

Charting the Path to Tomorrow

Effectively Serving Load Growth

David Porter

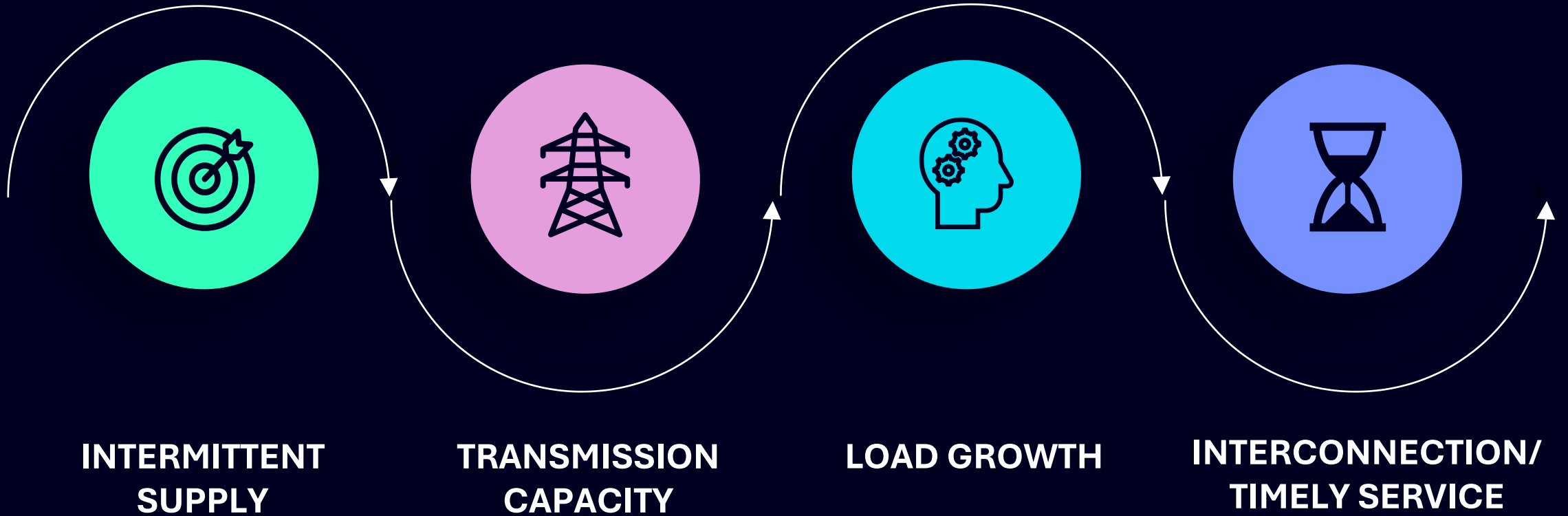
VP Electrification & Sustainable Energy Strategy

25 September 2025

NCPA Annual Conference



Key Drivers Looking to the Future



Key Challenges With the Changing Grid

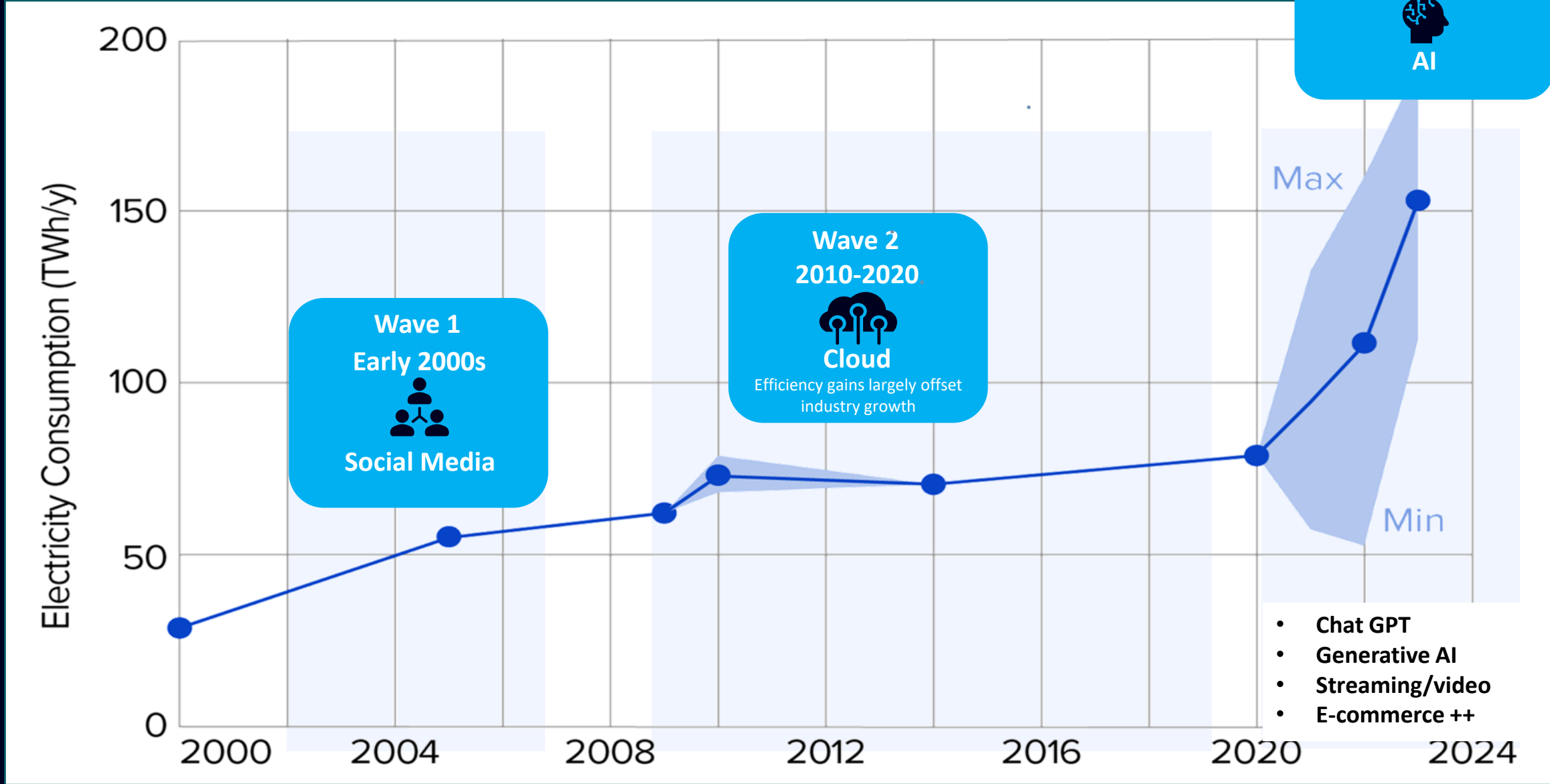
Electric Vehicles, Data Centers, Crypto Mining, H₂ Production, New Manufacturing, Heating Electrification, ...

Wind and Solar Generation, Aging Transmission Infrastructure, Climate Impacts ...

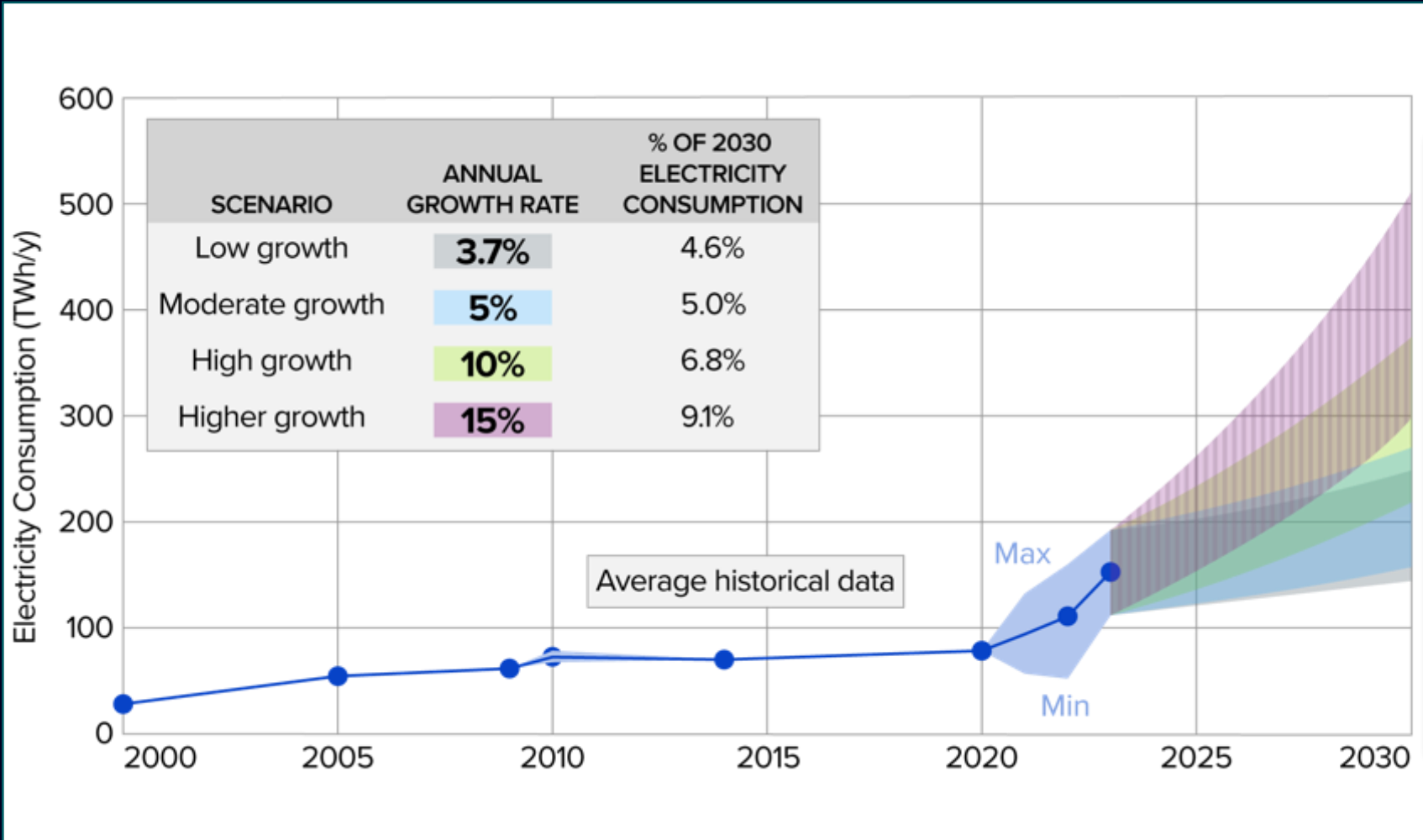


Flexibility is the key to meeting load needs

Data Centers: 3rd Wave of Evolution



U.S. Data Center Power Demand Growth

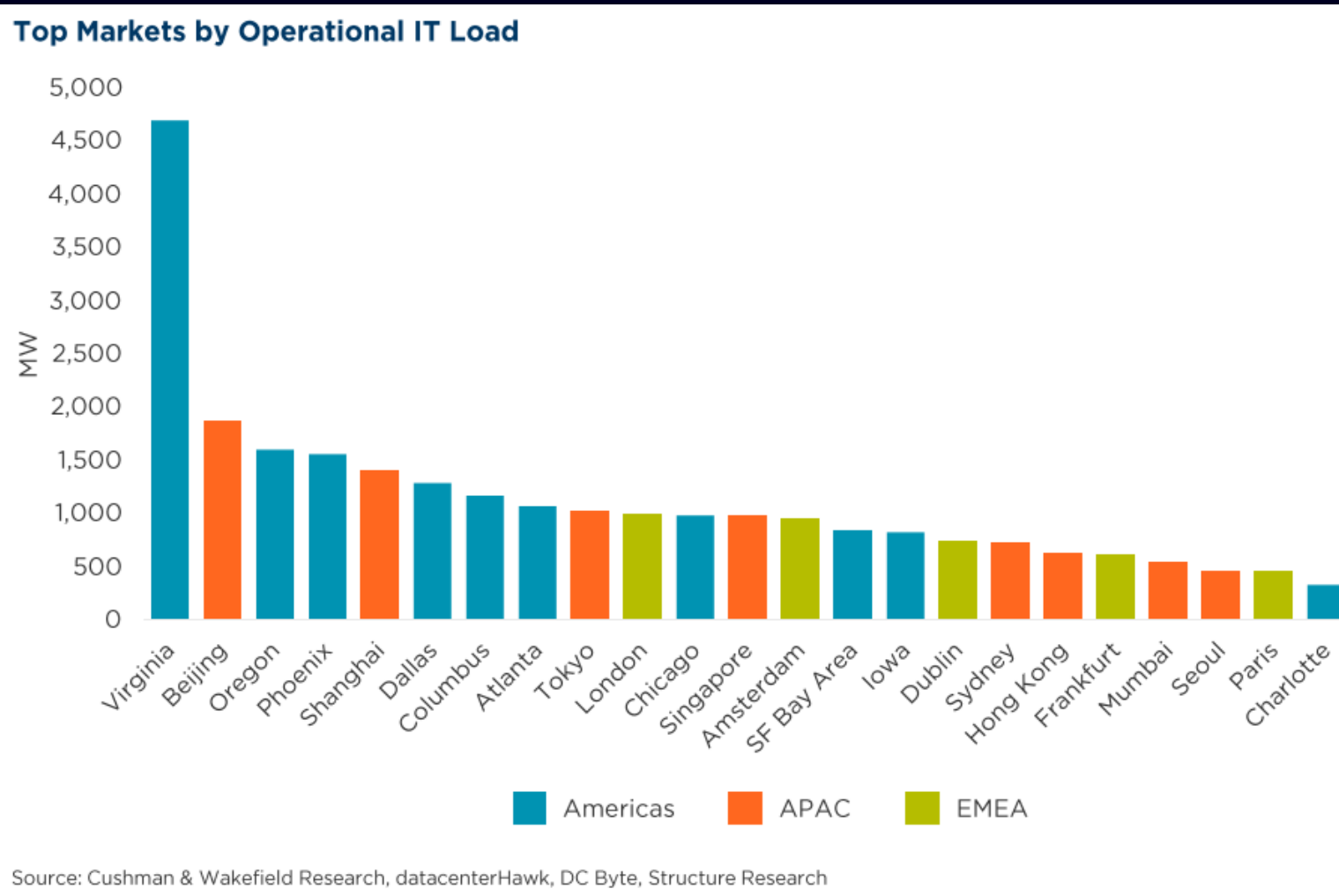


Key Themes in the Report

- History of data center load
- Drivers of recent and future growth
- Opportunities to reduce grid impacts
- Four scenarios for potential data center power demands in the U.S. through 2030

Source: EPRI Technology Innovation, [Powering Intelligence](#), May 2024

Data Centers Concentrated Regionally & Spreading



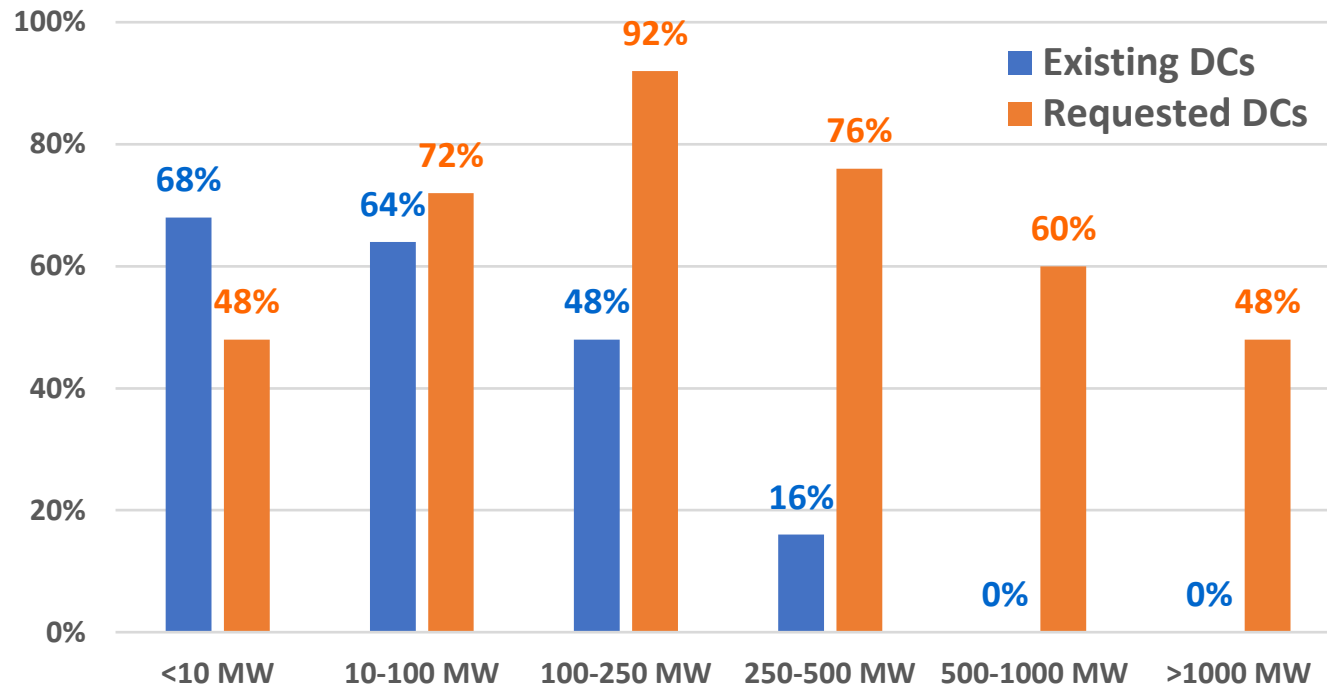
Site Selection Criteria

- Power availability
- Local tech skills
- Fiber connectivity
- Costs (land, taxes, power)
- Renewable energy options

Source: [Cushman & Wakefield \(2024\)](#)

New Data Center Demands Growing

Size of Data Centers Served and New Service Requests (% of 25 Utilities Surveyed)



Utility Experiences and Trends Regarding Data Centers: 2024 Survey.
EPRI, Palo Alto, CA: 2024. 3002030643.

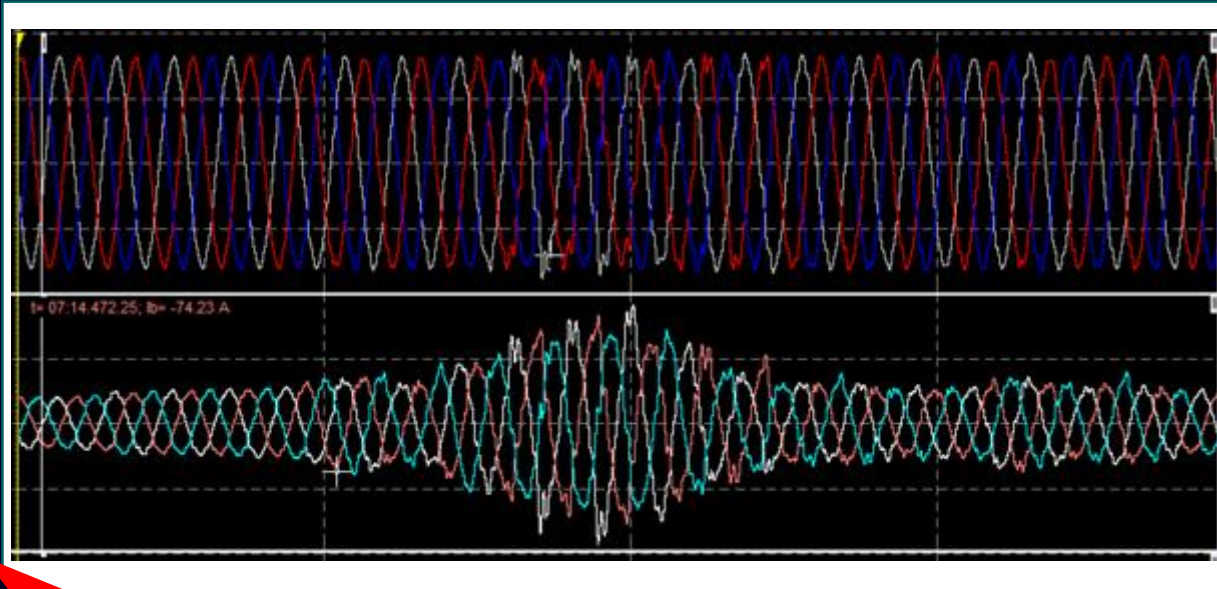
Key Points From Respondents

- All operating data centers today are less than 500 MW
 - Most < 100 MW
- 60% of respondents have requests for more than 500 MW
- 48% have single requests for more than 1000 MW

Data Center and Industry growth faster than supply and delivery buildout

Reliability Risks and Concerns

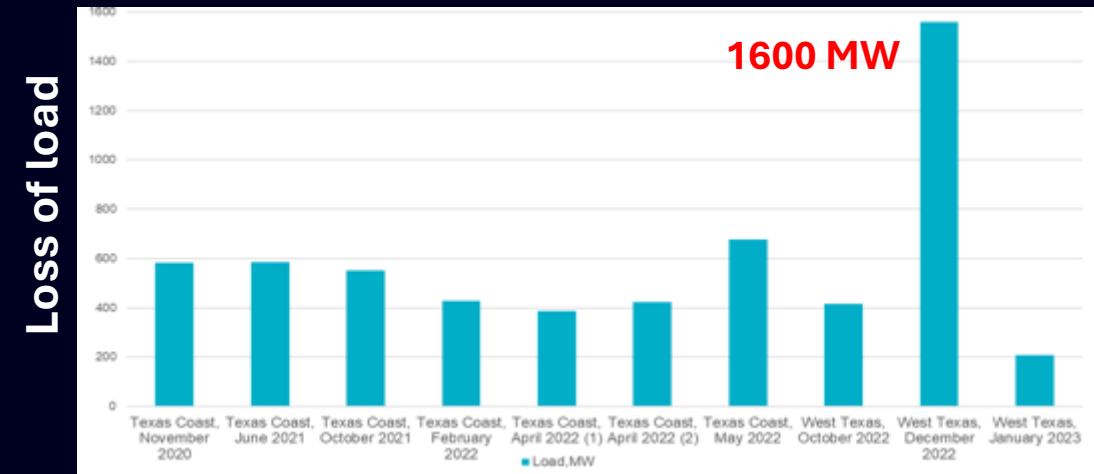
Choppy AI Training Load



AI data center GPUs cause short bursts of 2-4x power (on the order of 100 ms to seconds)

- Can cause local *voltage (flicker), imbalance, harmonic distortions, and frequency issues*
- May excite *oscillations in an interconnection* which becomes a reliability issue

Voltage Sensitivity and Ride-through



“System frequency increased to 60.235 Hz and did not return to normal for over 10 minutes.” ERCOT LFLT

Data centers and crypto can disconnect from the grid for normally cleared faults. **An unplanned large load disconnection can cause local voltage and systemwide frequency issues**

DCFlex

Data

Center

Flexible Load Initiative



Why Flexibility Matters

Flexibility: The Key to a Modern, Resilient Grid



Cost Savings

Avoids price spikes & optimizes energy use



Reliability

Rapidly balances supply & demand



Network Efficiency

Reduces congestion & improves asset utilization



Environmental Impact

Optimizes plant dispatch & integrates renewables



Faster Grid Access

Accelerates connection for new projects

Key Factors for Success

Making Flexibility a Reality



Economic Incentives

Minimize opportunity costs for data centers/large loads



Clear Market Rules

Enable participation in grid services



Advanced Control Systems

Enable rapid and reliable response



Collaboration

Between grid operators, data center owners, and technology providers

DCFlex

Driving Innovation & Accelerating Integration

- Developing a robust evidence base through modeling and demonstration
- Facilitating collaboration between key stakeholders
- Identifying and validating innovative flexibility solutions



*Enhancing grid reliability
by leveraging data centers
as flexible loads*

Flexible Data Center Designs

Enabling future data centers to become grid resources through flexible & efficient designs and operational practices

Transformational Utility Programs

Explore program and market structures that equitably complement data center flexibility

Grid Planning for Operational Flexibility

Equip the utility industry planning practices to embrace large flexible loads

Data Center Informed Energy Supply

Inform Supply Portfolio needs and Regional Readiness

Current Progress

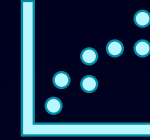
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Committed
Members & Growing

F



Flexibility Taxonomy



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Load Forecasting Framework

Policy & Regulatory Digest

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Demonstration Cohort



D

Initial Demonstration Projects

Compute Flexibility, Grid Services

Arizona



Emerald AI, Arizona Public Svc.

Compute Flexibility

- Reducing load by up to 25%
- Matching utility program parameters
- Ramping capabilities
- Eliminating snap back potential

North Carolina



Google, Duke Energy

Compute Flexibility

- Reducing electric load up to 20%
- Testing signaling and response times/durations
- Addressing various communications protocols

France



Schneider Electric, RTE

Ancillary Services to the Grid

- Fast frequency response
- Ride through
- VAR support
- Under frequency load shedding

DCFlex: Early Industry Impacts

Broad Value Delivery to the Industry



DCFlex Participants

Developers



Hyperscalers



IPP's



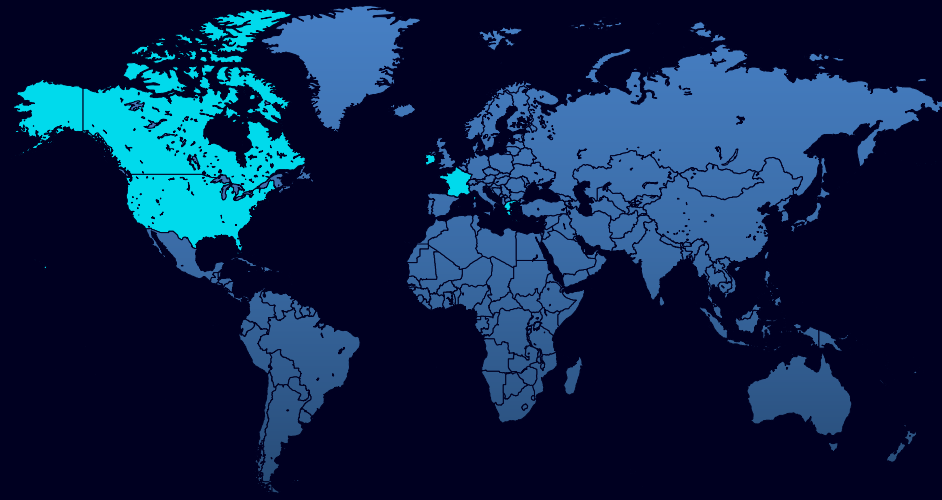
ISO/RTO



Other



Technology Providers



Utilities





TOGETHER...SHAPING THE FUTURE OF ENERGY®