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Energy Industry Update

Complicated

Webinar | September 17, 2025

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Kevin Hernandez

Partner

Kevin Hernandez is a partner with ScottMadden where he specializes in grid transformation, energy storage, and transportation electrification. Since joining the firm in 2012, he has consulted with a variety of utility and industry clients on issues ranging from fleet electrification to EV infrastructure planning. Kevin earned a B.A. from the University of Tennessee, Knoxville, an M.A. from the U.S. Navy War College in Newport, Rhode Island, and an M.B.A. from the Fuqua School of Business at Duke University. He is also an eight-year veteran of the United States Navy.

Energy Is Who We Are

ScottMadden is a management consulting firm with more than 40 years of deep, hands-on experience. We deliver a broad array of consulting services—from strategic planning through implementation—across the energy utility ecosystem.

Our energy practice covers the following areas:

GENERATION

RATES & REGULATORY

TRANSMISSION & DISTRIBUTION

NATURAL GAS

GRID EDGE

ENERGY CORPORATE SERVICES

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TOPIC #1

Large Loads and Implications for Rate Design

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Eric Brooks

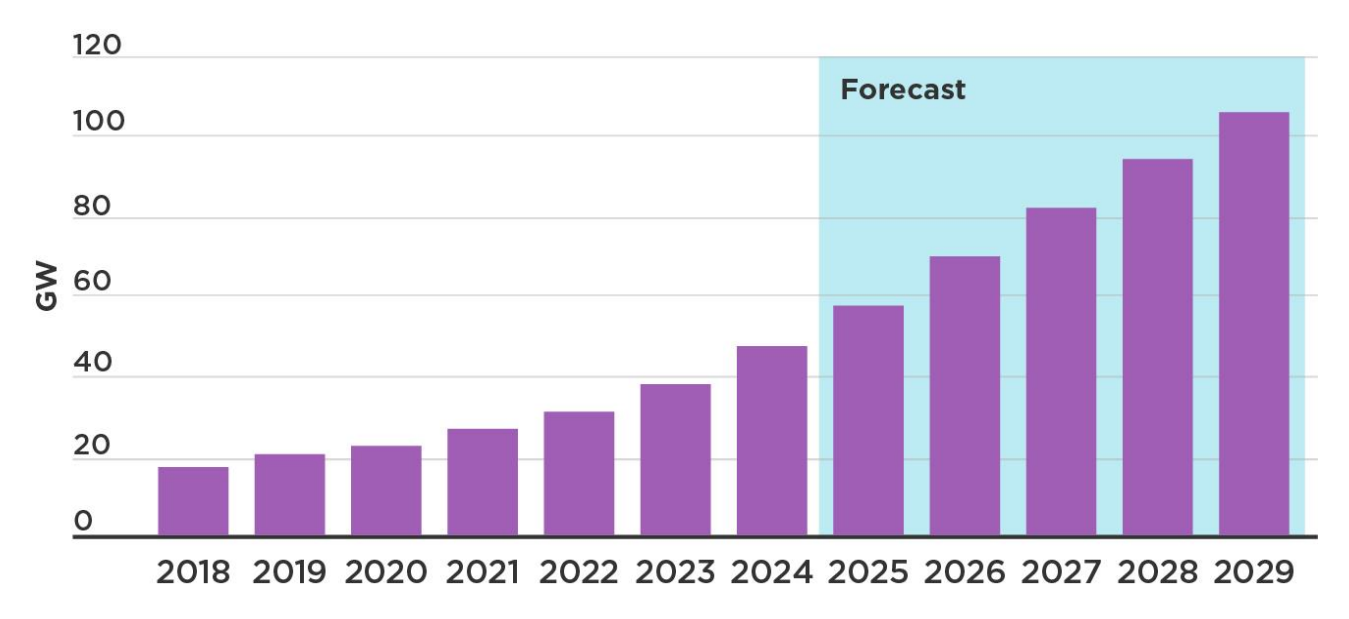
Manager

Eric Brooks joined ScottMadden in 2020 after receiving an M.B.A., with concentrations in corporate finance, energy, and sustainable enterprise, from the University of North Carolina Kenan-Flagler Business School. In the summer of 2019, Eric interned with the corporate finance and corporate development departments at Duke Energy Corporation. Prior to business school, he spent four years working at a leading expert network, facilitating energy market research for diverse financial and corporate clients. Eric graduated Phi Beta Kappa from Michigan State University with a B.A. in social relations and policy.

Impact of U.S. Data Center Expansion on Utilities

The scale of potential data center demand growth represents an unprecedented opportunity to deploy capital into energy infrastructure; however, the pace and uncertainty of this demand creates unique challenges for utilities.

U.S. Utility Power Demand from Data Centers (GW)



Key Issues for New Large Loads

- Incremental investment requirements and potential cost shifts
- Impact on system performance
- Longevity of demand and risk of stranded costs
- Interest in and risk allocation for new technologies

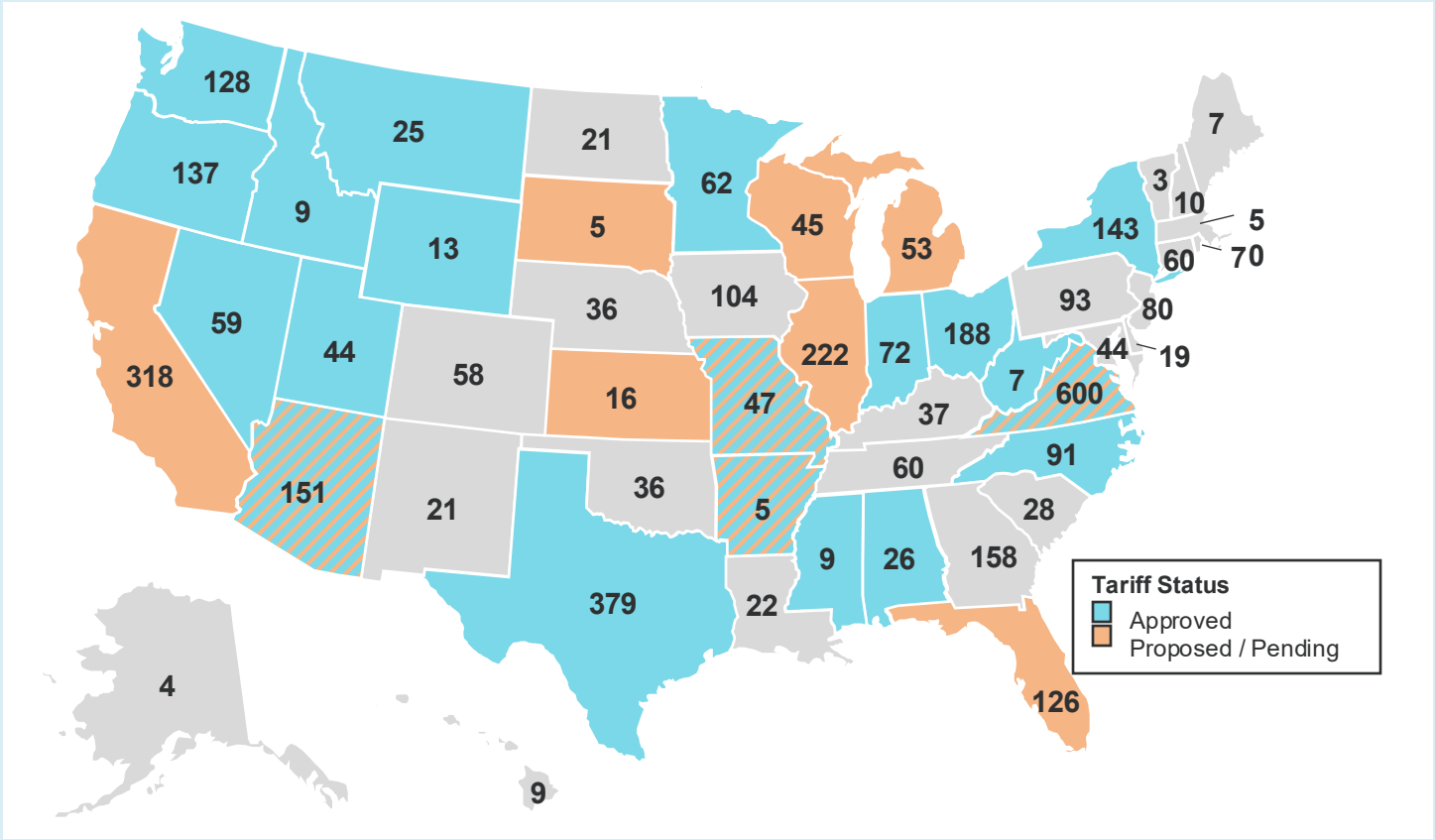
Note: Excludes enterprise-owned data centers.

Sources: Platts Megawatt Daily (May 28, 2025) (citing S&P Global Market Intelligence; 451 Research and Datacenter Services & Infrastructure Market Monitor and Forecast: U.S. Focused released Mar. 14, 2025)

Adapting Utility Tariffs for Large Load Customers

While data center development has largely been clustered in key markets, most notably Northern Virgina, utilities, regulators, and stakeholders across the country are taking actions to re-evaluate how this infrastructure is paid for.

Large Load Tariffs and Data Center Count by State



Sources: Database of Emerging Large-Load Tariffs (DELTa). Smart Electric Power Alliance (SEPA) and North Carolina Clean Energy Technology Center (NCCETC). Retrieved August 15, 2025, from https://sepapower.org/large-load-tariffs-database/; Data Center Map. (2025). "USA Data Centers." Retrieved August 15, 2025, from https://www.datacentermap.com/usa/

General Principles of Rate Regulation and Design

Utility rates are intended to compensate utilities for the operating of electric service as well as a reasonable return on and of capital deployed in "used and useful" utility assets. Key design principles include:

GENERAL PRINCIPLES

Classes Matter

Large customer rate classes are designed to reflect their unique service requirements and load characteristics.

Cost-Causer Pays

Customer and classes that impose costs on the system and other customers are responsible for their payment.

Just and Reasonable

Rate design should ensure that service to those customers should not be subsidized by other customers or classes.

Approaches to Manage Large Load Risks

Utilities and regulators are using both terms and pricing in large load tariff and contract arrangements to ensure costs are recovered from new large load customers while striving to support continued development.

Opportunities

- Economic development
- National policy priorities
- Rate base growth

Issues

- Potential cost shifts
- Stranded asset risk
- System reliability

Risk Mitigation Provisions

- Minimum charges
- Long-term contracts/early termination penalties or exit fees
- Collateral or creditworthiness requirements
- Direct assignment of costs

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Case Study: Virginia Electric and Power Company (Dominion)

"Virginia is home to the largest data center market in the world, with Northern Virginia alone surpassing the combined size of the next five largest U.S. markets. This scale is not just notable – it is unprecedented, and it fundamentally alters the risk profile the Company must manage."

—John A. Blackwell, Director – Data Center Practice at Dominion Energy

Key Provisions in High-Load Customer Proposal	
Applicability	■ ≥ 25 MW of demand ■ ≥ 75% load factor
Min. Demand Charges	■ ≥ 85% of transmission and distribution ■ ≥ 60% of generation
Contract Duration	■ 14-year standard contract with optional 4-year load ramp
Customer Flexibility	■ Reduce contacted capacity up to 20%
Exit Fees	■ Minimum charges over the remaining contract duration
Collateral	■ $1.5 million per MW of contracted capacity

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Source: Blackwell, J. A. (2025, August 13). Rebuttal testimony of John A. Blackwell on behalf of Virginia Electric and Power Company: Case No. PUR-2025-00058. Virginia State Corporation Commission.

Key Takeaways

As data center development accelerates, utilities and regulators will need to work collaboratively and creatively with large customers to manage this opportunity while protecting other rate payers and stakeholders.

Energy demand from data centers and other large loads is projected to grow significantly over the next 5 to 10 years.

Utilities and regulators are monitoring and managing the potential impacts to other customers of ramping up infrastructure to serve this new and rapidly growing demand.

Some utilities are proposing special tariffs and rate structures to equitably balance the economic development that these new customers bring with ongoing capital and revenue requirements to serve them and manage risks of overbuilding and potential stranded costs.

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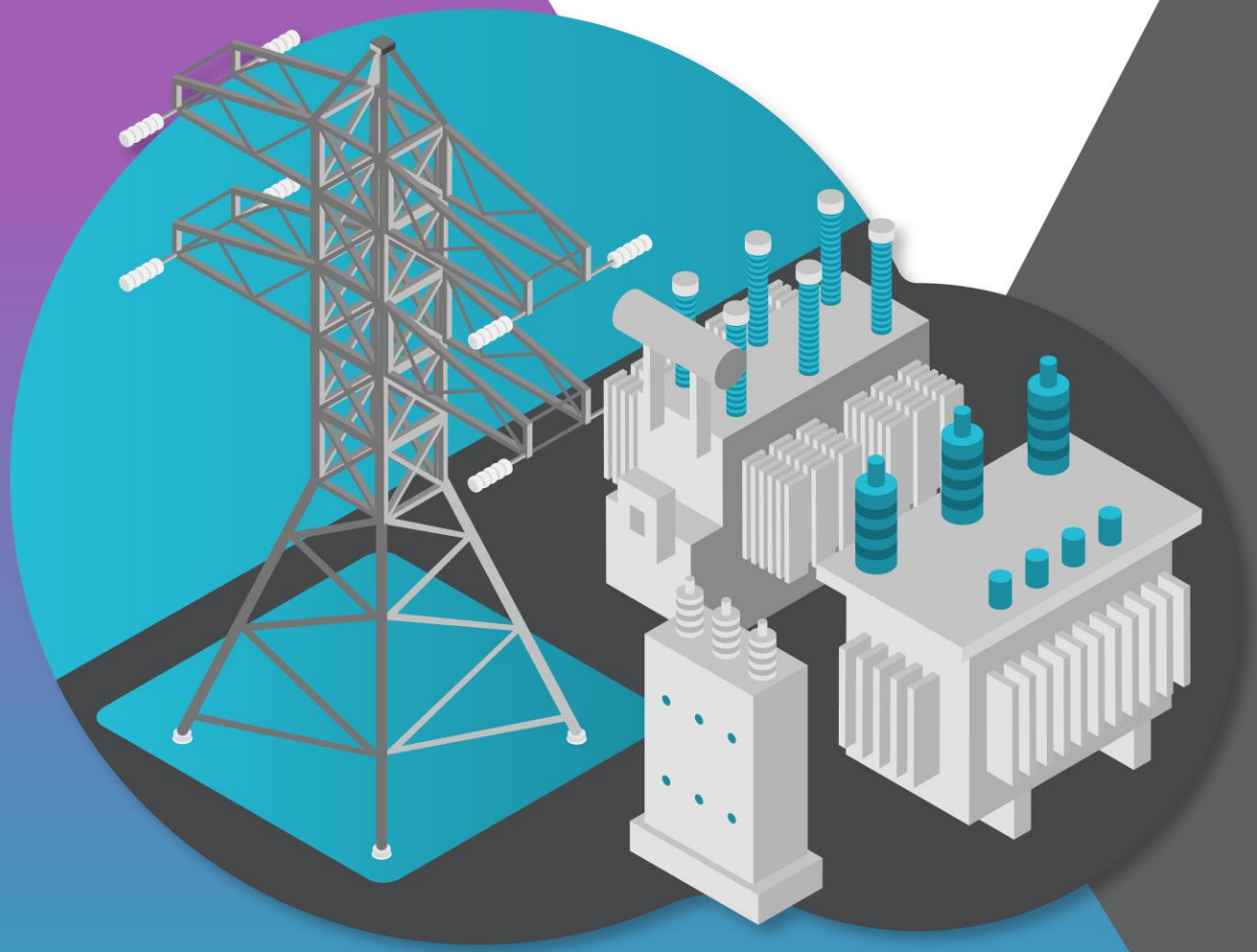

TOPIC #2

Scaling Capital Projects

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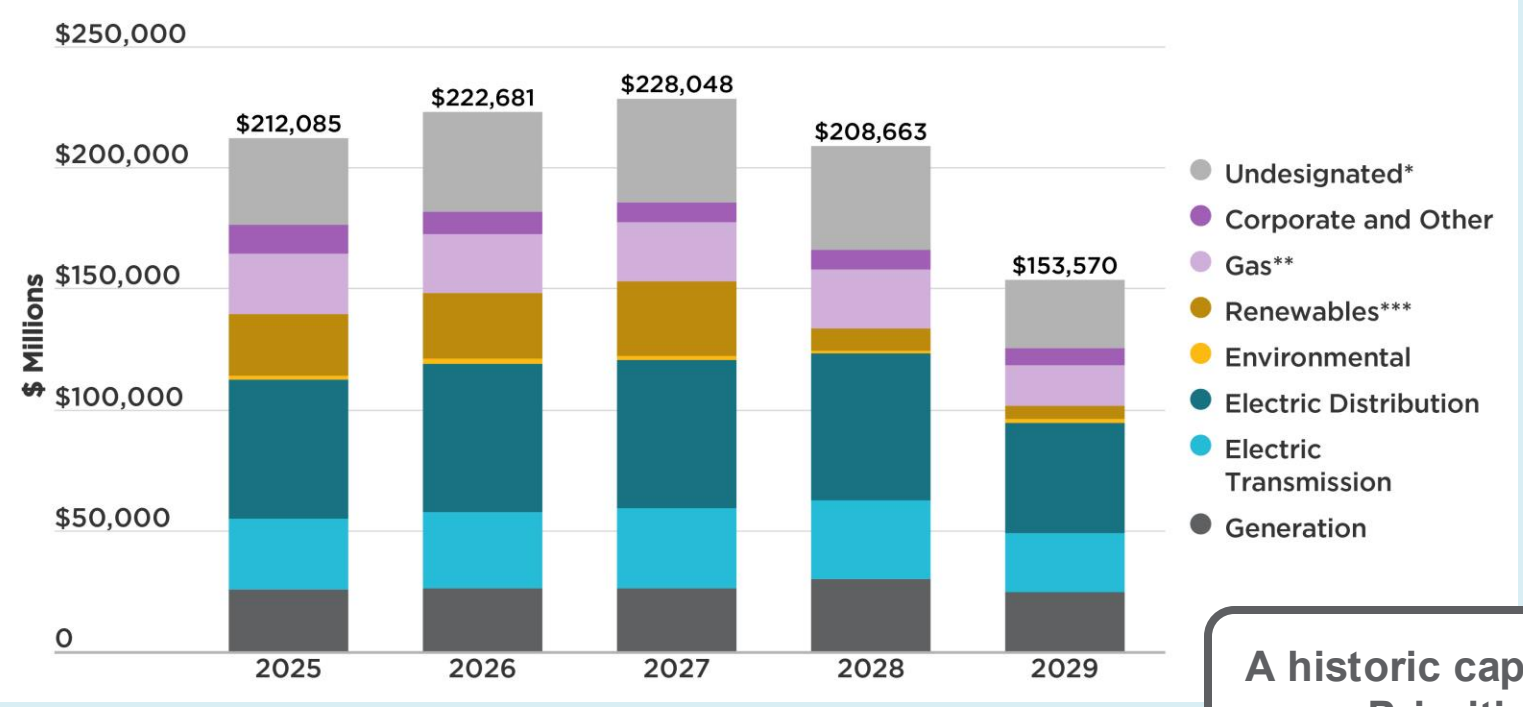
Preston Fowler

Director

Preston Fowler is a director with ScottMadden focused on the energy sector. He joined ScottMadden in 2006 after obtaining an M.B.A. in finance, organization, and management from the Goizueta Business School of Emory University. Since joining ScottMadden, he has primarily worked on utility projects focusing on process improvement, business planning, strategy development, benchmarking, and project management. While pursuing his degree, Preston interned at EarthLink, serving as an internal consultant and creating a new process map for improved project management for the customer support organization. Prior to business school, he worked as a project and design engineer for Delphi Corporation. In addition to an M.B.A., Preston holds a B.S.E. in mechanical engineering from Duke University.

The Investment Wave: Where CAPEX Is Going

Capital Investment Trends by Segment for Selected U.S. Electric, Gas, and Combination Utilities ($ Millions) (2025–2029 Forecast)



- More than $1.1T planned
- T&D = backbone (largest, fastest-growing)
- Renewables + storage ramping
- Gas adds firm capacity
- Near-term years most reliable
- Execution > ambition

A historic capex cycle is here; T&D is the backbone. Prioritize near-term, shovel-ready value.

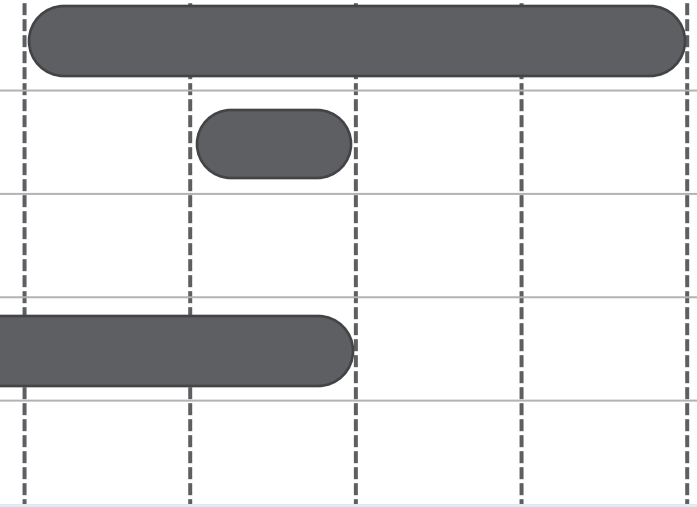
Notes: *Undesignated reflects totals for companies that do not disclose segmented capex, including Dominion Energy, PG&E Corp., Sempra Energy, Northwest Natural Holding Co., Avista Corp., MDU Resources, and Hawaiian Electric Industries. **Gas includes gas pipelines, storage, distribution, and other gas expenditures. ***Renewables includes planned energy storage spending. Data are for 17 electric utilities, 9 gas utilities, and 21 combination utilities. Capex data for the first three years is the most reliable, as some companies do not consistently release fourth- and fifth-year projections.

Sources: S&P Capital IQ; Regulatory Research Associates; ScottMadden analysis

Can We Get the Gear?

Power Infrastructure Equipment: Estimated Lead Times

Equipment Type	Estimated Delivery from Manufacturer*							
	2025	2026	2027	2028	2029	2030	2031	2032
Combined-Cycle Gas Turbines								
Gas Peakers								
Battery Storage								
Transformers								
Distribution Transformers**								



*For orders placed mid-2025
**Pad-mount

Long lead times and 2X cost inflation demand *early commitments*, *OEM alliances*, and *smart sequencing*.

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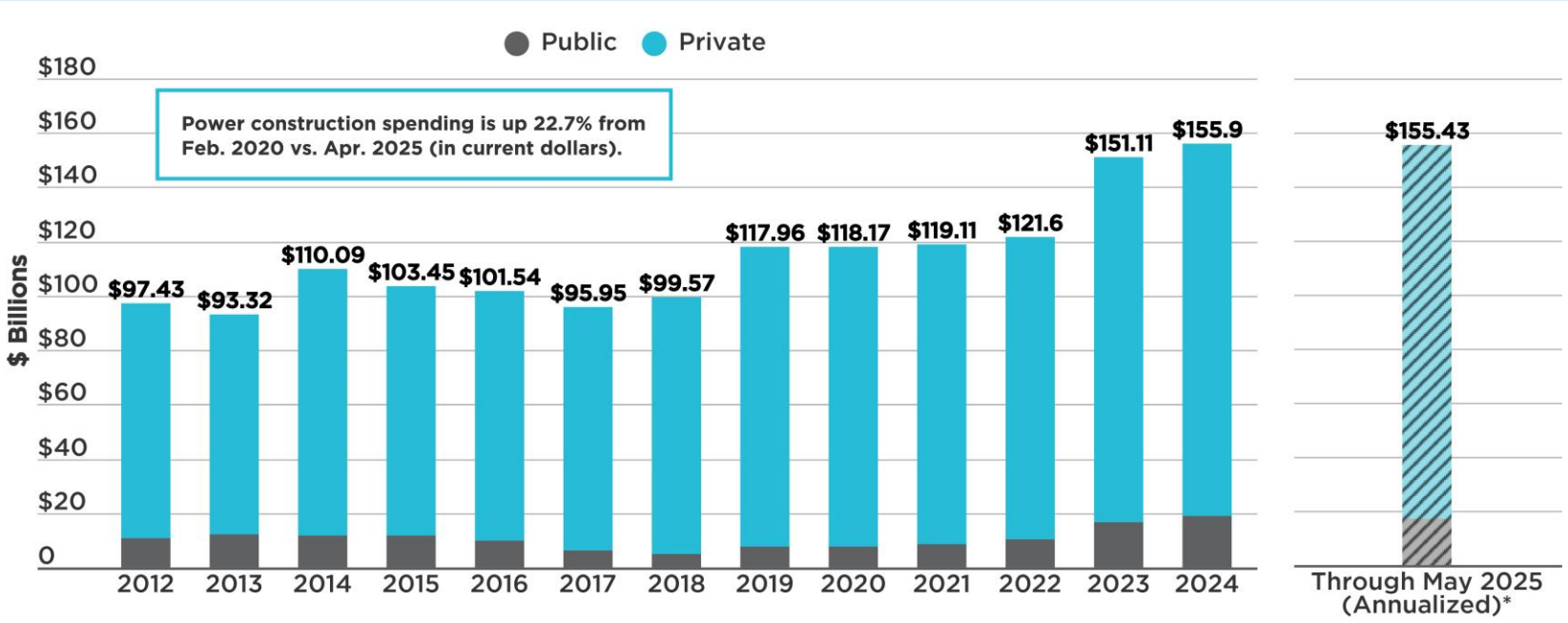
Sources: *Natural Gas Week*; *Power* magazine; company investor presentations; Wood Mackenzie; U.S. Dept. of Energy

Construction Continues to Rise

Annual Total Value of U.S. Construction Put in Place – Private and Public Sector Power (2012–May 2025 Annualized) ($ Billions)



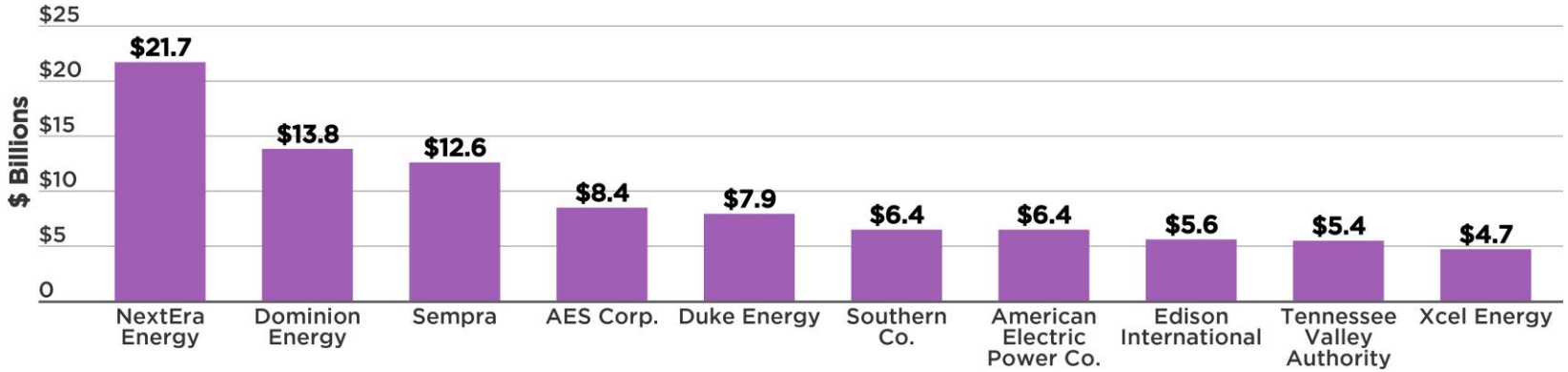
- Power stays hot
- Data centers amplify demand
- Project mix is shifting
- Inflation + tariffs = pressure

Note: Totals reflect individual rounding. *Figures are Value of Construction Put in Place in the United States, Seasonally Adjusted Annual Rate.

Sources: U.S. Census Bureau Construction Spending data; Engineering News-Record, Sage Policy Group (citing Census Bureau); ScottMadden analysis

Utilities Lead the Way

Top 10 Companies with Electric, Gas, and Sanitary Services Construction in Progress (at Year-End 2024) ($ Billions)



- Pipeline is real
- Utilities dominate CIP
- Capex stepping up

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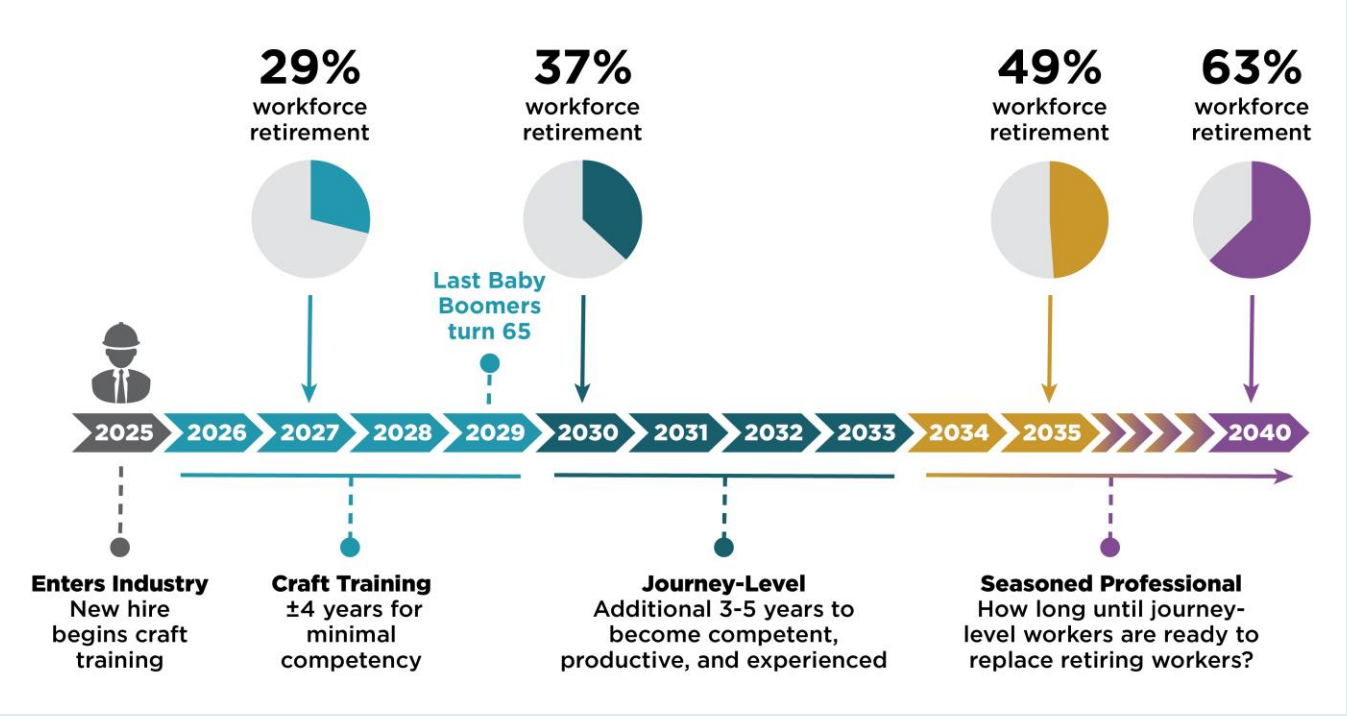
Source: Engineering News-Record

The Labor Reality

A Shrinking Construction Workforce: Labor Supply Attrition and Replacement



- Openings exceed hires; recruiting lead times are long
- Senior craft is retiring; crews are getting junior

The labor market is structurally tight; *industrialize delivery* to turn scarce talent into output.

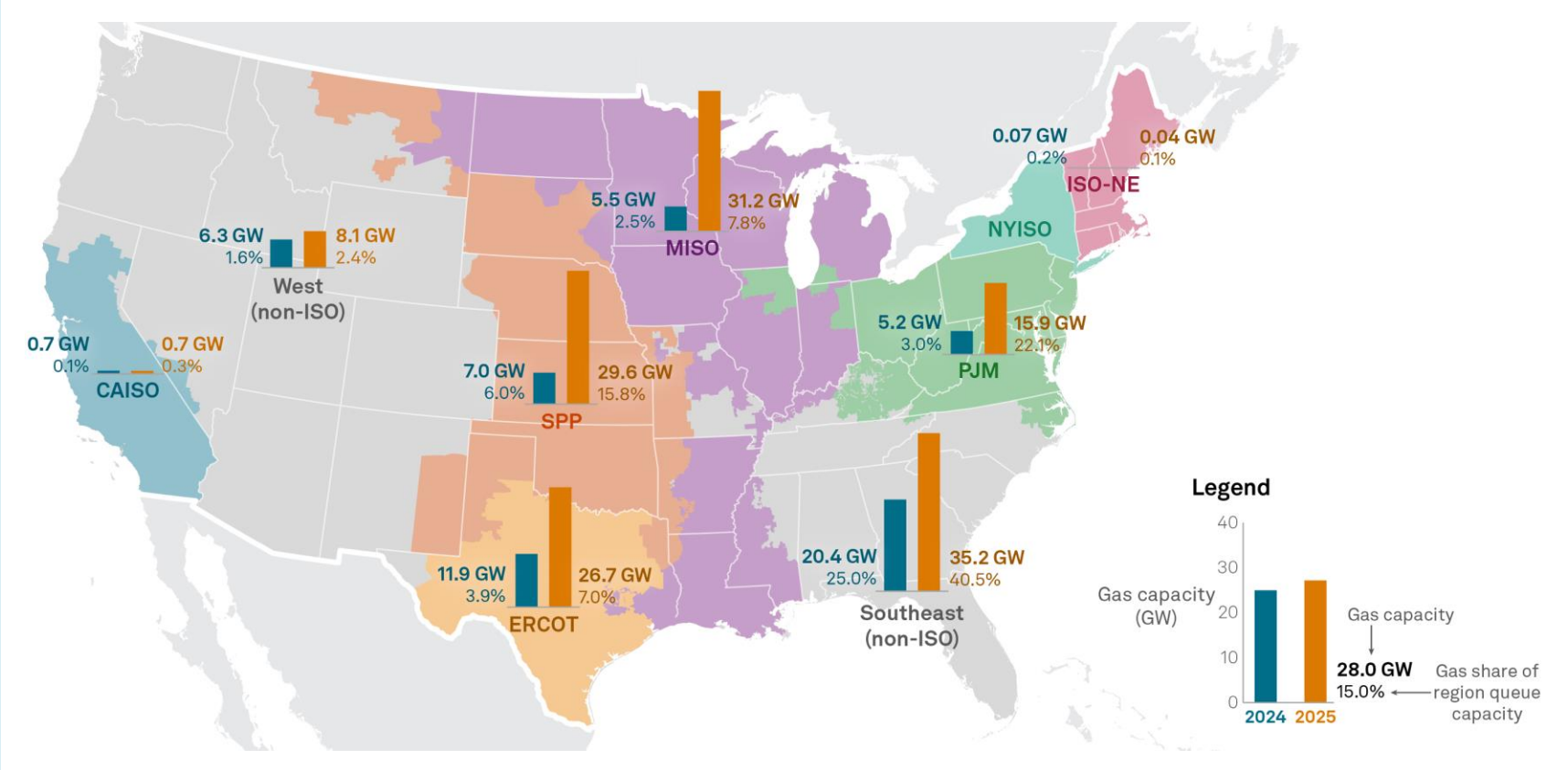
Note: The workforce population above reflects the following craft labor disciplines: Boilermaker, carpenter (scaffold builder), electrician, instrumentation technician, insulator, ironworker (reinforcing), ironworker/welder (structural), lineman, millwright, operator (heavy crane), operator (heavy equipment), pipefitter/combo welder, rigger/signalperson, sheet metal worker.

Source: Construction Industry Resources

Interconnection Remains the Pace Setter

Interconnection queues are tilting toward gas across key regions as wind and hybrid proposals recede. Recent reforms are weeding out speculative projects, but approval timelines remain lengthy and largely unchanged.

Gas-Fired Generation in U.S. Interconnection Queues (2024 vs. 2025) (GW)



Notes: As of June 9, 2025. Calculations based upon stand-alone gas projects; active queues only. PJM active capacity for 2024 updated based on energy/capacity MW.

Source: S&P Global Commodity Insights

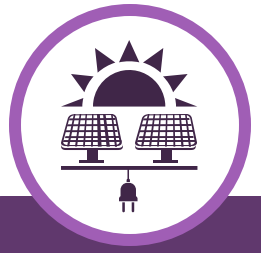
How We Scale Anyway

Alternatives

- Buy vs. build (M&A at 50%–65% $/kW)
- Aftermarket equipment (bridge the gap)
- Funded production (secure supply)
- Standardize and modularize

Advanced Energy

- Long-term firming
- FOAK risk: partner early
- Rate/contract design matters
- Plan for siting and skills



Behind-the-Meter

- On-site 100–500 MW
- Storage for flexibility
- Curtailable load contracts
- Faster than the queue

Treat supply, labor, and permits as design inputs – *standardize*, *modularize*, and *secure the long leads now*.

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Key Takeaways

Demand isn't the issue—delivery is. Win with speed, reliability, and affordability through optionality.

UTILITY CAPEX IS ACCELERATING

Powered by electrification, onshoring-driven manufacturing, and data center growth that is resetting load forecasts.

PORTFOLIOS ARE SATURATED

Utilities, developers, and EPCs are executing overlapping megaprojects, stretching preconstruction, supply chains, and field leadership.

EXECUTION RISK IS RISING

Tight labor and constrained equipment, plus slow permitting and interconnection, threaten schedules without early long-lead buys and contingencies.

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TOPIC #3

AI and Energy

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Brian Szews

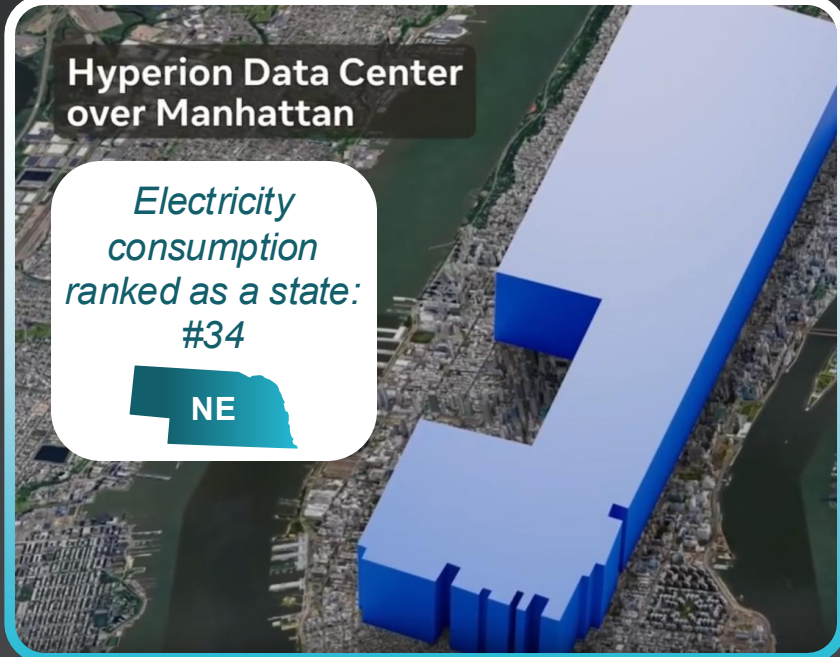
Director

Brian Szews joined ScottMadden in 2019 after receiving an M.B.A. from the Fuqua School of Business at Duke University. Prior to joining ScottMadden, Brian worked as a supervisor and project manager for AECOM, a power plant construction company, where he served as an engineering consultant to some of the largest power companies and utilities in the United States, including Duke Energy, Luminant, Detroit Edison, and others. He provided engineering solutions to clients in the United States and participated in many capital and O&M upgrades to nuclear, hydroelectric, combustion turbine, and combined-cycle facilities. Brian also spent eight years working as a system engineer, design engineer, and major projects supervisor with Duke Energy, primarily at the Harris Nuclear Plant. He spent the first phase of his career in the manufacturing industry, where he designed and sold precision chemical and synthetic fiber metering pumps to a worldwide market. Brian holds a B.S. in mechanical engineering from UNC-Charlotte and is a former professional engineer license holder.

Life Moves Fast

“My guess is energy consumption goes up quite substantially.”
– Jensen Huang, CEO, NVIDIA (June 2024)

Meta: 5 GW



Plant Vogtle: 4.5 GW

“As I said a few years ago, the AI scaling constraint will move from chips to voltage transformers to electricity generation. That is worrying for U.S. leadership in AI long-term.”
– Elon Musk, CEO, xAI (April 2025)

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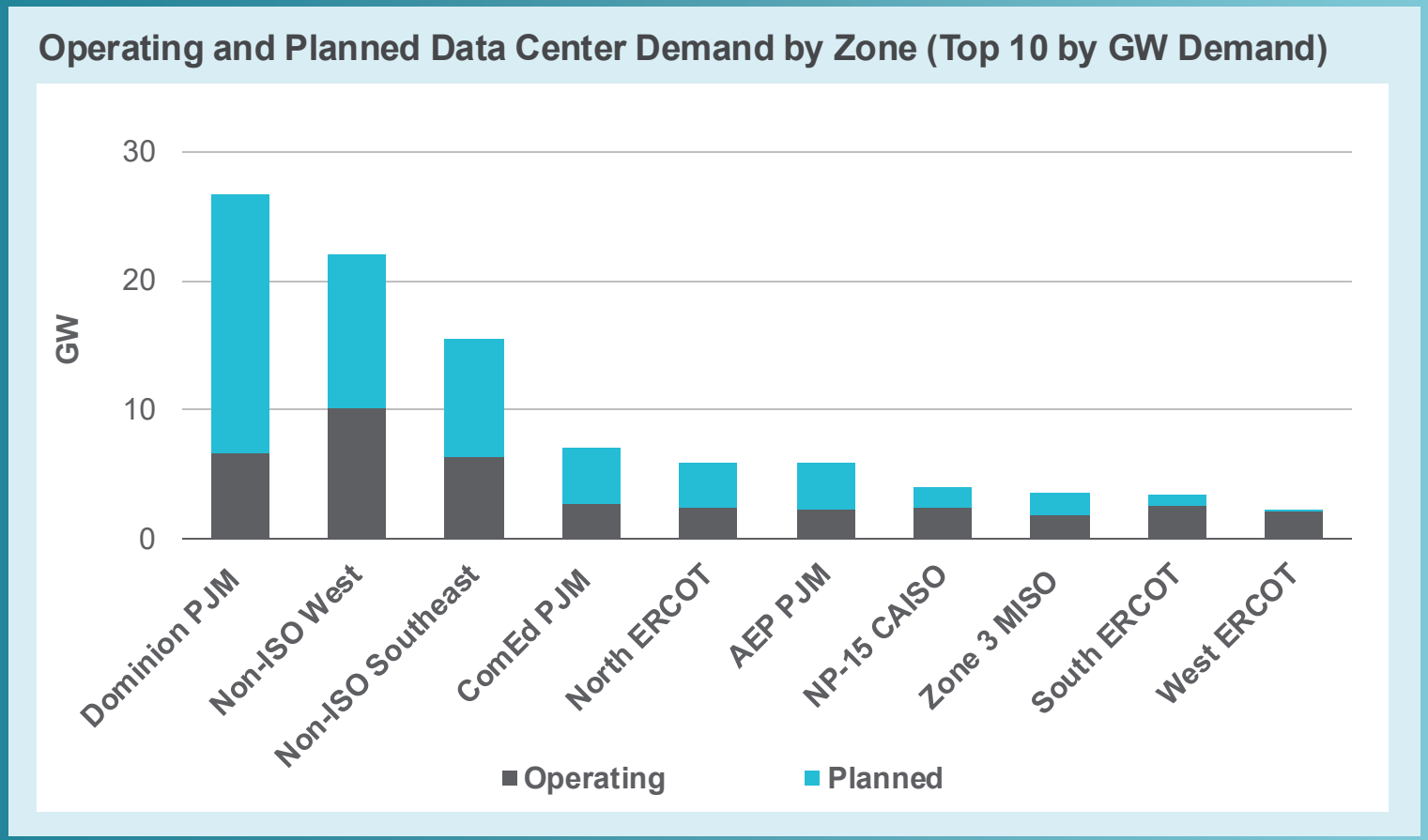
Data Centers: Primary Driver of Forecasted Load Growth

Data center *demand may double by 2029*, but impact will *vary by geographic region*.



Georgia is projecting 8.2 GW of load growth by 2030, with 80% coming from data centers, mainly in metro Atlanta.

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Source: S&P Capital IQ

Artificial Intelligence Can Help Us Prepare for…Artificial Intelligence

Grid Planning

AI can help lower the amount of new build-out by unlocking underutilized assets, optimizing infrastructure, and synthesizing data needed for foundational models.

Grid Operations

AI offers opportunity to better maintain existing generation assets, forecast non-dispatchable generation, and adjust flexible loads.

Siting and Permitting

AI tools can assist the review and approval process for state and local siting and permitting and federal reviews.

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Artificial Intelligence Can Make the Existing System More Efficient

System or Asset Health Reports

Provide several inputs to the LLM then have the GPT create a detailed written health report with suggestions for ongoing maintenance frequencies.

Maintenance Work Order Planning and Scheduling

When sensors indicate a need for maintenance, AI can automatically generate draft work order instructions and find an appropriate place to perform the work in the schedule.

Generative AI

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Artificial Intelligence Can Make the Existing System More Efficient (Cont'd)

Optimizing Combustion to Reduce Emissions

AI/ML can create a model using many variables and then train itself to recognize when a system is sub-optimal, making suggestions to operators in real time.

Moisture Carryover (MCO) Prediction

AI/ML can peer into the "blackbox" of moisture carryover using historical fuel cycle data and past MCO measurements to then predict MCO and identify its key drivers.

Distinguish CAPEX from OPEX

AI can read and understand a company's accounting procedures and work being performed and then identify and suggest capitalization opportunities that humans may overlook.

Predictive AI

Expert Systems

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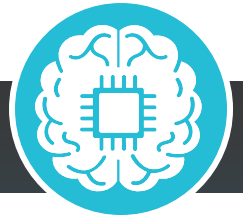
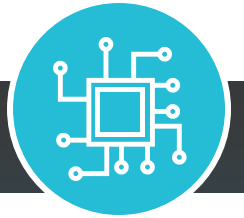
Key Takeaways

Data center energy use could double or even triple from 2023 levels by 2028. This implies data centers alone might draw 6.7% to 12% of all U.S. electricity by 2028, up from 4.4% today.



Artificial intelligence can help the industry accommodate the energy needs of…artificial intelligence.



A multitude of use case are already being explored by many industry sectors.

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Source: Lawrence Berkeley National Laboratory; ScottMadden analysis

Your Webinar Presenters

Kevin Hernandez
Partner

Eric Brooks
Manager

Preston Fowler
Director

Brian Szews
Director

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All topics covered in our latest issue:

1. Permitting and Siting Reform
2. Large Loads and Implications for Rate Design
3. AI and Energy
4. Scaling Capital Projects
5. Grid Flexibility
6. The Energy Industry in Charts
   (focus on rising U.S. gas demand)

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