# Leveraging Large Loads to Advance the U.S. Electricity System

## How large loads can unlock system benefits

BATES WHITE
ECONOMIC CONSULTING

February 2026

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# Executive Summary

1. **The rapid expansion of data centers is coinciding with rising U.S. electricity prices, fueling public perception that data centers are to blame. The story, however, is more complicated.**
   - Recent analysis shows that on a state level, load growth is not correlated with electricity prices.
   - Investments needed—to replace aging infrastructure, modernize the grid, integrate renewable resources, and build resilience to extreme weather, in addition to hurdles to resource development and volatile natural gas prices—are all pushing up electricity prices.

2. **Data centers and other large load customers can unlock significant electric system value. Large load customers can:**
   - Help pay for the costs of the system—both legacy costs and new costs that must be incurred.
   - Create efficiencies in dispatch due to their high load factor and demand response potential.
   - Put downward pressure on rates by spreading existing costs over more MWs.
   - Absorb risk and drive down costs associated with deploying new or emerging generation technologies.
   - Drive operational, interconnection, and planning efficiencies.

3. **To leverage data centers and other large load customers to achieve system benefits, utilities, large load customers, and interested stakeholders should develop a transparent and standardized framework that provides large load customers with the flexibility to optimize their operations while ensuring that they contribute equitably to system costs.**

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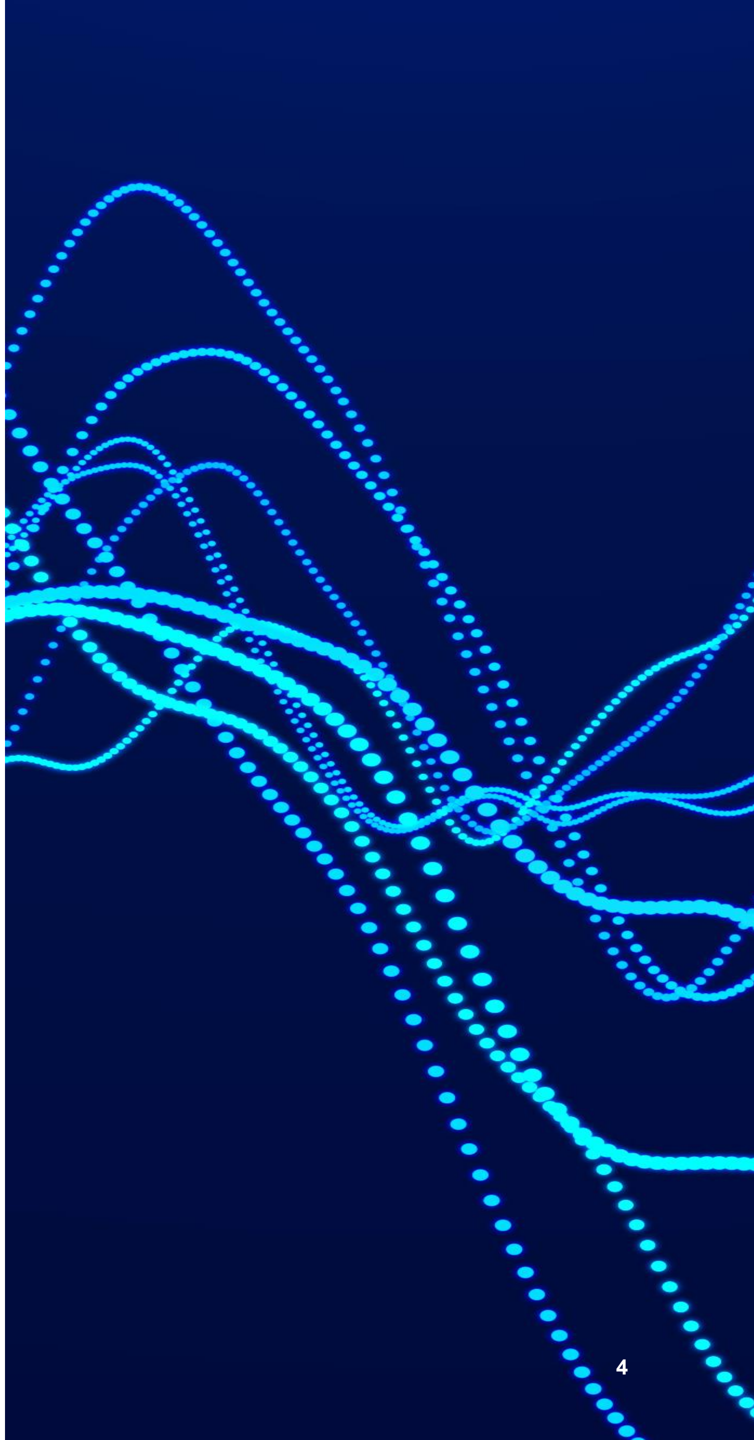


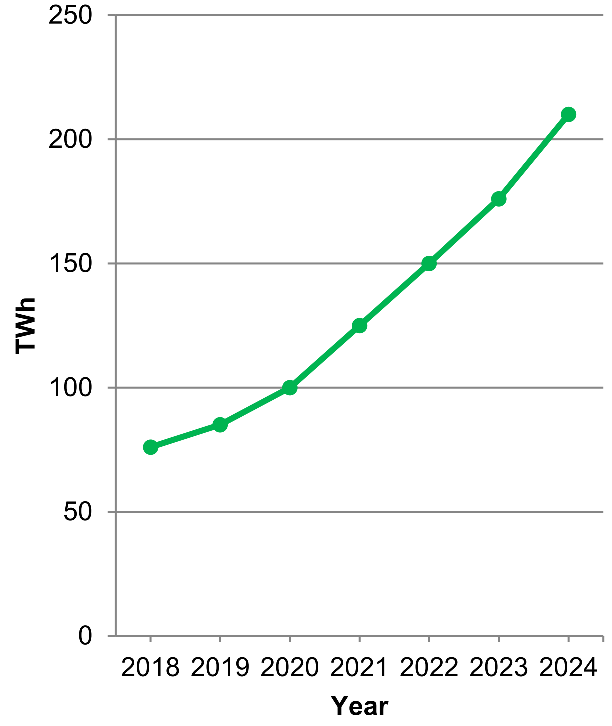
# Section I

## Electricity price increases have multiple key drivers

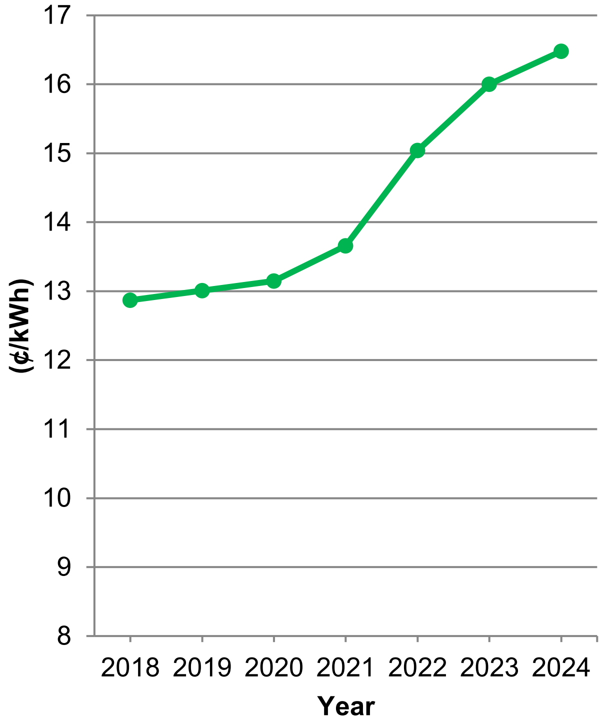
# The data center construction boom has coincided with rising electricity rates, leading to public backlash

There has been a sharp escalation in large-scale load growth in the United States in recent years driven primarily by rapid data center expansion.[1] Over the same period, electricity prices paid by residential customers have risen materially after years of stability. Press coverage has focused on the apparent link between these two trends.

**Annual U.S. Data Center Electricity Use** [1]




**Annual U.S. Residential Electricity Prices** [2]




**Data centers are concentrated in these states. Here's what's happening to electricity prices** [3]

**AI Data Centers Are Sending Power Bills Soaring** [4]

**AI, data center load could drive 'extraordinary' rise in US electricity bills: Bain analyst** [5]

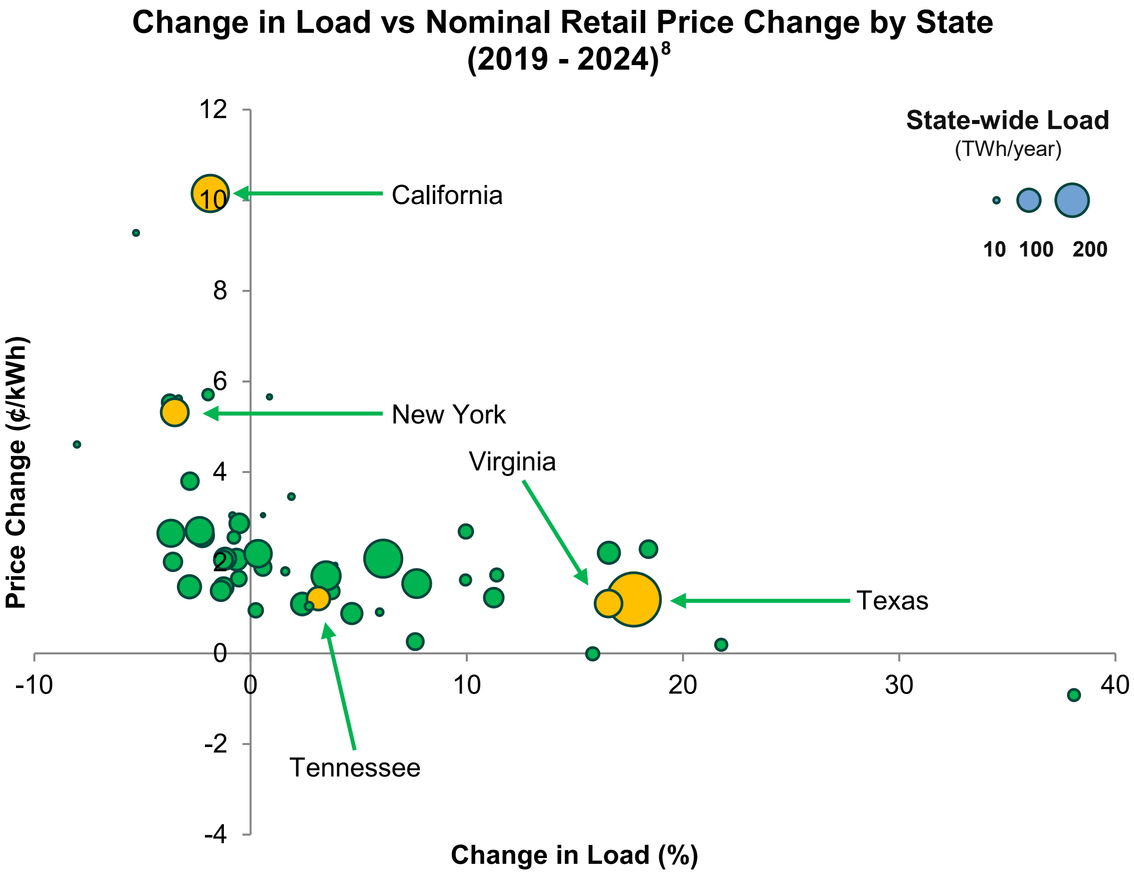
**Amid Rising Local Pushback, U.S. Data Center Cancellations Surged in 2025** [6]

**The Data Center Resistance Has Arrived** [7]

A new report finds that local opposition to data centers skyrocketed in the second quarter of this year.

# The relationship between load and electricity prices is not clear

**Analysis shows that the change in load versus the change in prices is not correlated across all U.S. states.**




## California | Data Center Capacity: <= 1.5 GW[9]

A substantial share of this rate increase is attributable to wildfire-related costs. Between 2019 and 2023, California's three largest utilities were authorized to collect $27 billion from customers for wildfire-related prevention and insurance.[10]

## New York | Data Center Capacity: <= 0.5 GW[11]

Load decreased by 2% but rates jumped by over 5 ¢/kWh. Rate hikes were driven by grid infrastructure investments and natural gas price volatility, a pattern seen across Northeastern states during this period.[12]

## Virginia | Data Center Capacity: >= 3 GW[13]

Home to "Data Center Alley," rates rose only modestly while statewide load grew sharply. Rate hikes were driven primarily by natural gas volatility and grid infrastructure investments.[14]

## Texas | Data Center Capacity: <= 3 GW[15]

Like Virginia, rates rose modestly even as statewide load grew sharply. Texas has become one of the top destinations for large loads due to its inexpensive, abundant land and business-friendly market. It has avoided large price increases despite extreme weather challenges such as Winter Storm Uri.[16]

## Tennessee | Data Center Capacity: <= 0.5 GW[17]

Rates and load both grew modestly. This rate increase is similar to that of Virginia and Texas; however, Tennessee has had minimal growth in data center capacity.[18]

# While load growth can increase electricity prices, it is not the only driver

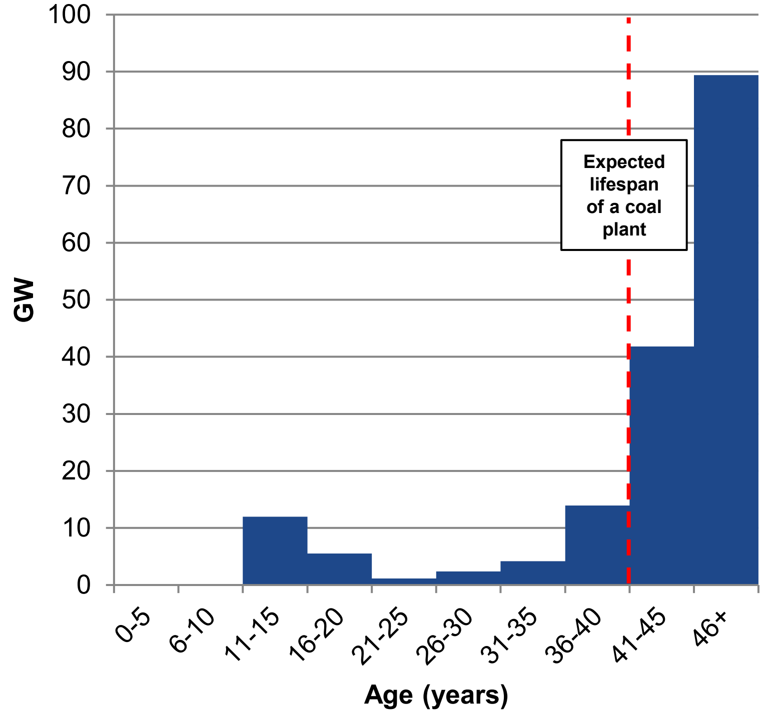
Load growth is only one of several factors that influence electricity prices. Other factors include replacing aging infrastructure, integrating intermittent generation, volatile natural gas prices, and costs of mitigating and recovering from natural disasters such as extreme weather events and wildfires.

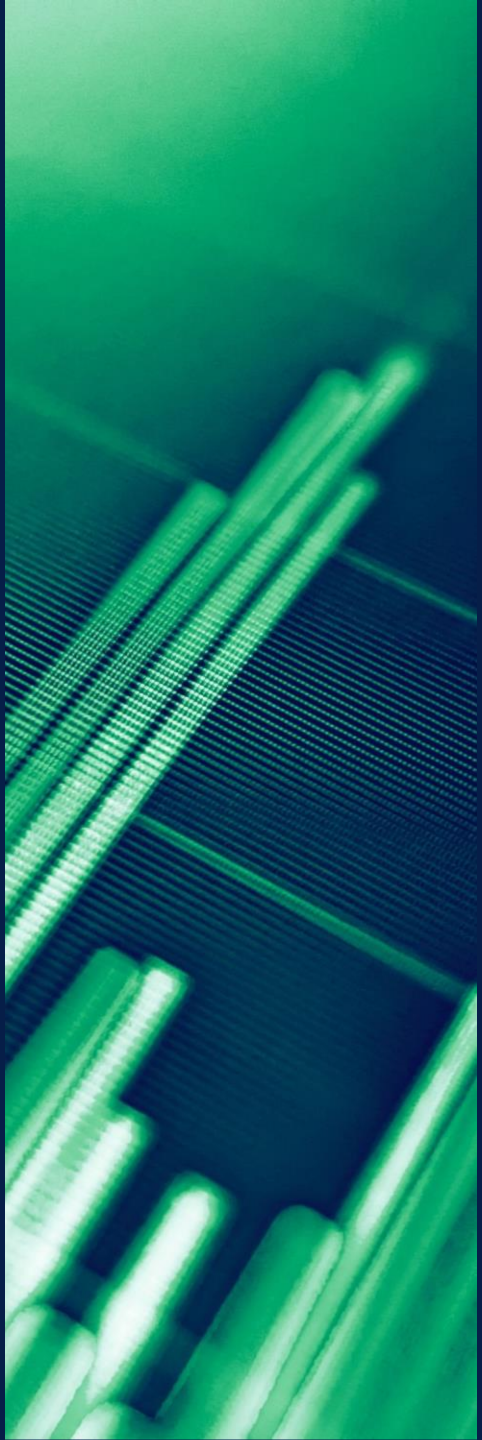
**Replacing Aging Infrastructure:** A large share of America's generation fleet is nearing the end of its useful life: **77% of U.S. coal capacity is over 40 years old**.[19] The cost of replacing this coal-fired generation alone is estimated to be $181 billion, which far exceeds the projected functional capital expenditure on generation by all investor-owned utilities in 2025 ($62.4 billion).[20]

**Other Drivers**

- **State legislatures undertook 393 grid modernization initiatives in Q3 2025** and introduced a further 190 bills to integrate new technologies, harden the grid, and invest in damage protection.[21]
- **Increasing American LNG exports will put upward pressure on domestic natural gas prices** despite continued growth in domestic gas production. This exposes many utilities and states—especially those with a high share of natural-gas-fired generation—to higher fuel costs, which feeds into electricity prices.[22]
- **Extreme weather and natural disasters are driving significant costs**. In 2025, Oncor—the largest utility in Texas—proposed a 4.7% electricity rate hike, with 45% of the increase driven by storm-related damage recovery.[23]

**Net Summer Capacity (GWs) of U.S. Coal Units by Age**[19]





# Section II

## Data centers can be leveraged to provide benefits to the grid

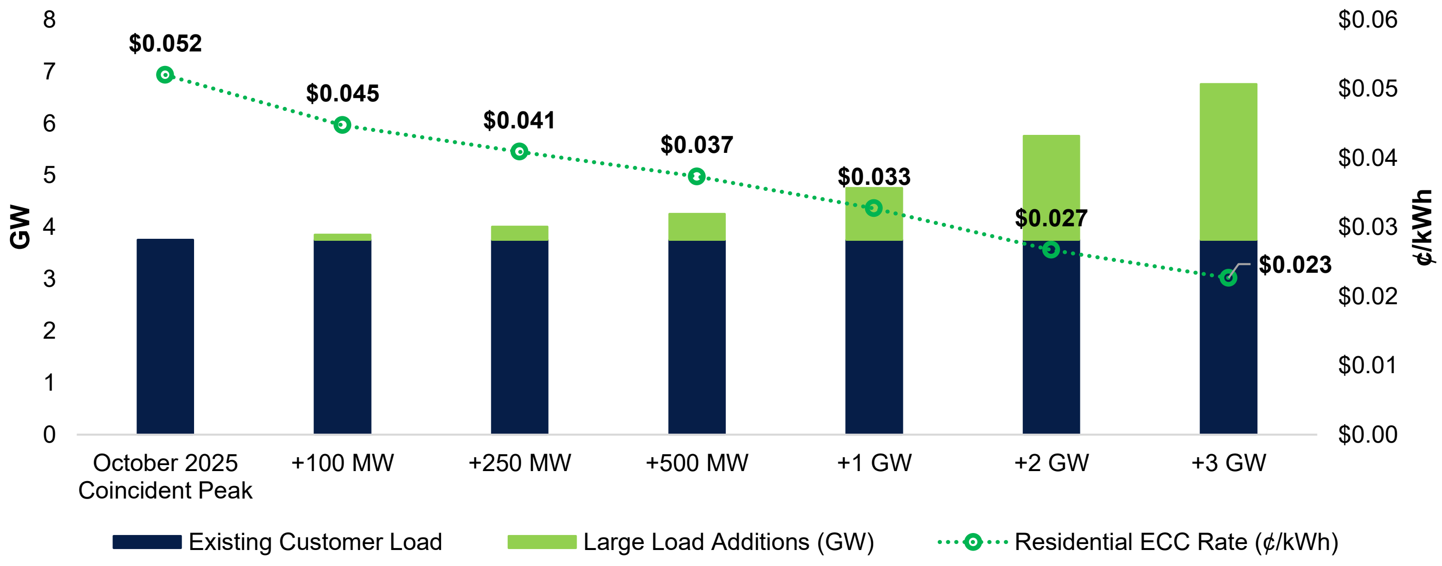
# Large loads help pay for legacy costs, reducing amounts that must be paid by other customers

Securitization provides utilities with upfront funding to address large atypical costs, such as those related to hurricane recovery or generation retirements. The costs of securitization often appear on customer bills as a separate line item.

- In 2020, We Energies securitized $100 million of stranded investments in the Pleasant Prairie coal plant, which was retired before its capital costs were fully recovered.[24]
- The utility's customers pay for these costs through a separate charge on their bills called the Environmental Control Charge (ECC). For residential customers, it is a kWh charge. In the example on the right, we show how data center load could reduce the residential ECC rate **because the ECC charge will be spread across more units of consumption**.
- **Other examples of securitization**:
  - Public Service Company of Oklahoma: $675M in storm recovery costs.[25]
  - Consumers Energy (Michigan): $688M in retired asset recovery.[26]
  - Public Service Company of New Mexico: $360M to facilitate its transition to renewable energy.[27]

**WE Energies Residential ECC Rate Under Hypothetical Large Load Addition Scenarios**[24]

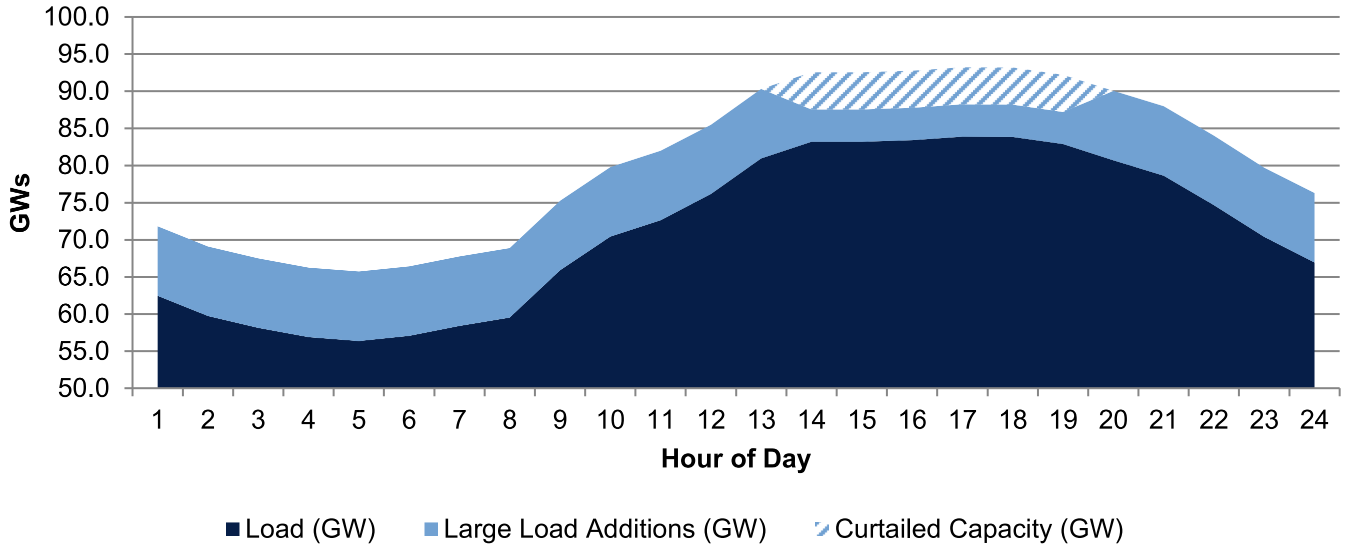
*Adding large load decreases the ECC rate paid by residential customers*



# Large loads can make more efficient use of existing grid infrastructure

Electricity demand varies significantly between peak and off-peak hours, creating large swings in system use and underuse of system assets. By shifting or curtailing usage during peak periods, large loads increase the grid's overall utilization while helping moderate growth in peak demand, improve reliability, and reduce average system costs.

**ERCOT 2025 Peak Hourly Load (including 11 GW of Hypothetical Large Loads Participating in Demand Response)[28]**




This graph displays the **hourly load in ERCOT on the day it achieved its annual peak hourly load in 2025** (~83.9 GW on August 18, 2025) and shows the impact of adding a hypothetical 11 GW of large customer load with flexible demand.[28] As can be seen, the **new load shape** is flatter, representing more efficient system utilization.

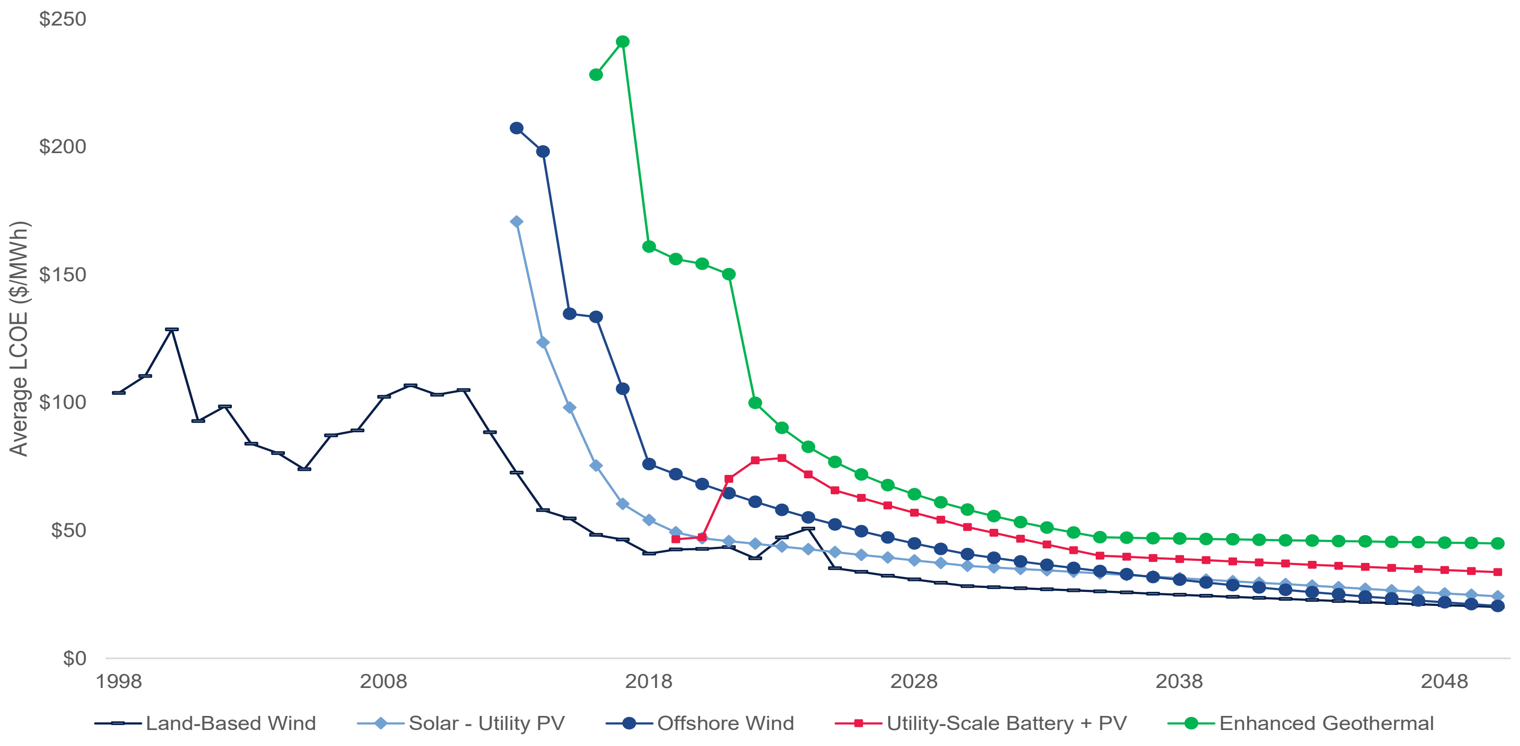
# Large load customers are advancing generation technologies

Utilities face challenges investing in novel generation technologies without exposing customers to undue risk. By committing to long-term offtake agreements or paying for project expenses, large load customers can support early-stage innovations that might otherwise struggle to scale, sending powerful investment signals to potential developers and accelerating widespread adoption.

Hyperscalers are investing in emerging clean technologies to power their operations and create more flexible energy systems.

- **Google**: Invested in a "first-of-its-kind" enhanced geothermal power project in Nevada that will supply clean electricity to the local grid that serves its data centers.[29]
- **Amazon**: Backing flexible microgrid generators that can run on different types of renewable fuels.[30]
- **Meta**: Supporting 150 MW of next-generation geothermal energy development in New Mexico.[31]
- **Equinix**: Pre-ordered 774 MW of compact nuclear micro-reactors to power its data centers.[32]

**Technologies with High Costs Early in Their Lifecycles that Became More Cost-Effective as Adoption and Continued Investment Drove Down Capital Costs**[33]



# Large load customers are driving grid innovation

Large load customers' process, software, modeling, and data management innovations can help improve interconnection timelines, system awareness and control, and optimization of grid assets. Large load customers have an inherent incentive to innovate in order to reduce their energy costs and accelerate their access to electricity.

Google is collaborating with PJM to deploy Tapestry, an AI-powered tool designed to **accelerate the interconnection of energy projects** to PJM's electric grid.

- Tapestry is anticipated to streamline interconnection application processing and automate data verification to accelerate project approvals.[34]

Amazon is employing machine learning models powered by AWS to **optimize the timing of charging and discharging of energy** back to the grid in battery storage systems.

- This software improves battery performance and value, helps stabilize the grid, and firms up the capacity of intermittent resources by making energy available during more hours (e.g., solar at night).[35]

# Section III

A standardized large load framework can unlock potential benefits

# Utilities and large load customers need standardized and transparent terms and provisions

Standardized terms and provisions provide certainty for large load customers, utilities, and regulators. Provisions are interdependent and adjustable, allowing for different utility-specific packages that balance large load, utility, and customer needs.

**Terms and Provisions**

**Minimum Contract Length:** The minimum number of years that the large load customer commits to taking service

**Minimum Bills:** Guaranteed baseline level of revenue for the utility regardless of the customer's energy consumption

**Exit Fees for Full or Partial Contract Capacity Reduction:** These often require customers to pay minimum bills for the remainder of the contract term. May be coupled with capacity reassignments that lower the exit fees.

**These provisions work together to provide predictable revenues and align cost recovery with customer commitments. Because each provision affects the others, they must be coordinated to ensure that the utility's need for predictable cost recovery is balanced with the customers' need for flexibility.**

**Collateral Requirements:** Help ensure that large load customers will meet their cost obligations, reducing risk to the utility and other customers

**Applicable Customer Size (MW):** The minimum load threshold at which a customer must take service under the set of provisions

**Provisional Rates:** Rates paid by large load customers before rates are established in a rate case

**These provisions help the utility manage risk and uncertainty. Both collateral requirements and applicable size can be adjusted to align with customer risk and utility demand profiles. Provisional rates enable the utility to provide service and collect revenues based on expected costs before actual load and cost details are available.**

# No single set of terms and provisions will fit every utility or large load customer

| | **Ameren Missouri**[36] *Large Load Power Rate Plan* | **Evergy Kansas**[37] *Large Load Power Service Tariffs* | **Dominion Energy**[38] *Schedule GS-5* |
|---|---|---|---|
| Minimum Contract Length | ✓ | ✓ | ✓ |
| Minimum Bills | ✓ | ✓ | ✓ |
| Exit Fees for Full or Partial Contract Capacity Reduction | ✓ | ✓ | ✓ |
| Collateral Requirements | ✓ | ✓ | ✓ |
| Applicable Customer Size | ✓ | ✓ | ✓ |
| Load Factor Requirements | | | ✓ |
| Optional Clean Energy Riders | ✓ | ✓ | ✓ |
| Mechanisms for Customers to Support Incremental Clean Generation | ✓ | ✓ | |
| Demand Response Programs | | ✓ | |
| Mechanisms to Compensate Customers for Owned Capacity | | ✓ | |

**For customers requesting additional flexibilities, contracting options can supplement the standard tariff framework**

**Clean transition tariffs**: Allow large load to bring forward new technology and to match their electricity demand with carbon-free energy on an hourly basis.

**Demand-side management programs**: Provide incentives or lower rates for large loads that reduce or shift their power use during peak periods.

**Generation co-location**: Enables large loads to develop their own generation sources, adjacent to their operations, to reduce their exposure to grid constraints.

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