

ACCELERATING DATA CENTER SPEED TO POWER CHALLENGES & SOLUTIONS

WLRA/AEIC Conference

**San Diego, CA
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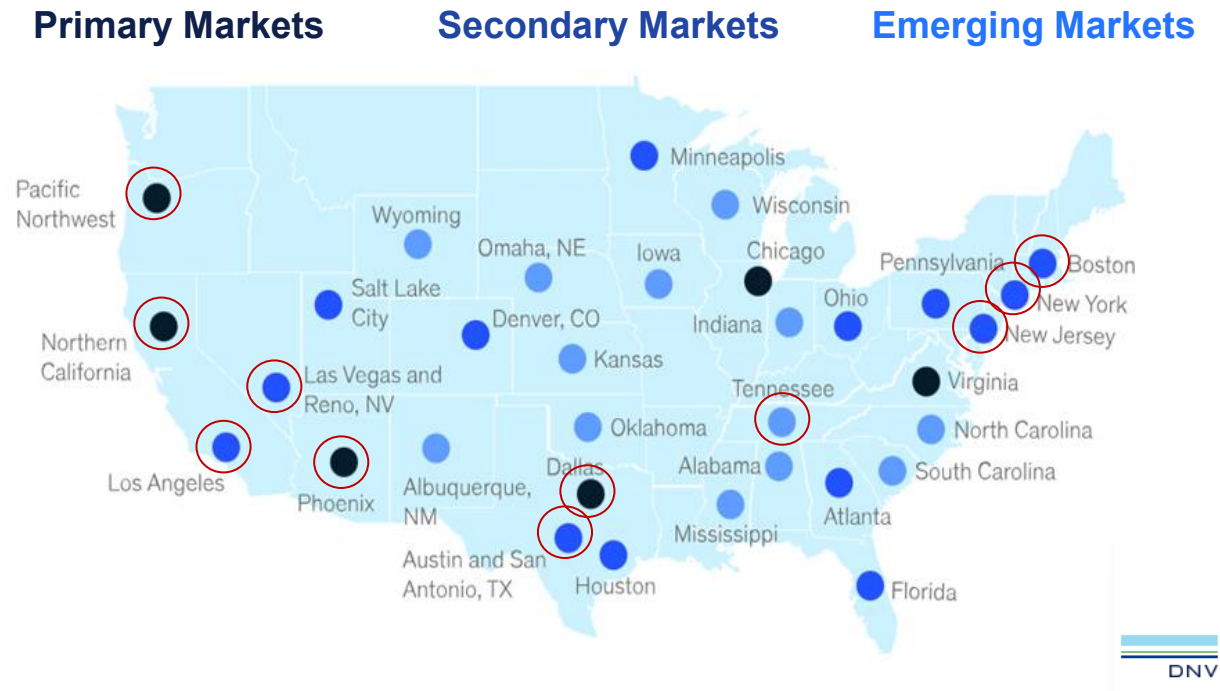
DNV Study Objectives and Methods

Objective. Capture experience and views market actors on the frontline of powering data center growth.

- Key business, technical, regulatory challenges
- Value assessment and experience with business and technology solutions
- Current and potential role of battery technology in accelerating speed to power and delivering other values

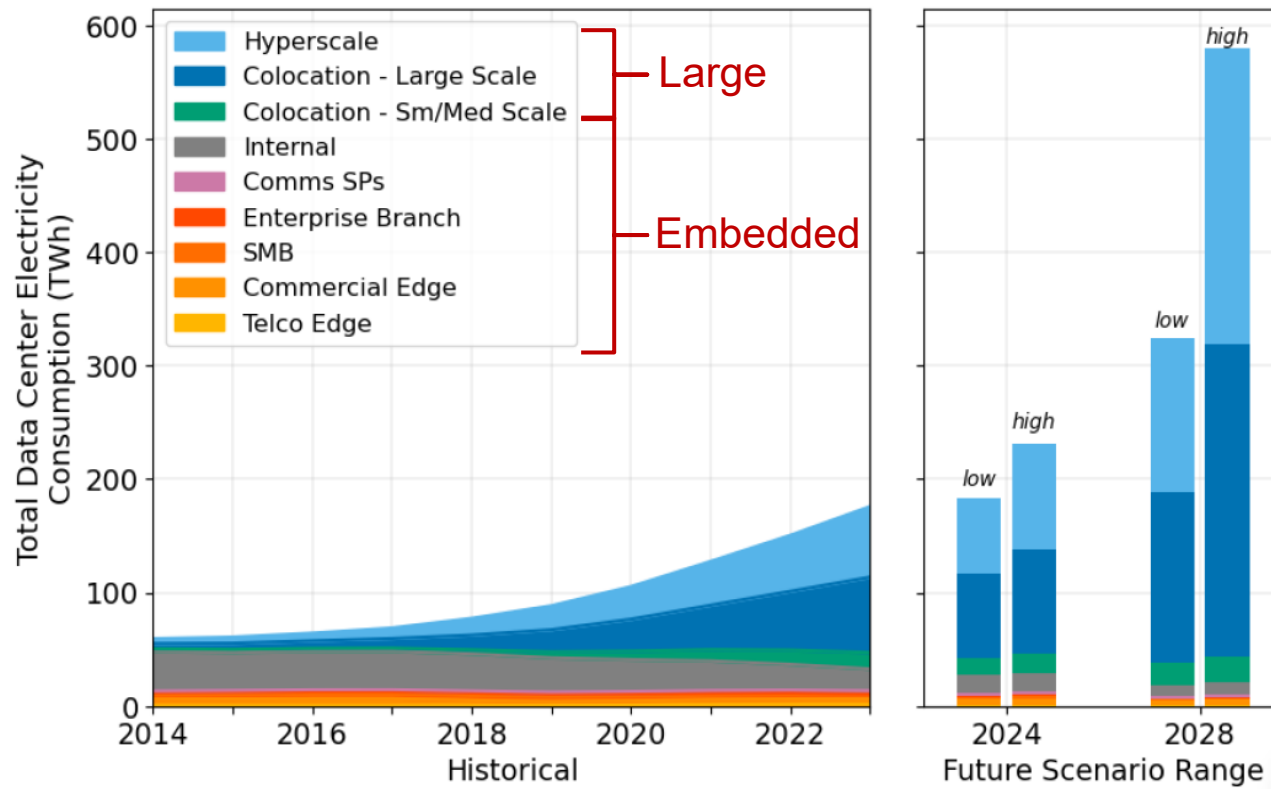
Methods

- In-depth interviews with utility & grid executives and data center developers in major markets
- Extensive document review
- Review of preliminary results with stakeholders



Fundamentals: Speed, Scale, and Uncertainty of Data Center Growth

Berkeley National Lab Data Center Energy Use Historical Estimate and Short-Term Forecast



Source: LBNL 2024

Speed & Scale: The Past 10 Years

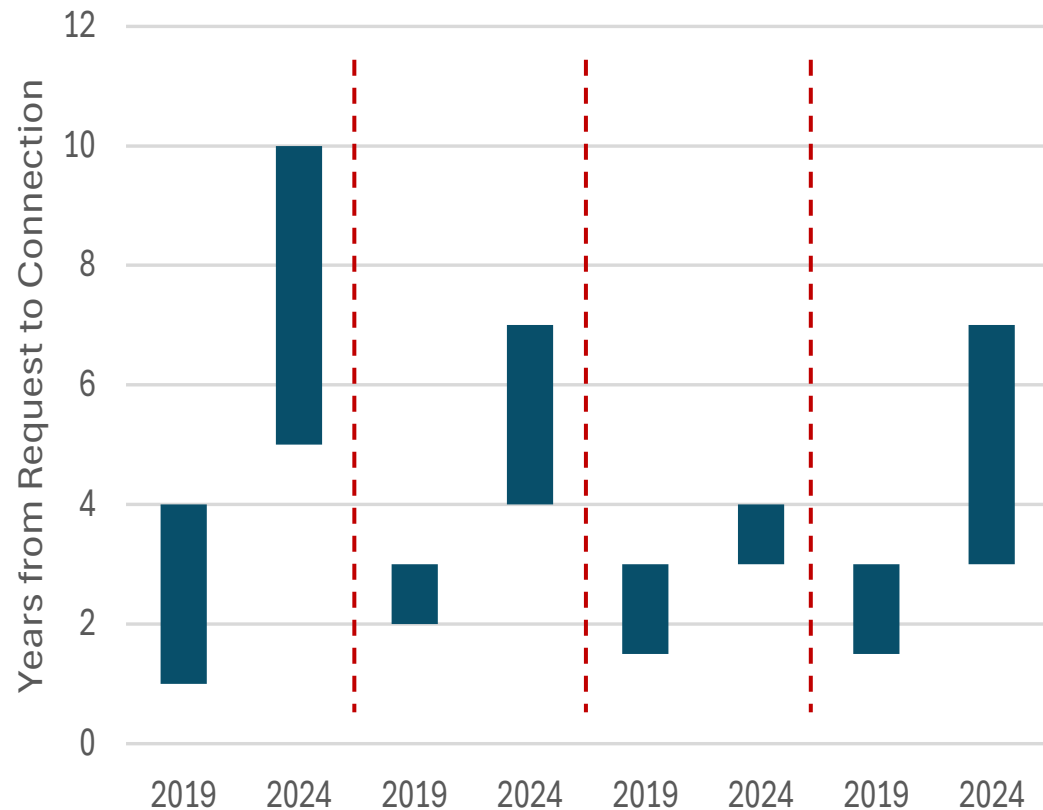
- Between 2014 and 2023, 33% CAGR
- Major drivers: increased IT workload, shift to cloud, introduction of AI

Uncertainty: The Next 5 Years

- Many potential disruptions in drivers, markets, technologies, business models
- Credible sources forecast 16% to 25% CAGR through 2030.
- Uncertainty on grid connection requests

The Data Centers' Main Challenge: Speed to Power

Typical Time in Connection Queue
for 4 Data Center Developers: 2019 - 2024



Other Challenges

- Maintain reliability of service to customers and tenants
- Meet public voluntary decarbonization goals

“It’s not just Tier 1 data center markets. Problems are and starting to show up in Tier 2 markets as well.”

- Data Center Developer

The Utility/RTO Challenge: Support Data Center Growth while Meeting Key System Priorities

"Our strategic goals:

- 1) Don't shift risk or cost onto our other customers.*
 - 2) Don't create a new reliability risk.*
 - 3) Maintain our clean energy commitment."*
- Utility Data Center Strategy Manager*



Evolving Solution Sets

Grid-side Tariffs & Contracts

- Interconnection and Service Contracts
- Joint Investment Projects
- Tariff Designs



Customer-Side Technology

- Colocation with Power
 - Firm – Fossil
 - Firm – Clean
 - Intermittent Renewables
- Battery Energy Storage Systems
 - Behind the Meter
 - Front of Meter
- Hybrid Systems - Microgrids

Key Takeaways from Stakeholders

Still in very early stages of developing solutions to accelerating data center development.

Stakeholder cooperation and collective action are key to meeting data center growth challenges

- **Flexibility and transparency in developing solutions for individual projects**
- **Major issues requiring joint action and partnerships to scale project development**
 - Continue to develop transparent, repeatable processes to accelerate grid the grid connection process
 - Development/clarification of regulatory frameworks to enable and compensate data centers as grid assets
 - Piloting and information sharing on technology and business solutions for load flexibility

