Ameresco with Energy Changemakers
**Redesigning Power White Paper**

# When the Grid Can’t Keep Up

## Why Large-Load Developers Are Becoming Their Own Power Suppliers

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# Introduction

Headlines are everywhere about the electric grid straining under a surge in demand from data centers and other large loads. But the more urgent story is: How can the grid evolve to meet this new demand at speed? Utility and regional grid planning efforts often take years and cost billions. Large-load developers can't afford to wait, not with interconnection queues stretching into years and costs climbing. They need speed to power.

That urgency is being driven by a new class of demand.

AI is no longer just a technology story; it is fundamentally an electricity story. Hyperscale data centers now require city-scale, always-on power, making access to reliable energy a primary constraint on growth. Utilities, large-load developers, and infrastructure partners will each play a role in delivering timely, effective grid solutions.

This shift is already playing out across project development strategies. Data center developers and infrastructure platforms are expanding their control over both facility design and energy supply to reduce risk and accelerate timelines. These moves reflect a broader shift that energy planning is happening in parallel.

Pressured to balance grid reliability with large customer priorities, utilities are moving in a new direction — shifting toward a more flexible, decentralized grid model that leverages distrib-uted energy resources (DERs) built by large-load developers. Utilities once eyed those behind-the-meter (BTM) resources as competition but now recognize them as strategic assets. Customer-owned generation, storage, demand response: they are emerging as real tools for managing load growth and shaving peaks while major grid infrastructure catches up.

Ameresco has delivered large-scale onsite power, resilience, and microgrid projects for the U.S. military for more than two decades. In partnership with Energy Changemakers, this white paper applies Ameresco's lessons to the next wave of large-load developers—from AI-driven data centers to industrial facilities—and explores how developers, utilities, and energy infrastructure partners can move from grid constraint to site-specific, scalable strategies.

KEY INSIGHTS INCLUDE EXPLORATIONS OF HOW:

1. A balanced portfolio of firm power resources, large-scale renewables, and DERs can accelerate speed to power while improving reliability, resilience, and cost control for energy-intensive facilities.

2. Collaboration among utilities, large-load developers, and third-party energy partners enables scalable, digitally enabled, site-specific generation solutions tailored to data center and industrial customer needs.

3. Military deployments demonstrate integrated DER strategies that can enhance reliability and resilience across other high-demand sectors.

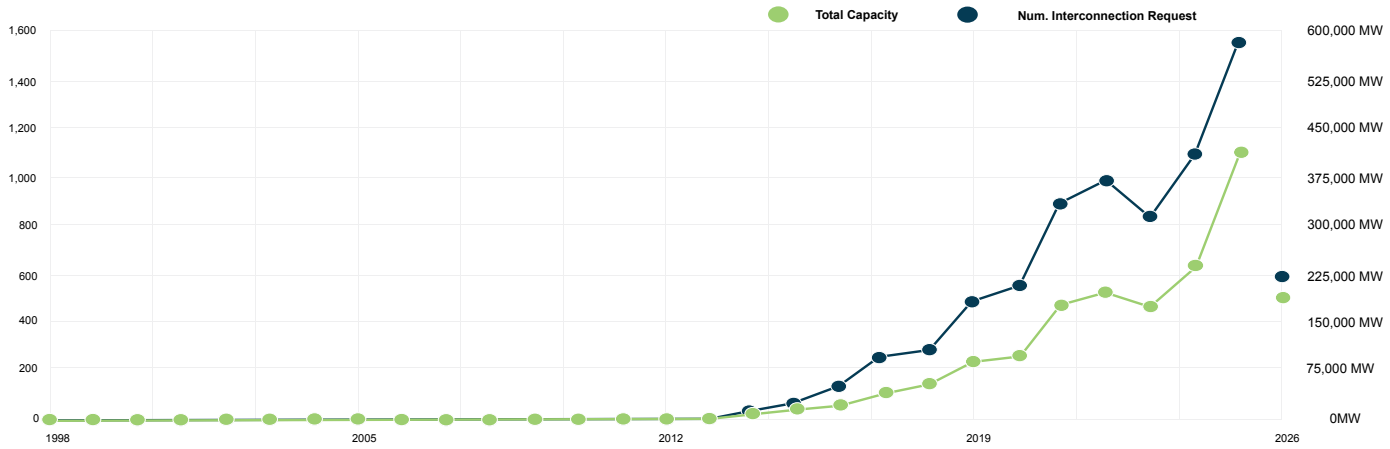
# The Limits Of The Centralized Energy Model

The U.S. Energy Information Administration (EIA) expects total U.S. electricity generation to increase 1.4% in 2026 and 2.5% in 2027, after growing by 2.7% in 2025. It would be the first time electricity generation has grown for four straight years in more than two decades.

Data centers needed to support AI growth are expected to increase total and peak energy demand across the United States for at least the next decade. Deloitte estimates that power demand from AI data centers will grow 30-fold, to 123 GW by 2035, from only 4 GW in 2024. More than 35 GW of data center capacity was under construction at the end of 2025, according to global commercial real estate firm JLL.

In the United States, there is insufficient generation and transmission capacity to meet this rising demand using centralized resources alone. More than 1,800 GW of proposed power generation waits in utility interconnection queues, a number that has been quickly rising in recent years.

### 1995-2026 INTERCONNECTION CAPACITY OVER TIME, ALL STATES, BY DATE ENQUEUED



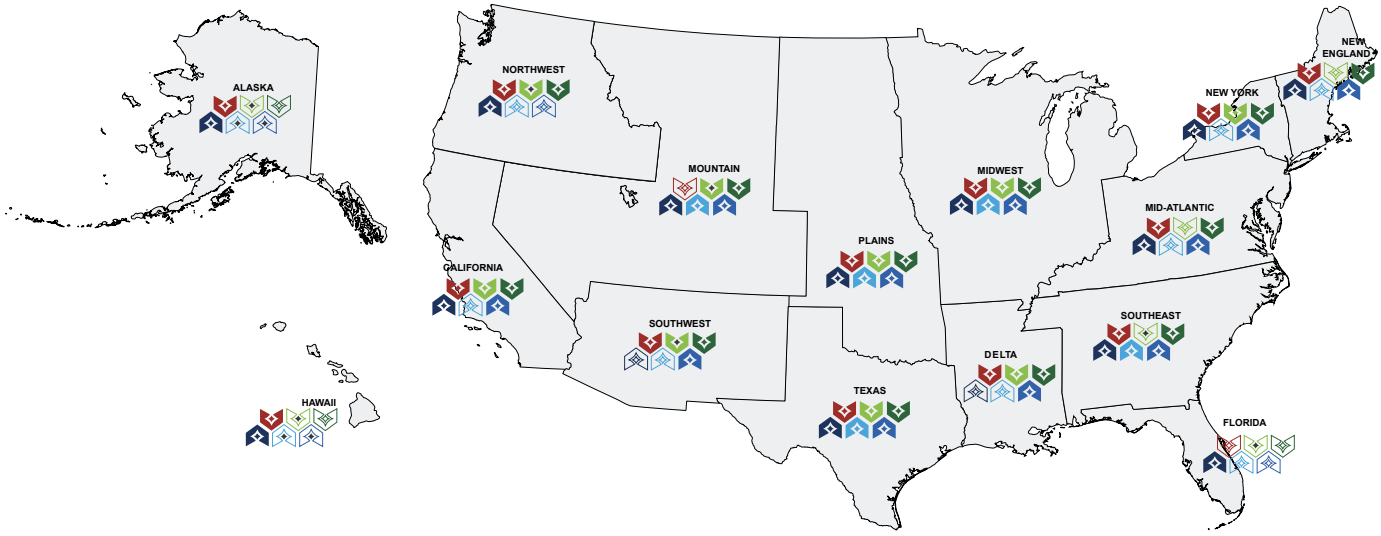

**1.74 TW**

**Total Capacity**

**7,936**

**Requests**

Source: Interconnection.fyi

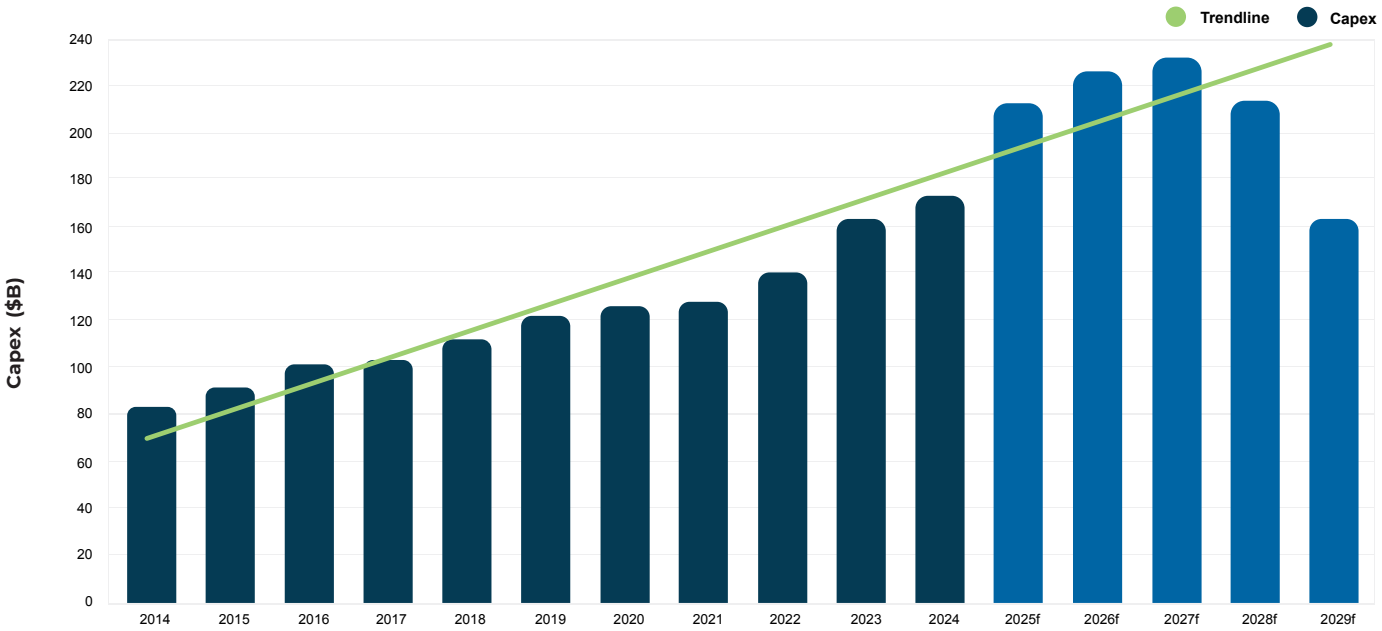




Source: U.S. Department of Energy

The generation interconnection queue has surged in recent years in part because the U.S. transmission system lacks the capacity to deliver the additional electricity needed to meet rising demand, resulting in long interconnection delays. The U.S. Department of Energy's most recent "National Transmission Needs Study" shows that virtually every region in the United States requires significant transmission investment to meet future generation and energy demand needs.

## ENERGY UTILITY ACTUAL AND ESTIMATED CAPEX




Source: Regulatory Research Associates, a group within S&P Global Commodity Insights

Building large generation and transmission infrastructure projects is a costly, lengthy, and complex process for utilities. According to S&P Global, energy utility investments are projected to reach $227.8 billion in 2026 and $233.3 billion in 2027—up from $173 billion in 2024, $164 billion in 2023 and $146 billion in 2022. With all that investment, electric utility rates are rising rapidly. Since 2021, electricity prices have risen by nearly 40 percent, with residential retail prices up 7 percent in 2025 alone.

With critical supply chain shortages hampering infrastructure investment plans and pushback from customers and regulators against additional rate increases, utilities are seeking more cost-effective ways to meet their challenges.

In many cases, developers are prioritizing sites where they can combine grid access with supplemental or onsite energy solutions to improve certainty.

# A Behind-the-Meter Solution with Potential to Scale

Severe grid limitations are slowing the race to build data centers to meet the AI industry's compute needs. To overcome these constraints, data center developers are expanding their approach to energy strategy, bringing generation planning, partnerships and onsite behind-the-meter (BTM) solutions into earlier stages of development.

In 2030, 38% of facilities are expected to use some onsite generation for primary power, up from 13% in 2024. More than a quarter of data centers expect to be fully powered by onsite generation by 2030, a 27x increase from just 1 percent of facilities in 2024. As JLL stated in its 2026 North America Data Center Report:

> "Grid connection timelines for data centers still average four years or longer across much of North America. Developers that bring solutions to utility negotiations—including phased demand, load flexibility, or supplemental power—are often able to secure accelerated connection timelines. Given extended grid lead times, developers are increasingly deploying bridge solutions and permanent onsite power strategies."

As a result, **more than 35 GW of data center capacity is expected to be self-generated by 2030**, reflecting a structural shift toward onsite and hybrid power strategies.

Utility planners and data center developers recognize that onsite DERs can serve both parties' goals and benefit the grid as a whole. These generation resources reduce utility transmission and distribution upgrade costs. Utilities can also incentivize owners to operate their DERs in ways that help meet system-wide peak demand, thereby offsetting the need to build more expensive centralized generation. DERs can also provide ancillary services that improve grid reliability and resilience.

This shift is already underway at scale. A growing share of developers are planning for onsite or BTM generation as a primary energy strategy, not just backup—marking a fundamental change in how large loads are powered.

# The Role of Site-Specific Solutions in a Balanced, Future-Ready Portfolio

When a large-load developer like a data center is planning onsite DERs, it benefits both the facility and its utility to use digital, modular and site-specific generation solutions.

### DIGITAL

Sensors connect the infrastructure and monitor it for real-time optimization.

### MODULAR

The system includes a combination of generating assets, such as solar panels and natural gas turbines, energy storage, and smart system controls that are right-sized for the current operation and designed to scale for the operation's future needs. For example, many data centers are built in phases, meaning a 5 MW microgrid might serve today, but a 300 MW solution will be needed in the future.

### SITE-SPECIFIC

Cookie-cutter approaches don't work. Every facility site has a different footprint, different financing options and different regulatory requirements. The DER solution must be tailored for that reality.

For large-load customers, BTM solutions do more than support the grid. They help projects move faster and operate with greater confidence. Key benefits include:

- Accelerated speed to power when grid upgrades or interconnection timelines threaten project schedules
- Improved operational resilience with onsite generation, storage, and controls designed around critical load requirements
- Support of phased expansion with modular infrastructure that can grow alongside demand
- Optionality to support utility needs, reduce congestion exposure, and strengthen long-term energy strategy

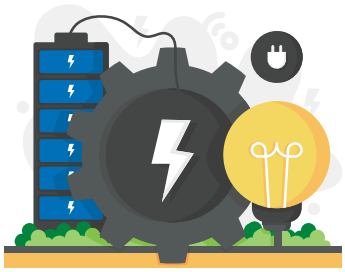
### WHAT PROACTIVE PARTNERSHIPS MAKE POSSIBLE

**The value of onsite DERs increases when utilities, developers, industrial operators, and energy partners engage early and plan around shared system realities.**

- Keep an open dialogue with large-load customers that have submitted interconnection requests to learn about their onsite generation plans and identify opportunities to partner.
- Advocate with state policymakers and regulators for rules that allow utilities and developers to capture the benefits of BTM DERs that support the grid and ratepayers.
- Large-load customers usually look to third-party experts to build their onsite generation solutions, and utilities and developers can partner with these providers to ensure BTM solutions maximize benefits for both the utility and the customer.

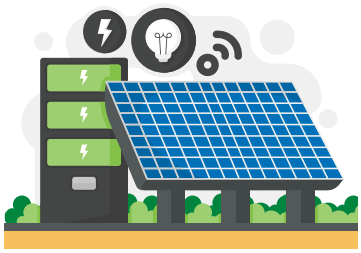
# The New Model to Redesign Power

By embracing onsite DERs and strengthening coordination between utilities, developers, and solution providers, the industry is shifting to a new model with three generating resource pillars to efficiently operate an affordable, reliable, resilient grid.



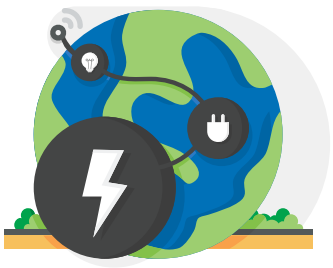
### 1. FIRM POWER FOR RELIABILITY

Utility-owned, centralized firm resources and customer-owned, BTM firm resources are foundational for 24/7 electric reliability. These resources include natural gas turbines, dual-fuel generators, fuel cells, and geothermal and biofuel generation. Advanced nuclear technologies are also emerging as a critical part of the firm-power conversion.



### 2. RENEWABLES TO MEET DEMAND AND CLEAN ENERGY GOALS

Intermittent renewables like solar and wind aren't just clean, zero-carbon resources. They also help utilities optimize system costs because electricity can be generated cheaply and then stored for use during times of peak demand. Even with fewer federal incentives to build wind and solar, the resources are still often the most economic new build option. The EIA expects a 17% increase in solar generation in 2026 and an additional 23% increase in 2027, with wind generation increases of 6% and 7%, respectively, over those years. To keep up with demand, utilities around the country will likely need to pursue all options—building these resources on their own and signing power purchase agreements (PPAs) or other contracts with third-party developers. The scale and constant nature of AI-driven demand is reinforcing the need for firm, always-on power, creating new tension between decarbonization goals and reliability requirements.



### 3. DERS FOR FLEXIBILITY

New large loads don't necessarily act like the loads utilities are used to serving. For example, AI data center loads are massively larger than traditional large loads, but they are also defined by quick ramp ups and ramp downs in demand. This demand variability at such a large scale presents a major challenge to grid reliability and resilience. BTM DERs can be designed to meet the needs of AI data centers and buffer the utility grid from the negative impacts those loads can have on the system.

Microgrids and distributed energy resources are increasingly viewed as foundational infrastructure to deliver reliability and reduce dependence on constrained grid infrastructure, while enabling faster project deployment timelines.

# Military Deployments Showcase the Future of BTM Generation Work

Utilities are increasingly working more closely with large-load customers like data center developers as well as third-party generation solutions providers to maximize the system value of DERs. However, as these partnerships emerge and become more refined, they can learn from similar successful onsite, BTM projects developed in partnership with the U.S. military.

## JOINT TRAINING BASE LOS ALAMITOS

- 3 MW emergency backup generation
- 31.5 MW solar generation capacity
- 40 MWh battery energy storage system (BESS)

The energy resilience project included the development and construction of a microgrid designed to provide the military base with 100% backup power in emergencies to support the Army and California National Guard, and generate clean, renewable solar energy for the surrounding community during normal operations.

The facility is interconnected with Southern California Edison's power distribution system. During normal grid conditions, the system exports energy to the grid through a contracted off-take PPA. In the event of a grid emergency, the system can supply 100% of the installation load when the local utility grid is unavailable.

## JOINT BASE PEARL HARBOR HICKAM

- 42 MW solar generation capacity and 168 MWh BESS Kūpono project completed
- '99 MW of firm and flexible renewable generation proposed in total
- 11 dual-fuel reciprocating generators proposed

Ameresco is building and will own and operate the Pu'uloa Energy project for 30 years. This firm-energy project is designed to interconnect to the O'ahu grid and provide resiliency for Joint Base Pearl Harbor-Hickam should there be an island grid failure.

The project will provide significant grid benefits, notably supporting grid stability to allow for more rooftop solar and other intermittent resources while also providing black start capacity to the island grid to recover from major grid outages. It will also supply power to around 23,000 homes while helping Hawaii reach its renewable energy goals.

## PORTSMOUTH NAVAL SHIPYARD SOLUTION

- 14 MW emergency power capacity
- 10.4 MW combined heat and power (CHP) plant
- (2) 5.2 MW Solar Taurus 60 gas turbines
- (2) 70,000 lb/hr heat recovery steam generators
- (2) 70,000 lb/hr package boilers
- (2) 2 MW emergency diesel generators
- 2 MWh BESS

The U.S. Army Corps of Engineers and the U.S. Navy selected Ameresco to design and install three comprehensive energy conservation projects at the Maine facility under a $44 million Energy Savings Performance Contract (ESPC), as well as a microgrid solution to demonstrate islanding capabilities during electric public utility downtime.

Improvements to shipyard systems have allowed for the elimination of older equipment. The facility now regularly saves on energy and can operate self-sufficiently if necessary.

## MILITARY DATA CENTER PROJECTS

While U.S. military facilities have long been leaders in BTM generation, they also lead the way in data center development with onsite generation solutions.

Ameresco is partnering with the U.S. Navy to develop a 100-MW, AI-optimized data center and critical energy infrastructure at Naval Air Station Lemoore. The state-of-the-art facility will be co-located with dedicated onsite energy generation infrastructure designed to meet the unique reliability and performance demands of advanced AI workloads.

The U.S. Army also recently announced exclusive negotiations with private industry partners to build and operate commercial hyperscale data centers on two Army installations. Ameresco is supporting the development of a project on approximately 1,201 acres at Dugway Proving Ground in Utah.

# BTM Generation Is a Pillar of an Optimized Grid

Energy is emerging as the defining constraint of the digital economy. As AI, electrification, and industrial growth accelerate demand, access to reliable power is becoming a competitive advantage. The organizations that can secure faster, more flexible, and more resilient energy infrastructure will be best positioned to lead the next phase of growth.

For decades, distributed energy resources were often viewed as a challenge to traditional grid operations. Today, advances in digitalization, controls, and distributed generation are transforming DERs into a critical component of a more resilient and adaptive energy system. Rather than replacing the grid, DERs complement and strengthen it, helping utilities and large-load customers navigate growing demand while improving reliability, flexibility, and speed to power.

The challenge ahead is not simply generating more electricity. It is integrating the right mix of firm power, renewables, distributed energy resources, and digital infrastructure into solutions designed around how each site actually operates. Success will require collaboration among utilities, developers, technology providers, and infrastructure partners to create energy strategies that are scalable, resilient, and future-ready.

The developers securing power certainty today will determine which large-load projects move forward tomorrow. Delivering that certainty requires more than a single technology or resource. It requires an integrated approach to designing power.

With more than 25 years of experience delivering mission-critical energy infrastructure for military installations, campuses, industrial facilities, and large-scale energy users, Ameresco helps customers move from grid constraints to executable power strategies, combining infrastructure expertise, digital innovation, and proven project delivery.

To explore additional insights on power strategy, energy resilience, and large-load infrastructure, visit Ameresco.com.

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Ameresco is a leading energy infrastructure company delivering integrated solutions to create reliable power and modernize infrastructure. Ameresco has delivered $15B+ in solutions and contracted 5+ GW of energy resources for customers across North America and Europe since its founding in 2000.

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