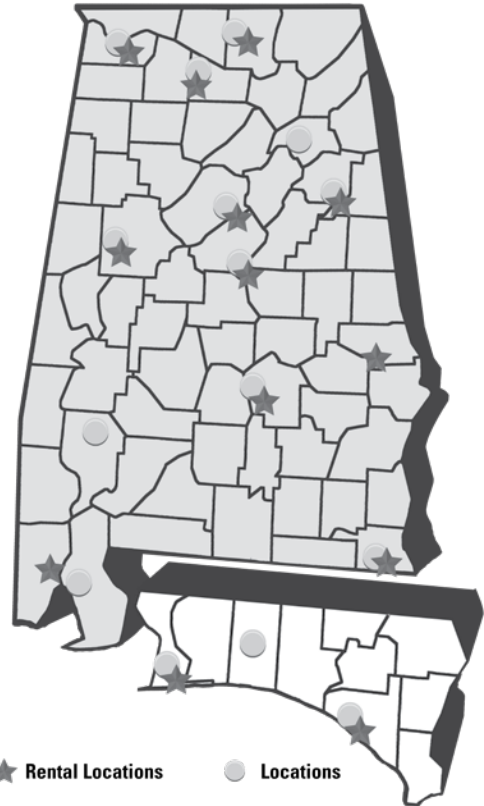
“A big part of the value Caterpillar provides is the physical assets—whether it’s energy storage or reciprocating generators—but also the software systems and the data analytics,” Phipps says. “We are highly data-oriented, and the fact that Caterpillar has integrated those assets makes it easier for us.

“We’re trying to automate as many systems as we possibly can, and the overall operation needs to be accurate,” he says. “The Cat energy management software platform is reliable and predictable, and does a good job in terms of helping us handle the peaks, which is very important to us.”

Musser says the Cat DERMS software platform can help utilities and commercial and industrial customers monetize their assets and keep up with the rapid pace of change.

“The energy transition is here to stay, and we’re helping customers like Greg navigate it,” Musser says. “There are certain areas of the country that are maybe further along than others when it comes to adopting new technologies, but the whole U.S. and North America will all be on board as this increasingly becomes the normal mode of operation.” 





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