NAVIGATING THE EVOLVING ENERGY LANDSCAPE:

A Guide for Municipalities Leveraging Power Solutions to Serve their Communities

CAT®

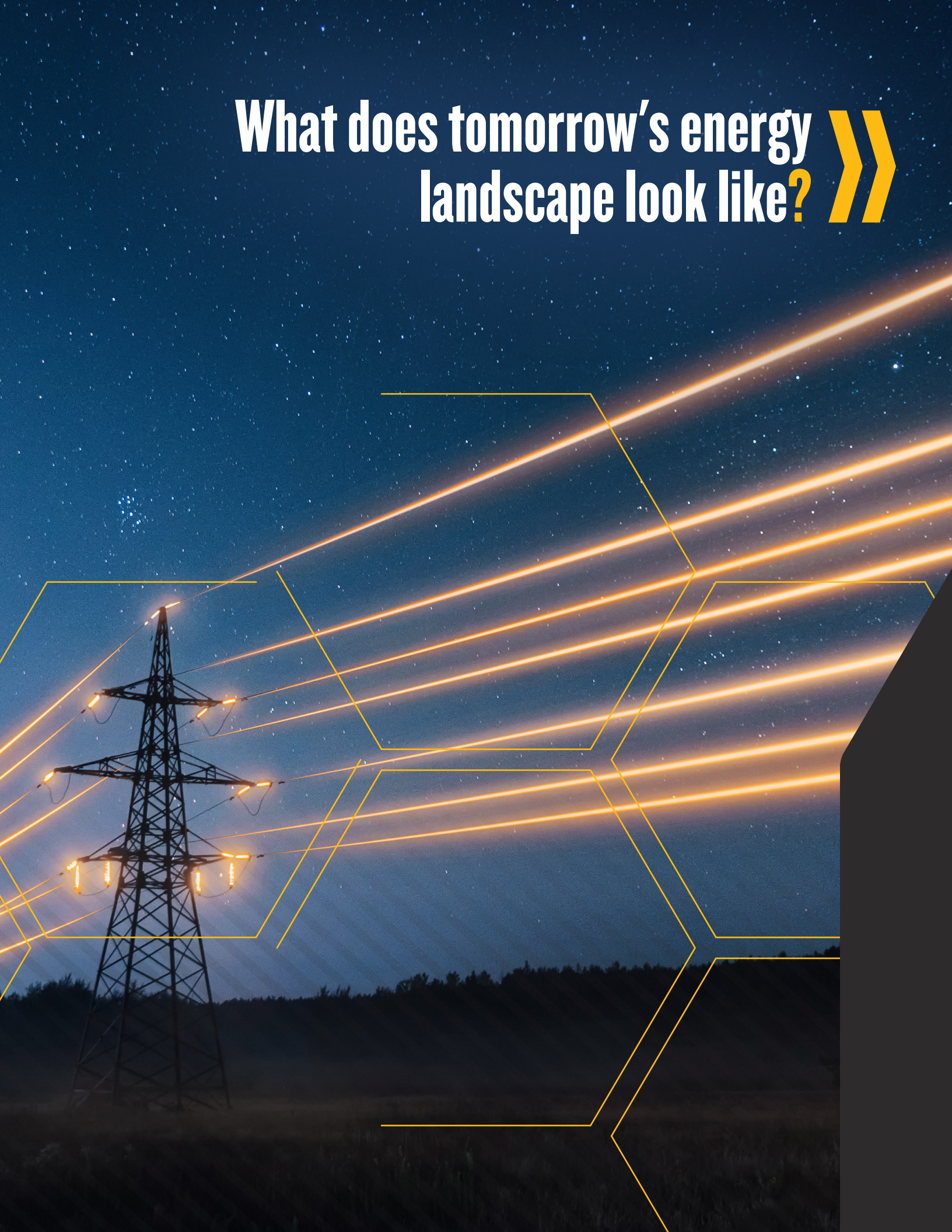
WELCOME TO A NEW ERA OF ENERGY.

The energy landscape is undergoing a significant shift.

For municipalities, this change brings both challenges and new opportunities. Communities are expecting faster, more reliable access to power and they're looking to you to lead the way.

You don't need all the answers to get started. What you do need are viable options and the right partner to help you navigate them. We're here to support your journey with solutions that can help you meet today's demands while planning for tomorrow's needs.

What does tomorrow's energy landscape look like?



THE DEMAND IS REAL

Today's energy infrastructure is struggling to keep up with growing demand. We need solutions that solve current challenges and prepare for what's next.

By 2040, new demand could **surpass anything we've seen in history.**

US Power Demand Projected Through 2040

2026

800 TWh

power needed for data centers

2030

+18%

portion of total electricity demand just from EV charging[2]

(up from 0% in 2023)

2040

+40%

overall electricity demand growth in US[3]

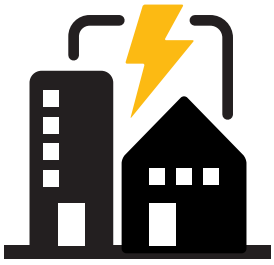
CHALLENGES OVER THE NEXT DECADE

INCREASED DEMAND

70 GW

INCREASE of US power demand through 2030[6]

from data centers, EVs, energy intensive industry and building electrification



RETIRED RESOURCES

50 GW

coal **RETIREMENT** through 2030[6]

RENEWABLES

2-3x

renewable-generated **CAPACITY** needed to replace a single MW of fossil fuel generation[1]

1. JP Morgan 2. A|B Bernstein 3. IEA World Energy Outlook 2023 4. EPRI Electric Power Research Institute, "Utility Preparation for Electrification at Scale" 2024
5. BofA Global Research 6. EIA, Platts, BNEF, BofA Global Research

YOUR SITUATION IS UNIQUE.

Your solution should reflect the unique needs of your community. What's a challenge in one region might not be an issue somewhere else. With so many options available, it can be hard to know where to start. That's why working with a trusted expert matters. They'll take the time to understand your goals and ask the right questions to guide you toward the best-fit solutions.

- → **WHAT'S YOUR BUSINESS LANDSCAPE?**
- → **WHAT CHALLENGES DOES YOUR COMMUNITY FACE?**
- → **WHAT ARE YOUR GOALS & MOTIVATIONS FOR MAKING ENERGY DECISIONS?**
- → **WHAT IS YOUR LONG-TERM VISION?**

Your energy solutions will also be influenced by the following factors:

- → **SITE AVAILABILITY**
- → **ACCESS TO FUELS**
- → **YOUR BUDGET**
- → **YOUR DESIRE FOR RENEWABLES AND EMISSIONS REGULATIONS**

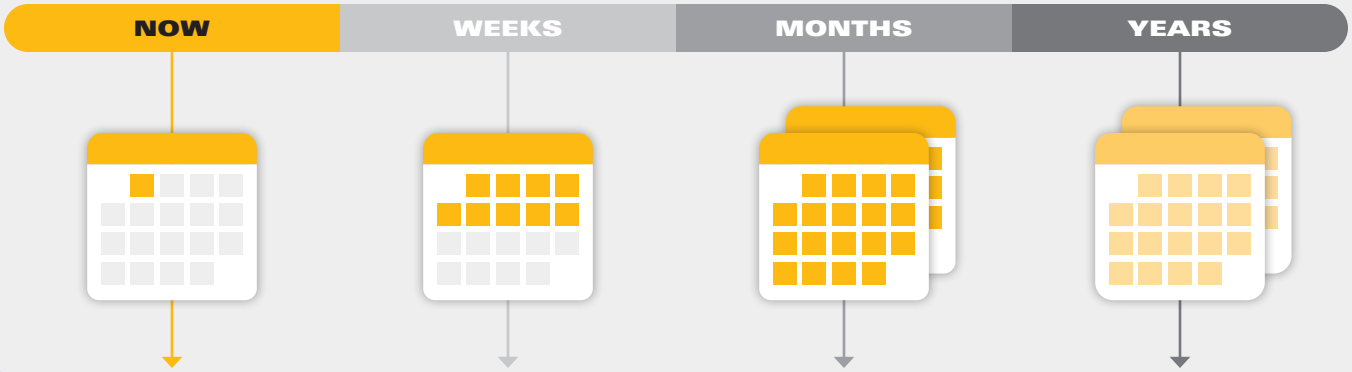
We take the time to understand your community and your goals to help guide you toward energy solutions that align with your needs, both now and in the future.

Let's get started.

HOW TO USE THIS PLAYBOOK »

This playbook outlines a range of solutions based on how quickly additional power is needed. Start by identifying when your community or customers will need more power, then explore which options align with that timeline.

A SOLUTION TO FIT ANY IMPLEMENTATION TIMELINE



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If you're unsure of how much time you have, the solutions in this guide can help you choose by providing the benefits each one delivers.

Either way, this guide can help get you going. **Our priority is to provide customers the power they need.**

POWER SOLUTIONS
Aligning Energy With Urgency

EMERGENCY SOLUTIONS	SEMI-PERMANENT SOLUTIONS	AGGREGATE ASSETS INTO A VPP	BUILD A PEAKING PLANT
NOW	WEEKS	MONTHS	YEARS

SOLUTION TYPE

Generators, Renewables, Energy Storage, Turbines
Distributed Energy Resource Management System (DERMS) Technology

WHEN TO USE

EMERGENCY SOLUTIONS	SEMI-PERMANENT SOLUTIONS	AGGREGATE ASSETS INTO A VPP	BUILD A PEAKING PLANT
Disaster or crisis	Seasonal load support	To add grid capacity	During periods of high electricity demand
Pop-up events	Remote locations or sites	Participate in available energy market programs	To support grid stability
Backup power	Transmission delays	Enhance grid resilience	For economic load balancing
	Utility constraint		

BENEFITS

EMERGENCY SOLUTIONS	SEMI-PERMANENT SOLUTIONS	AGGREGATE ASSETS INTO A VPP	BUILD A PEAKING PLANT
Temporary (days to months)	Temporary (weeks to years)	Fully customizable	Lower long-term operational costs
Cost-effective	Cost-effective	Revenue generation	Revenue generation
Mobile/Stationary	Relocatable	Maximize the value of existing assets	Flexible integration with renewables
Renewable fuels	Renewable fuels		Improved reliability

NOW

Immediate, temporary power.

EMERGENCY SOLUTIONS »

Whether facing an unexpected outage or executing your emergency preparedness plan, reliable short-term power solutions are within reach. From generator sets to compact battery storage, these mobile and scalable systems are designed to meet immediate demands while also serving as a critical bridge to more permanent, long-term energy solutions.

RENT OR OWN?

Explore the benefits below to find the right fit for you.

WHY RENT?

1. Determine Your Power Needs

Renting helps you avoid delays, additional expenses and rework as you understand your power needs.

2. Avoids Unnecessary Costs

Renting a genset that is ready to run on day one means no need to worry about labor, installation, or maintenance.

3. Establish Your Energy Mix

You can test out multiple combinations of products to find your ideal solutions before you buy.

WHY OWN?

1. Adds Flexibility

Purchased solutions offer flexibility to use them over and over again as and when you need them.

2. Cost Effective

If you know what you need, owning a power asset is typically more cost effective rather than renting over extended periods of time.

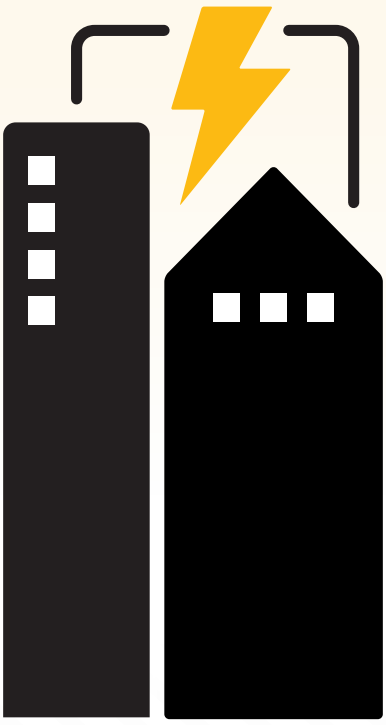
TEMPORARY POWER BENEFITS

Choose from power solutions that are **customizable**

Temporary, so you can try before you buy or simply keep renting

Scale up/scale down as your project needs change

Mobile gensets **transport** easily



SEMI-PERMANENT SOLUTIONS »

Economic development depends on more than just location it requires immediate, reliable access to power. For municipalities looking to attract new businesses, energy availability can be a deciding factor in site selection.

When permanent infrastructure isn't yet in place, semi-permanent bridging solutions offer a dependable alternative. These systems can be deployed quickly and operate for extended durations, ensuring power is available when and where it's needed without delaying growth or investment.

GETTING CLEAR

Bridging power solutions often cause confusion, so let's clear the perception of what these can offer.

MYTH	FACT
✗ They only work for a few weeks	✓ **They can be in place for multiple years**
✗ The options only include diesel fuel gensets	✓ **Options include natural gas gensets, turbines, other renewables and batteries**

GAINING PROJECT APPROVALS

It's important to have all the right voices involved in your planning discussion:

- **+ BOARD**
- **+ CUSTOMER**
- **+ SOLUTION PROVIDER**

Make sure your plan includes ancillary equipment, like the cabling you'll need, and how you'll source it. The more robust your plan, the easier it is to gain approval.

Caterpillar can be that single point of contact for helping you develop your bridging power plan.

WEEKS

A solution that doesn't take years to stand up.

USE WHAT'S IN YOUR COMMUNITY AS A VPP

One effective way to quickly add capacity is by identifying and aggregating existing power-generating assets within your community. These can be grouped into a managed network forming a Virtual Power Plant (VPP) to address capacity constraints in a coordinated and efficient manner.

While VPPs can be deployed rapidly, they're not just a short-term fix. They offer flexible, scalable solutions that can support both immediate and long-term energy needs by leveraging a range of assets.

HOW TO BUILD A VPP

Start by finding the generation assets and flexible loads in your area, then connect them using a Distributed Energy Resource Management System, or DERMS. This enables you to control assets through technology. DERMS, like Cat® AMP, can locate and interconnect each asset, forming your VPP.

VPPS automatically manage distributed energy resources to reduce grid load when needed. When activated, they can deliver significant load relief, sometimes offsetting megawatts of demand.

MONTHS

KNOWING WHERE THE ASSETS ARE SPEEDS UP THE PARTICIPATION PROCESS.

HOW TO FIND NEARBY ASSETS

USE A PROVIDER

An **ENERGY SOLUTIONS PROVIDER** can find the assets for you. They use connected asset locator software to quickly provide the number of assets by region.

RUN AN INCENTIVE PROGRAM

You can **INVITE ANYONE** who might have an existing generation asset on their site to register their asset using an incentive program. They get paid to participate, and you understand where the assets are and get permission to use them for supplementing the grid or load shedding.

FIND ON YOUR OWN

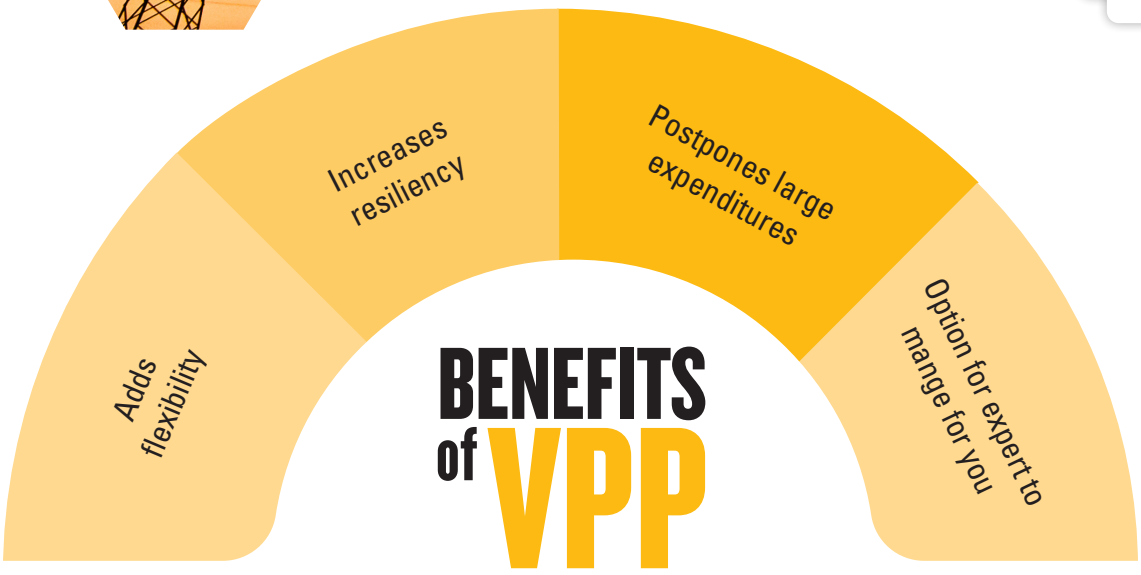
If you are locating the assets yourself, **FIND OUT**:

Technology details
(product info / serial number)

Age of the assets in the VPP

The application they are intended for: continuous or standby.

Certain VPP assets are not eligible for VPP use as they are reserved exclusively as emergency back-up power.



MANAGING A VPP WITH DERMS

You've set up a VPP. How will you manage it? Do you want a fully automated VPP? Do you want some level of control of your VPP?

VPPs provide visibility, control, and peace of mind.

A DERM solution flexes to let you make changes any time, through desktop, mobile or SMS, so you can switch from full automation or manual control and back, almost instantly.

A good DERM solution can provide:

- ✓ **FINANCIAL SAVINGS & EARNINGS REPORTS**
- ✓ **DEMAND-MANAGEMENT AUTOMATION & EMERGENCY OVERRIDE**
- ✓ **ASSET HEALTH**
- ✓ **MAINTENANCE OR FAULT REPORTS**
- ✓ **PEAK PREDICTIONS**
- ✓ **CAN MANAGE MULTIPLE BRANDS AND ASSET MANUFACTURERS**

IMPLEMENTING DERMS WITH A PEAKING PLANT »

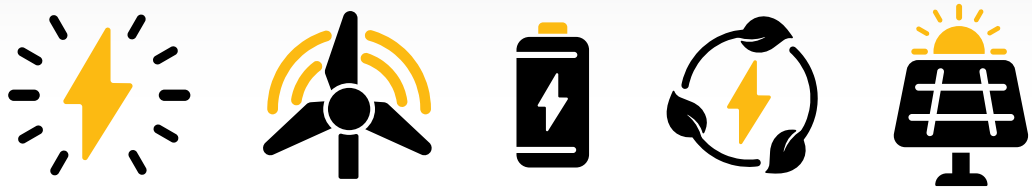
SMARTER ENERGY, SIMPLIFIED.

A peaking plant is a power facility designed to start up quickly and run to meet sudden spikes of electricity demand. When integrated with a DERMS solution, it helps optimize local generation and storage, reducing reliance on expensive grid purchases and improving budget efficiency.

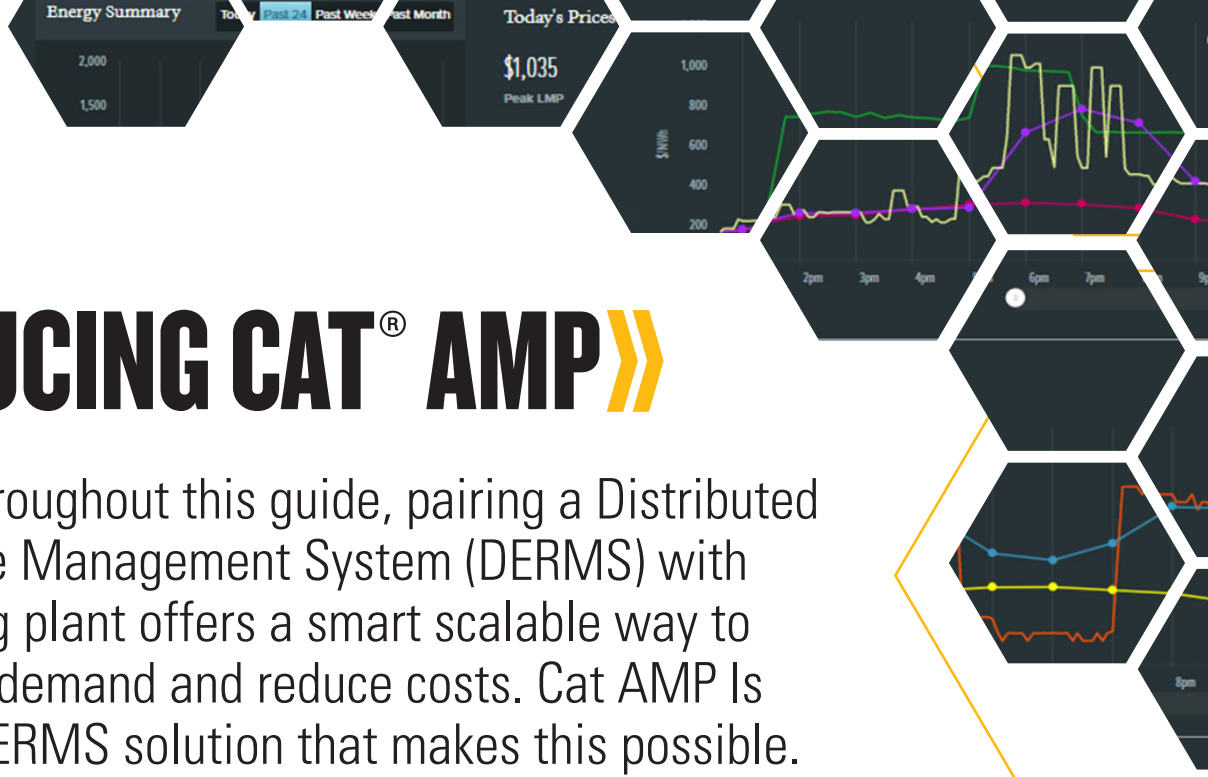
Deploying a Distributed Energy Resource Management System (DERMS) alongside a peaking plant may sound complex, but it doesn't have to be. From planning to integration and commissioning you can leave the heavy lifting to us! Cat® experts can handle the full process so you can focus on serving your community.

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.



MONTHS–YEARS



INTRODUCING CAT® AMP»

As discussed throughout this guide, pairing a Distributed Energy Resource Management System (DERMS) with a VPP or peaking plant offers a smart scalable way to manage energy demand and reduce costs. Cat AMP Is our 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.

How does it work?

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.

Benefits

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.

FINANCIAL STRATEGIES TO SUPPORT YOUR ENERGY GOALS »

OPTIONS TO HELP MAKE YOUR ENERGY PROJECT MORE AFFORDABLE.

FINANCING	Spreads the cost of energy projects over time, making them more budget-friendly by breaking expenses into manageable payments. Cat Financial can provide finance options to front the engineering and construction of the project including equipment costs.
GRANTS & INCENTIVES	Government programs at the local, state, or federal level can provide funding through grants or offer tax credits to reduce the cost of energy solutions like solar or battery storage. These incentives can significantly lower upfront expenses, especially for emissions-reducing projects.
POWER PURCHASE AGREEMENTS *(PPAs)*	Designed to help customers reduce overall expenses while unlocking new revenue opportunities through strategic use of DERs. These assets can participate in energy market programs or facilitate the sale of surplus energy back into the grid, offering financial benefits and mitigating future energy cost volatility. Although configuration may vary, these are commonly financed, owned, and maintained by third-party providers. This often results in minimal upfront investment while ensuring reliable access to onsite power in the event of a grid outage.
BUY IT OUTRIGHT	Involves a higher initial investment from purchasing the equipment upfront, but the buyer owns the full system and retains 100% of the financial benefits from any monetization of the asset.
RENTAL	A flexible, low-risk way to evaluate the solution before making a long-term commitment. It allows organizations to gather real-world performance data and build confidence in the investment without locking in budget upfront.

YOUR ENERGY JOURNEY WILL EVOLVE »

The resources in this playbook equip you with facts you'll need to get started on your energy journey. Make changes today and see the results you want quickly.

Caterpillar can help.
Schedule a consultation with a Caterpillar Energy Expert.

Let's Do the Work.

Click Here to Learn More

CATERPILLAR ELECTRIC POWER is an industry expert in the changing energy landscape. We can help you find the right path to resilient, affordable power. From energy-source blending to storage, integrated controls, and management technologies, we bring holistic solutions ready for any stage in the journey.

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