Turning Data Center Growth into an Energy Transition Opportunity

Challenges and observations from the US

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Objectives & Background

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- Illustrate **challenges and lessons learned** from the recent US experience with data center demand growth
- Highlight **emerging digital opportunities** that DMCs can use to support sustainable data center deployment

Agenda

1. US market context
2. Challenges from the US experience to date
3. Implications and risks
4. Emerging opportunities

RMI

RMI is a global, independent non-profit focused on supporting the energy transition.

- **Sectoral experts**, including electricity
- Geographic focus in **Southeast Asia**, China, the U.S., India, Africa, and the Caribbean
- Experience working on **data center solutions in the U.S. and China and power sector solutions in Southeast Asia**, particularly the **Philippines & Indonesia**
- Exploring how experiences across markets may translate to SEA's growing data center load growth

The US and EMDEs in Asia are facing very different economic and power sector paradigms…

Core Themes	United States	EMDEs in Asia
Load Growth	Slow, almost flat, load growth for the past 30 years until recently	Already surging; driven by industrialization, urbanization, and electrification
Resource Planning	Localized, speculative requests bottlenecked in regulatory approval	Overbuild risk compounded by rate of deployment and demand growth
Grid Status	Interconnected but deadlocked and at capacity; flexibility needs to be coupled with new supply	Less interconnected, leading to greater risk of stability issues; high value in leveraging flexible, grid responsive resources
Investment Opportunity	Policy-driven; deep liquid capital markets. Speculative building and third-party power procurement common	Greater influx of new bankable offtakers; investment risk-return profiles are higher and require integration with sovereign-backed capital & infrastructure

…but emerging solutions in the US are relevant to underlying fundamentals in Asian countries too

Category	Emerging solutions	Fundamental challenges addressed
Demand-side	Harness flexibility and efficiency by implementing DSM programs to increase grid headroom	✓ Lower additional investment needs and overbuild risk ✓ Improve system utilization, protecting affordability
Grid upgrades	Targeted grid upgrades with digital and/or grid-enhancing technologies to increase speed to power	✓ New interconnection capacity at existing corridors, sooner ✓ Avoid curtailment of low-cost resources
Supply-side	On-site battery storage, mechanisms for direct procurement of clean firm supply, and using existing interconnection rights to add capacity faster	✓ Near-term ways to diversify supply and meet high reliability standards ✓ Enable pathways to private capital investment

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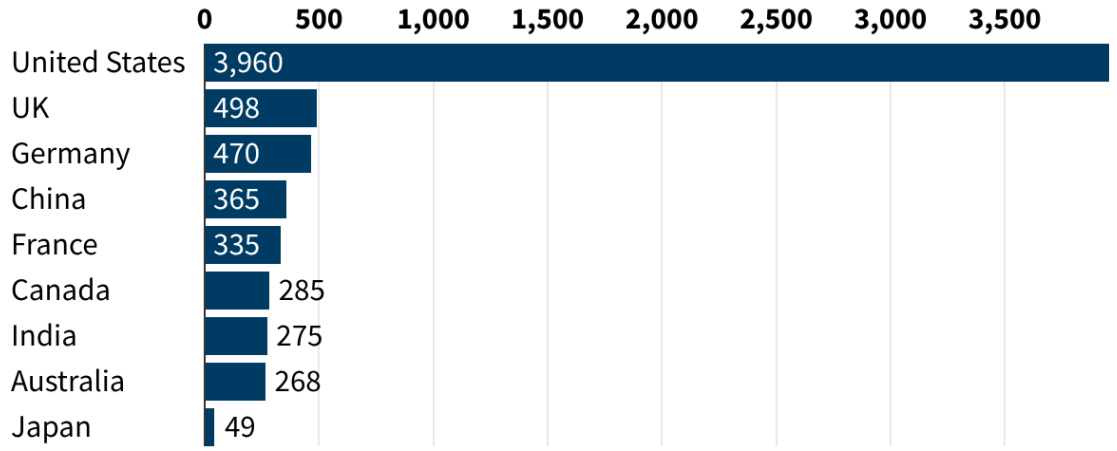
US Market Context

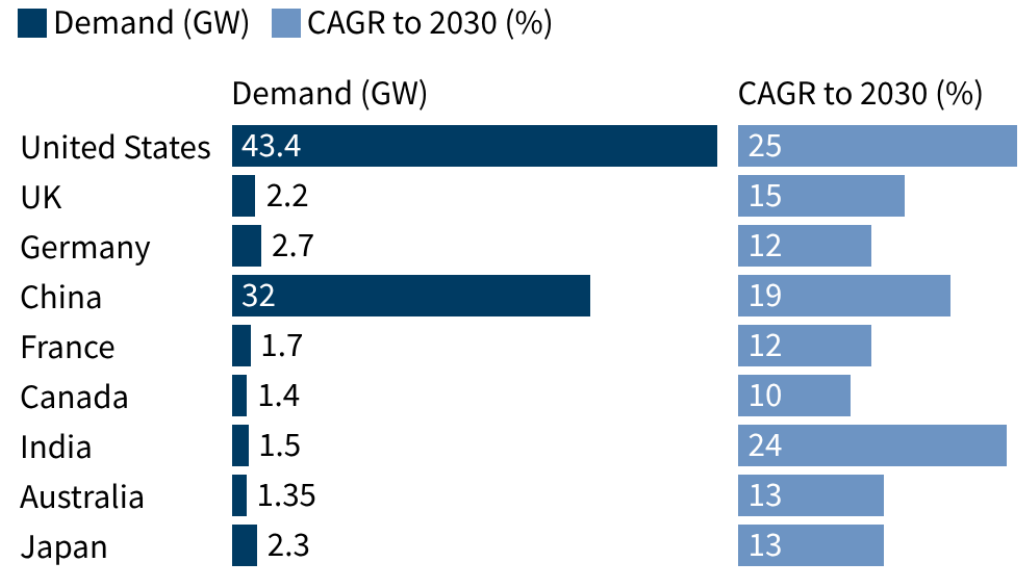
The US is the largest data center market globally

Number of Data Centers by Country



Global Operating Data Center Demand

Existing operating capacity and expected growth in the next 5 years.



Source: Statista, Cushman & Wakefield, Cleanbridge, Rystad, S&P Global, DC Byte, Indian Ministry of Electronics & IT, Clean Energy Finance Corporation, Yahoo Finance

Utilities forecast rising electricity demand, with data centers driving the surge and increasing uncertainty

Utility electricity demand forecasts

December 2021 through December 2025

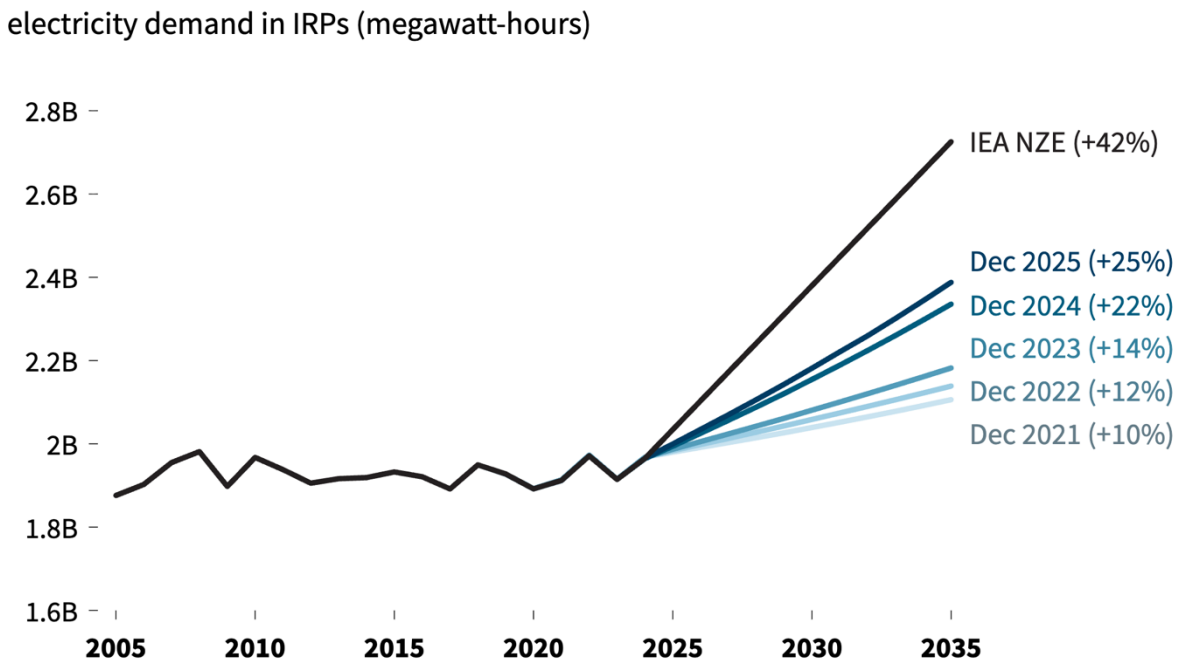


Chart includes projections from 132 IRPs, covering 47% of electricity delivered to US customers. % change refers to years 2023 to 2035.

- Electricity demand forecasts have shown **increasing rates of growth** with the combined effect of electrification and data center growth
- US **data center demand is expected to grow between 20 to 25%** CAGR until 2030
- Data centers expected to account for **40% of total demand growth** in the US over the next 5 years
- Demand growth is expected to **drive ~$360B of capex in the power sector** between 2026 and 2031

Uncertainty Drivers

Supply chain constraints	Political Backlash	Power Availability	Permitting Timelines

Source: RMI Engage & Act; covers utilities that supply 48% of US electricity demand, Goldman Sachs, McKinsey

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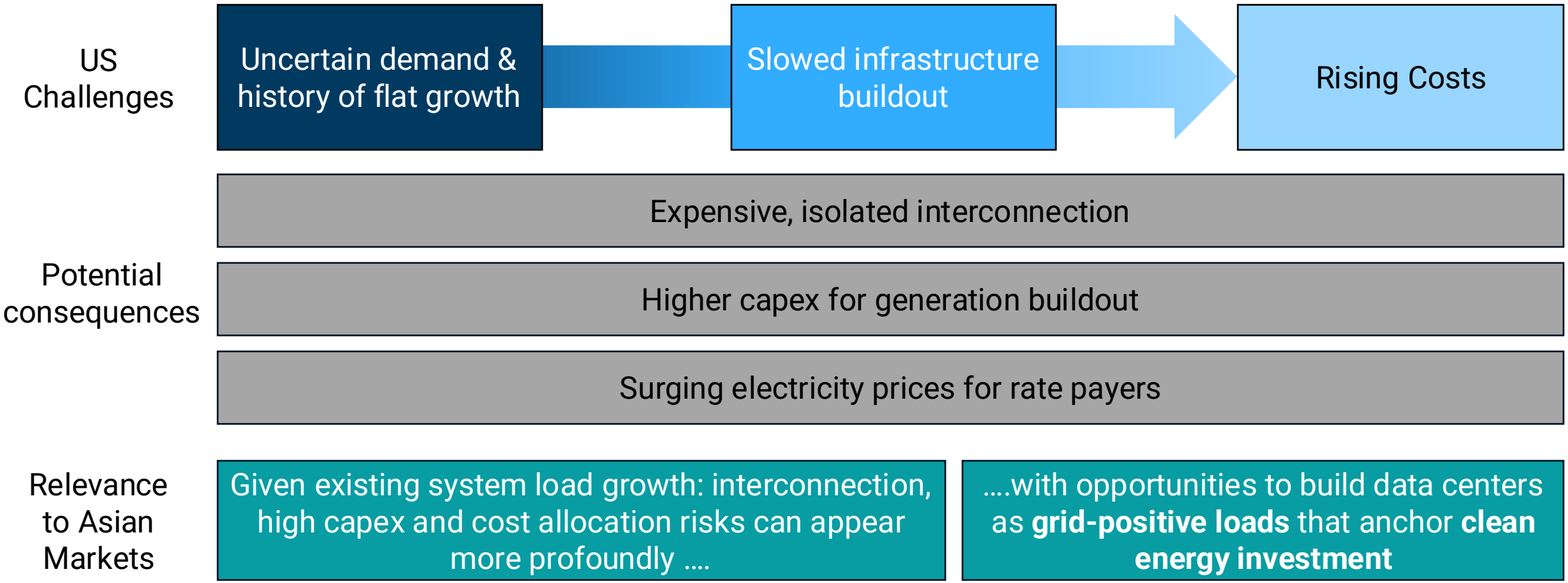
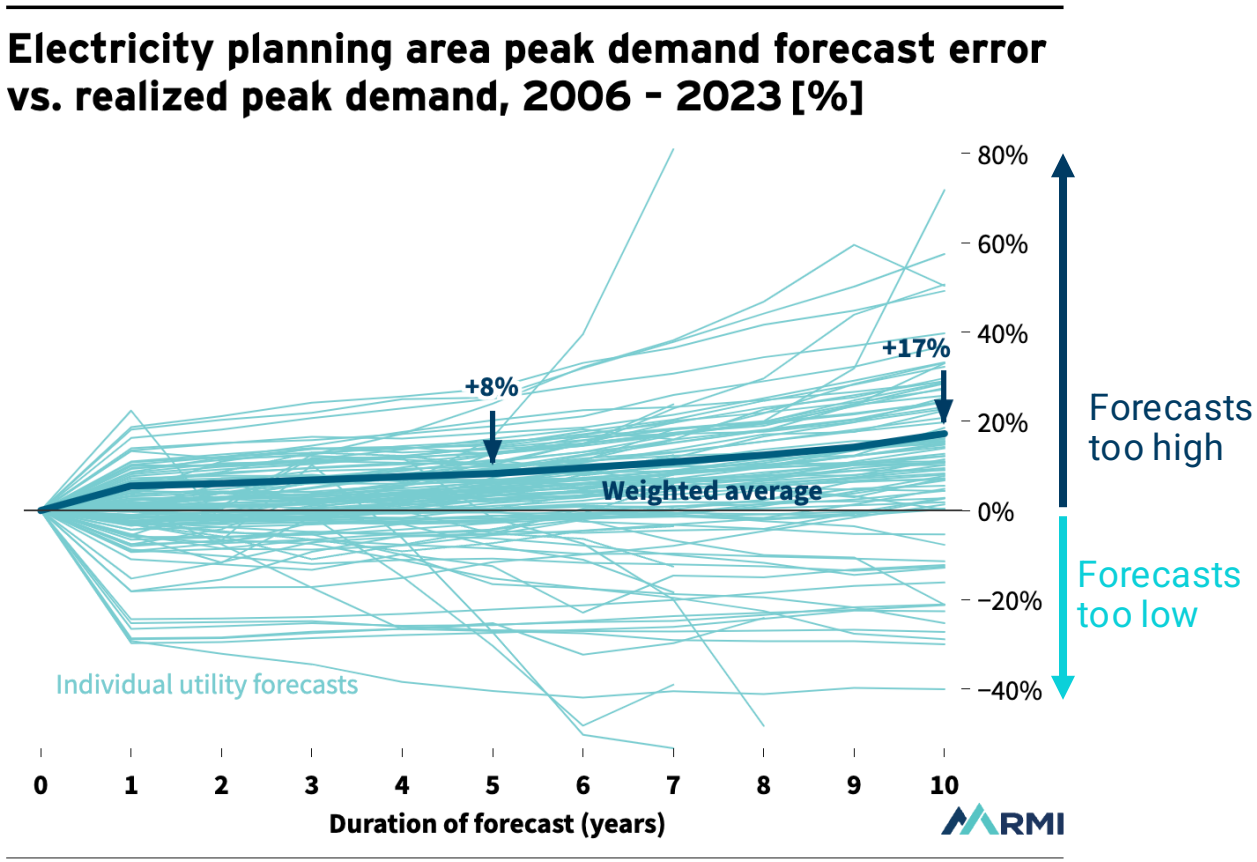
Critical Challenges in the US

- Forecasting with Uncertain Demand
- Slow Infrastructure Buildout
- Rising Costs

Data centers can outpace the grid system's ability to plan, build, and allocate costs



Demand forecasts have historically been inaccurate; data centers increase uncertainty



- **From 2012-2023, the forecast error was 28% for 10-year forecasts**
- **Data centers add uncertainty to future forecasts; speculative interconnection requests worsen this uncertainty**
- **Utilities are expected to spend nearly $1.3T between 2026 to 2030, risking over-shooting**

Results from common challenges in power markets

- Demand forecasting & its impacts on resource planning processes
- Risk management and customer protection

Source: RMI, using FERC 714 data as of October 2024, S&P Global

Data center load growth creates power price premiums and affordability concerns in parallel

DCs are paying a premium…

$140-160/MWh

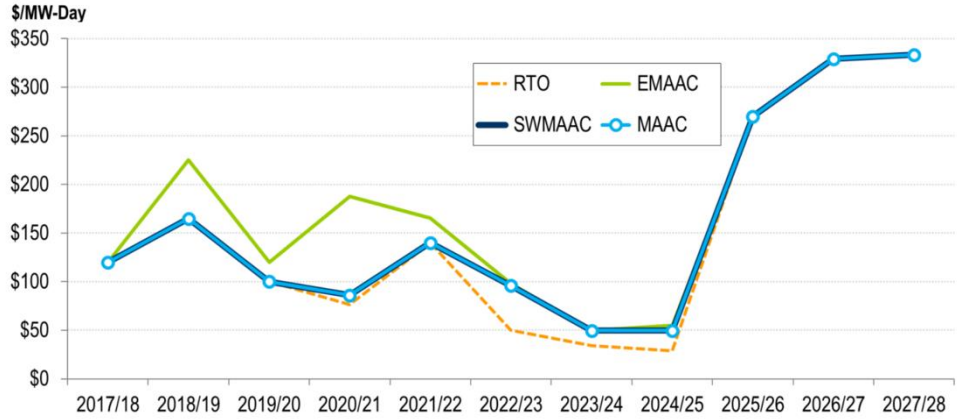
Estimates of off-grid power prices for Meta's onsite gas project in Ohio.

$50-80/MWh

Average grid power prices in the US.

…and driving up costs for others.

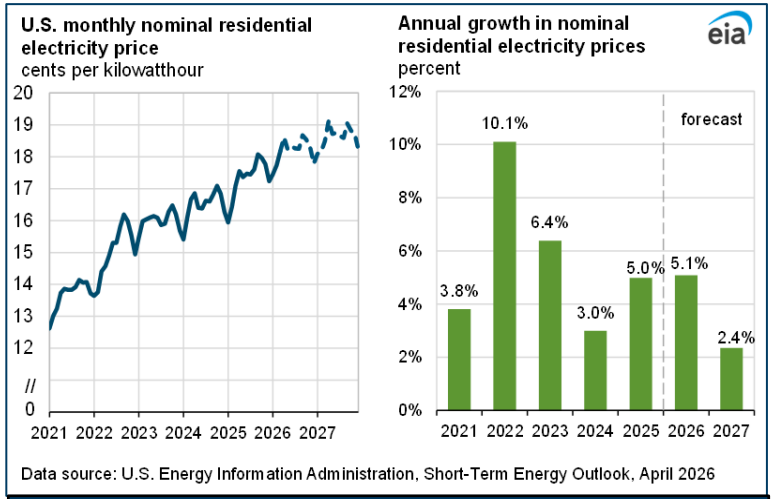
PJM Capacity Market Clearing Prices by Subregion



EMAAC, SWMAAC, and MAAC are sub-markets that cover NJ, DE, Eastern MD, and parts of PA.

"Data center load growth is the primary reason for recent and expected capacity market conditions…"
- PJM Market Monitor

EIA forecasts rising prices to continue



Data source: U.S. Energy Information Administration, Short-Term Energy Outlook, April 2026

Drivers of this cost surge include substantial upgrades to an aging grid, fuel cost spikes and reactive buildout of generation sources.

Similar Cost Pressure Stack in Asian Markets

- **Distribution system expansion**
- **Fuel price exposure**
- **Grid maintenance & upgrades**
- **Concentrated load and transmission buildout in economic zones**

Source: PJM, PJM Independent Market Monitor, EIA STEO, April 2026; LBNL May 2026

Power scarcity and delayed interconnections are pushing data centers behind-the-meter

Leading to suboptimal buildout of resources and missed opportunities to leverage load growth positively

System-Integrated

Grid-connected

Flexible load

Beneficial offtake for utilities

Improved grid utilization

Storage & demand response

Clean tech acceleration

Bypass the Grid

BTM gas

Less system coordination

Fuel cost exposure

Not optimized for least cost

Fossil fuel lock-in

Isolated investments

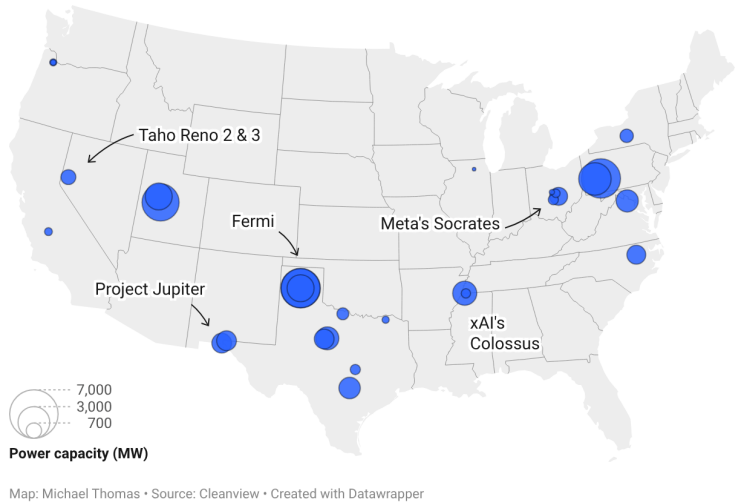
Timing Mismatch:

<2 years
Data center buildout

10 years
Transmission and grid upgrades

Planned behind-the-meter data centers in the US

Announced power capacity (MW)



Map: Michael Thomas • Source: Cleanview • Created with Datawrapper

Key Insight for Other Economies

Captive power may look like the fastest path to reliability, but planning and regulation need to ensure that data center load growth ***accelerates clean, flexible supply, improving overall system reliability and energy transition goals***

- February 2026: **46 data centers with a combined capacity of 56 GW** planned to build their own power **behind the meter,** roughly **30% of all data center capacity in the US.**
- **Project pipeline additions decreased by 58% from Q3 to Q4 of 2025 due to power constraints.**

Source: Cleanbridge, Wood-Mackenzie

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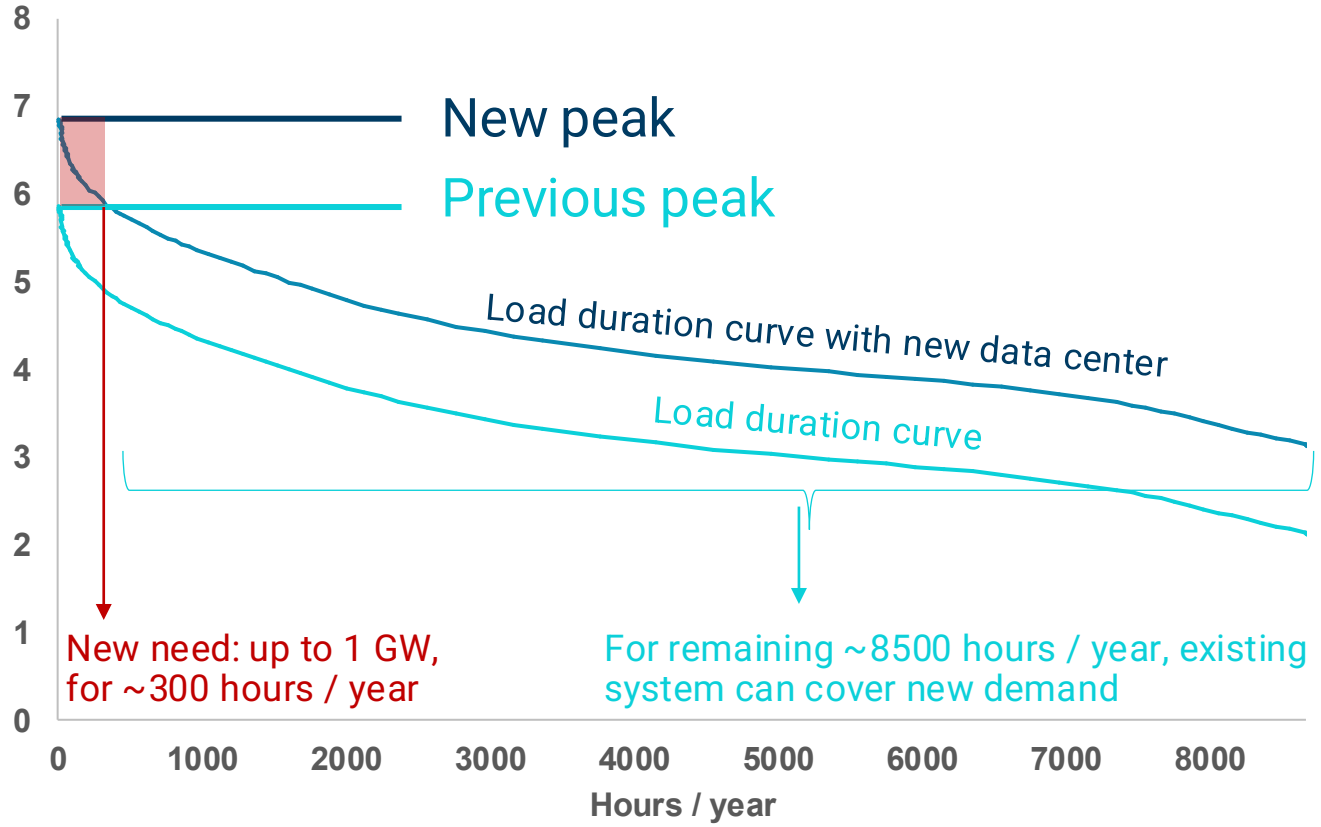
Emerging opportunities to leverage data center growth for energy transition

- Make the most of the existing grid
- Promote flexibility in new loads
- Speed up grid investment

Data center load growth can drive up costs given the need to meet new peak demands in constrained grids

Indicative impacts of 24x7 load on total utility system demand [GW]



- Solutions often focus on strategies to **meet peak cost effectively and modularly**, avoiding significant 'bulky' investments—particularly given uncertainties in magnitude of load growth
- For many US grid regions, even significant additions of new, 24x7, inflexible load can be **covered 95% of the time by existing supply**

Source: RMI; indicative and simplified example based on regional data from a summer-peaking grid with growing winter peaks

Fast, affordable, and flexible solutions for meeting peak demand exist today

Category	Facility-level	System-level
Demand-side	Harness flexibility (e.g., AI training) & maximize efficiency	Implement DSM programs to increase grid headroom and maintain grid stability
Grid upgrades	Add targeted grid upgrades for specific projects (e.g., advanced conductors)	Use grid-enhancing technologies & advanced conductors to increase resource adequacy capacity
Supply-side	Integrate on-site battery storage or dispatchable capacity	Leverage existing capacity interconnection rights to add new generation & storage faster

These strategies are all ways to increase "grid utilization"

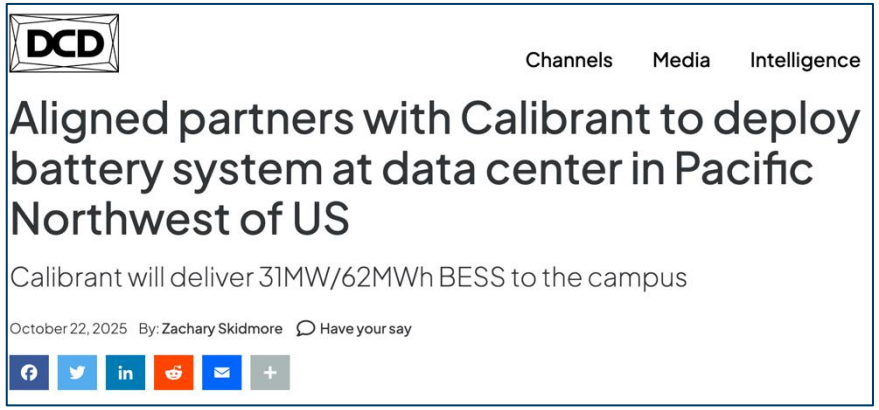
Source: RMI

Battery power is an emerging solution to provide demand side flexibility at scale

Distribution system

Homes

Data centers

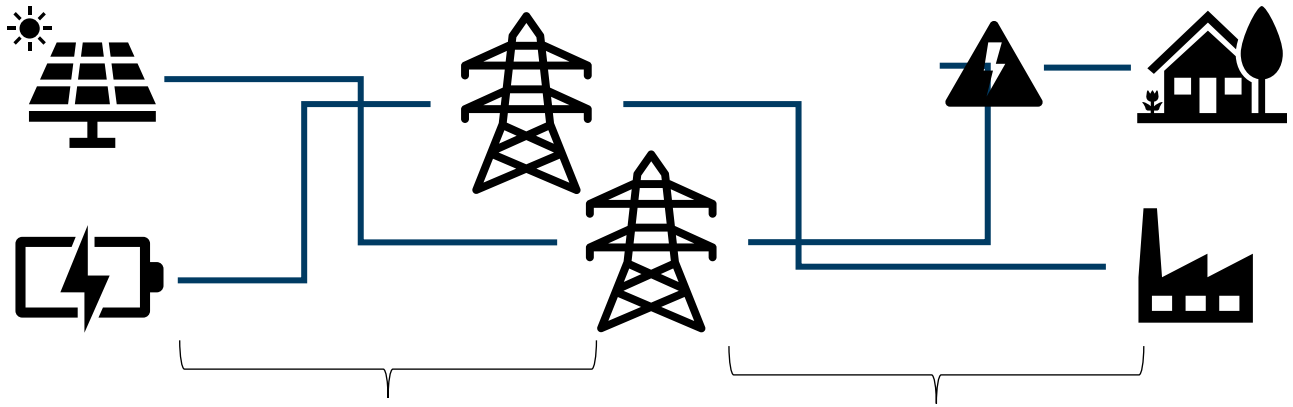


…and momentum continues to build

- As of late 2024, only **19.5%** of total North American distributed energy capacity was enrolled in a VPP, leaving **large margins for grid service optimization**
- Energy **storage capacity now outnumbers gas power in the queue** for future US grid addition by a factor of **6.5 to 1**
- Capital costs for BESS are expected to decline by **40% by 2030**

Sources: Utility Dive, Canary Media

Advanced transmission technologies (ATTs) can improve existing and future grid utilization



Options	High-temperature, low sag conductors, Dynamic Line Ratings	Topology control & flow devices, static synchronous compensators
Benefits	Unlock additional capacity	Eliminate local congestion

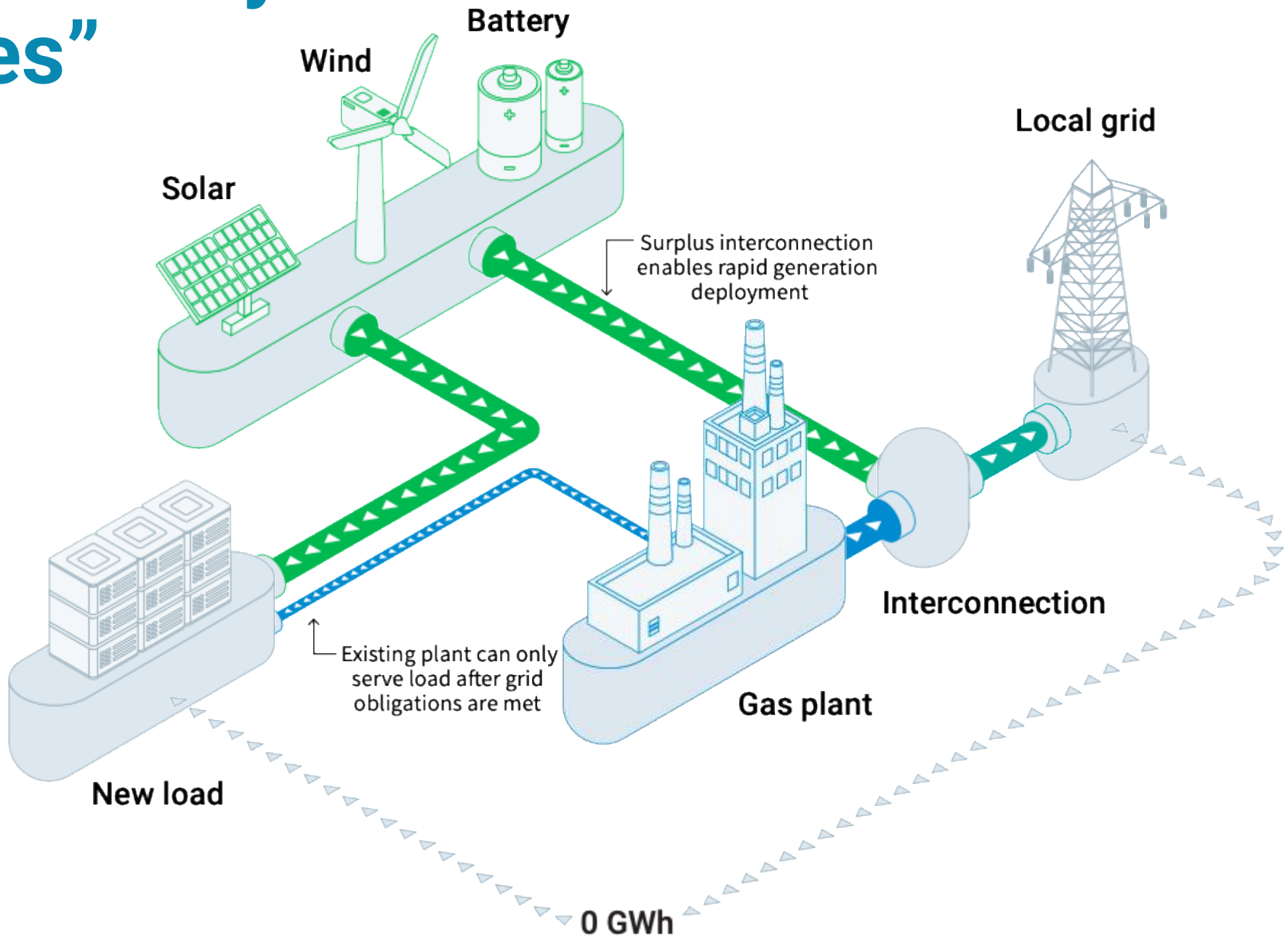
- **Core tenets of ATTs**
  - Re-engineering physical cables
  - Deploying real time sensors
  - Utilizing digital power routing software
- **Benefits of ATTs**
  - Improved power throughput
  - Accelerated capacity upgrade timelines
  - Cleared Ix queues
  - Enhanced grid resilience

Emerging opportunity: “Power Couples”

Supply side

Co-locating data centers with existing gas plants + new renewables + storage can deliver:

- Utilizing surplus grid capacity
- Faster interconnection
- Limited infrastructure costs
- Improved reliability
- Lower system-wide fuel costs and emissions



Large load tariffs can bring transparency to power development and pricing processes

Benefits of Large Load Tariffs

- **Ratepayer protections**
- **Cost certainty for developers**
- **Funding for reliability investments**
- **Reduced stranded asset risk**
- **Avenue for funding:**
  - Accelerated speed-to-power
  - Grid upgrades
  - New utility programs

Emerging examples in Asia

Malaysia's ultra-high voltage (UHV) tariff, demand ramp up schedule requirement, and corporate renewable energy supply scheme (CRESS)

Tariff Type	Key Features
Baseline Tariff	• Rate eligibility • Conditions for firm service including ratepayer safeguards • Can assign costs w/in established cost allocation framework
Flexible Service Tariff	• Flexible supply service conditions that permit curtailment • Options for procurement of flexibility as a resource
Bring Your Own (BYO) Resource Tariff	• Options for procurement outside of the utility planning and procurement process

Reforming interconnection rules can accelerate new renewable energy additions

For example, PJM's Energy Resource Interconnection Service (ERIS) opens a streamlined process for non-capacity crediting resources

Bypass deliverability studies (slowest process)

- Lower deliverability standards
- Accept curtailment risk

Separate energy-only access from firm capacity rights

- Forgo capacity credit revenues
- But eliminate risk of capacity penalties

Fewer upgrades and faster interconnection process

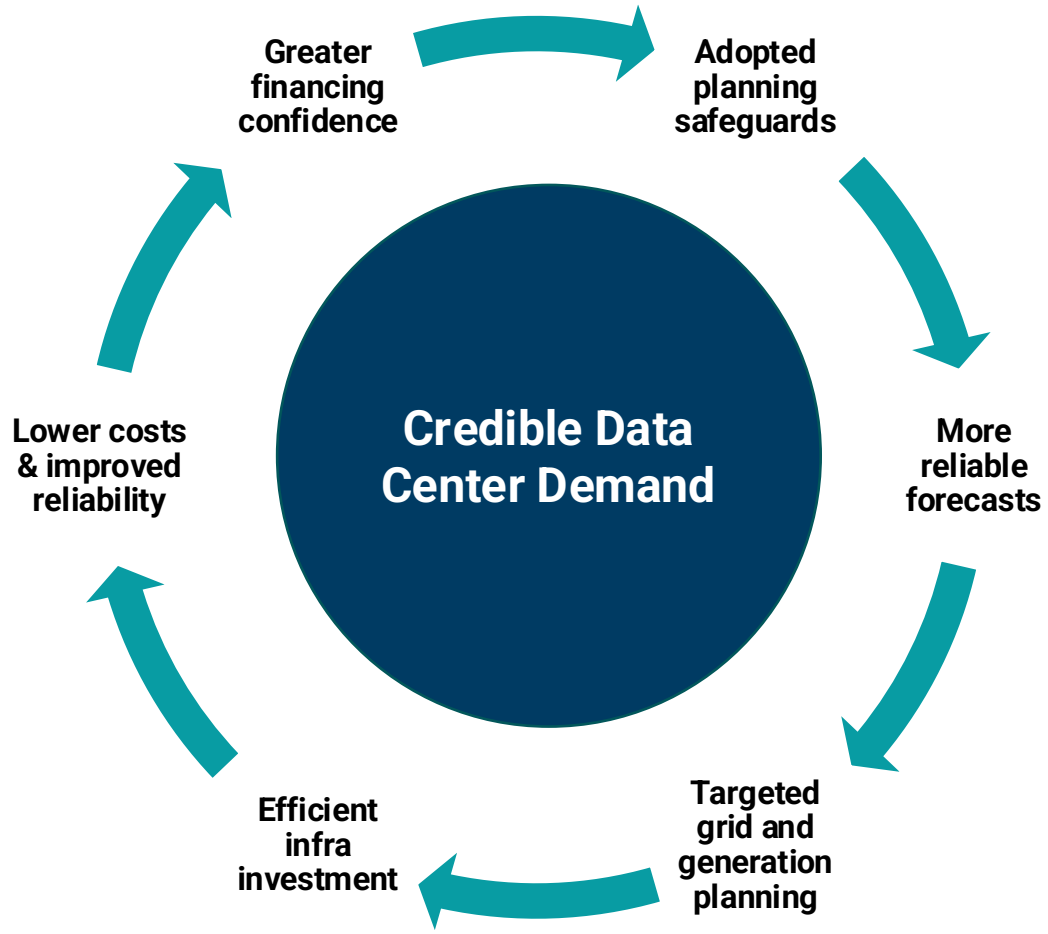
- Forgone revenue offset by lower costs and earlier market entry

Source: Aurora

Data center demand can improve planning certainty and de-risk system investment

Credibility Enablers

- Network upgrade cost responsibility
- Phased build plans
- Evidence of compute demand
- Interconnection deposits
- Load forecast reporting



Potential System Benefits

- Higher grid utilization
- Accelerated renewable development
- Reduced reliance on expensive peaky generators
- More private investment
- Improved energy security

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Conclusion

Regulatory and planning solutions can reduce future risks and unlock data centers as grid assets

1 Reduce overall demand and increase grid stability

- PUE standards
- Upfront guarantee deposits
- Queue standardization
- Interconnection & grid codes

2 Reduce over-investment risk with faster speed to power

- Advanced transmission technologies
- Power couples
- Non-firm interruptible interconnection
- DSM & BTM battery incentives
- Large load tariffs

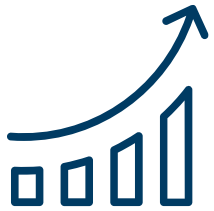
3 Leverage data centers as a grid resource

- Demand-side flexibility
- Utilize offtake for grid investment

4 Strategic new data center load planning

- Prioritize highest-value or strategic data centers
- Data center siting strategies
- Clustered + accelerated studies
- Proactive transmission investment

Solutions to meet incoming load growth need to support speed, flexibility and affordability

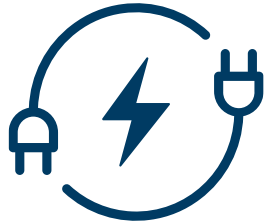


Fast

Solutions that are rapidly deployable, to help interconnect new loads in the next 1–3 years.

Affordable

Solutions that result in net system or customer savings.



Flexible

Solutions that provide different benefits or services at different timescales and adapting to evolving needs.

Thank You!

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