Powering Data Centers

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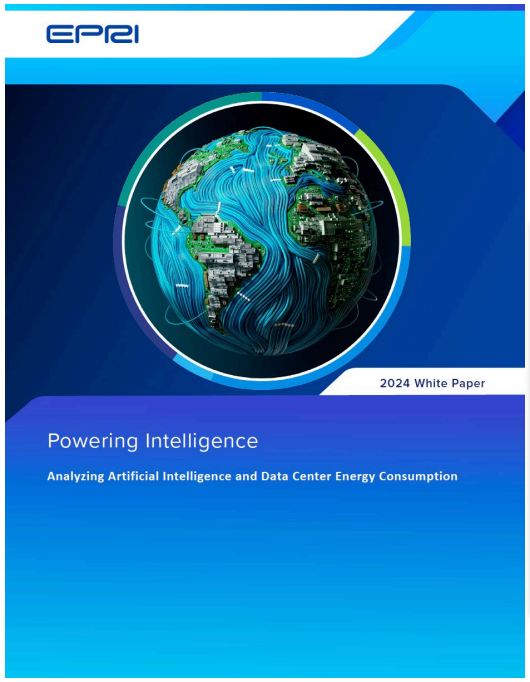
NAS, Artificial Intelligence-Related Data Center Electricity Use and Emissions Workshop

November 12, 2024

Four Resources for More Information



Powering Intelligence

EPRI 3002028905. May 2024

Utility Experiences and Trends Regarding Data Centers

EPRI 3002030643. Sept 2024

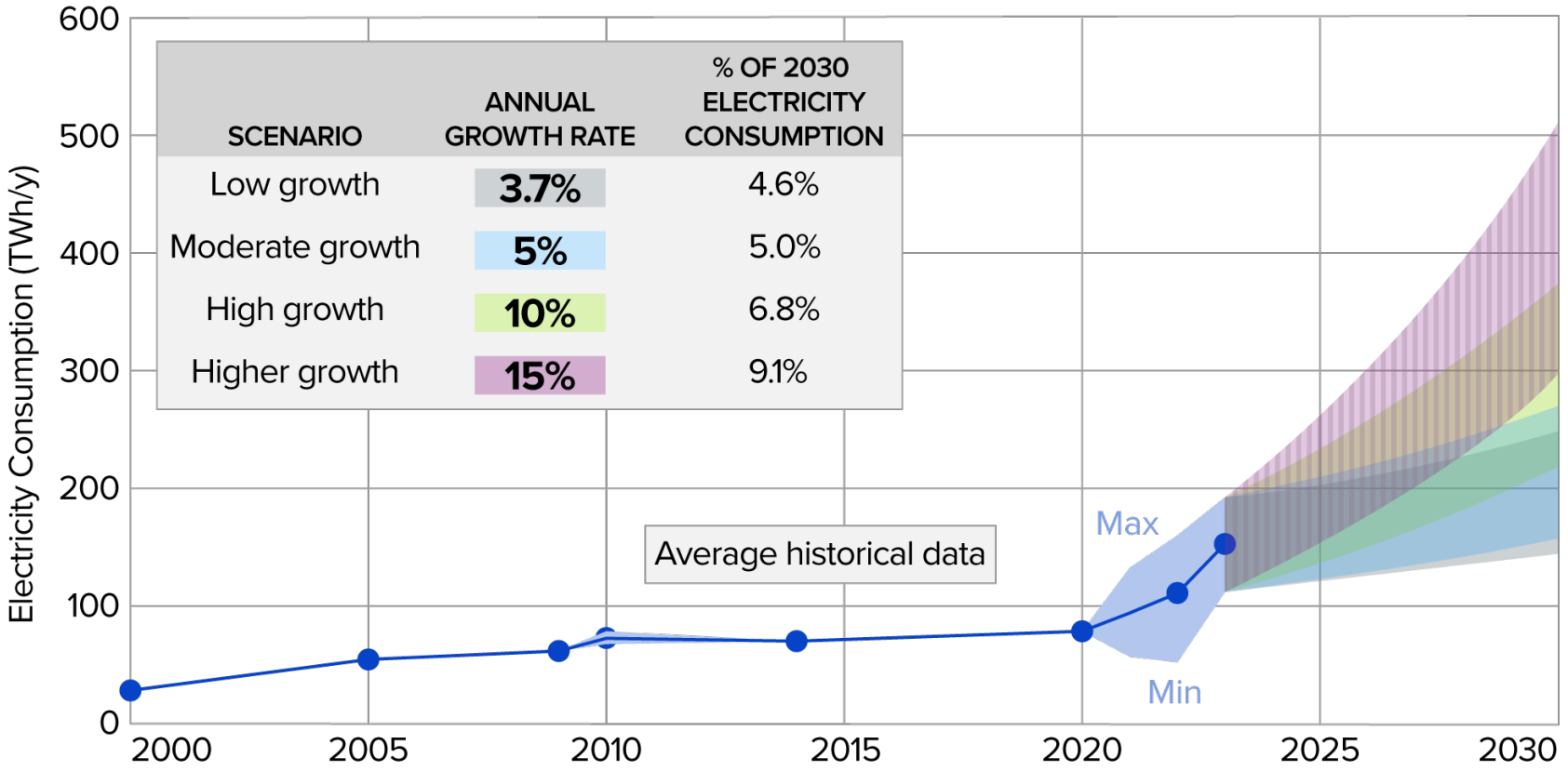
Powering Data Centers: US Energy System and Emissions Impacts of Growing Loads

EPRI 3002031198. Oct 2024

Data Center Flexibility Initiative, launched October 29

https://msites.epri.com/dcflex

U.S. Data Center Power Demands are Growing



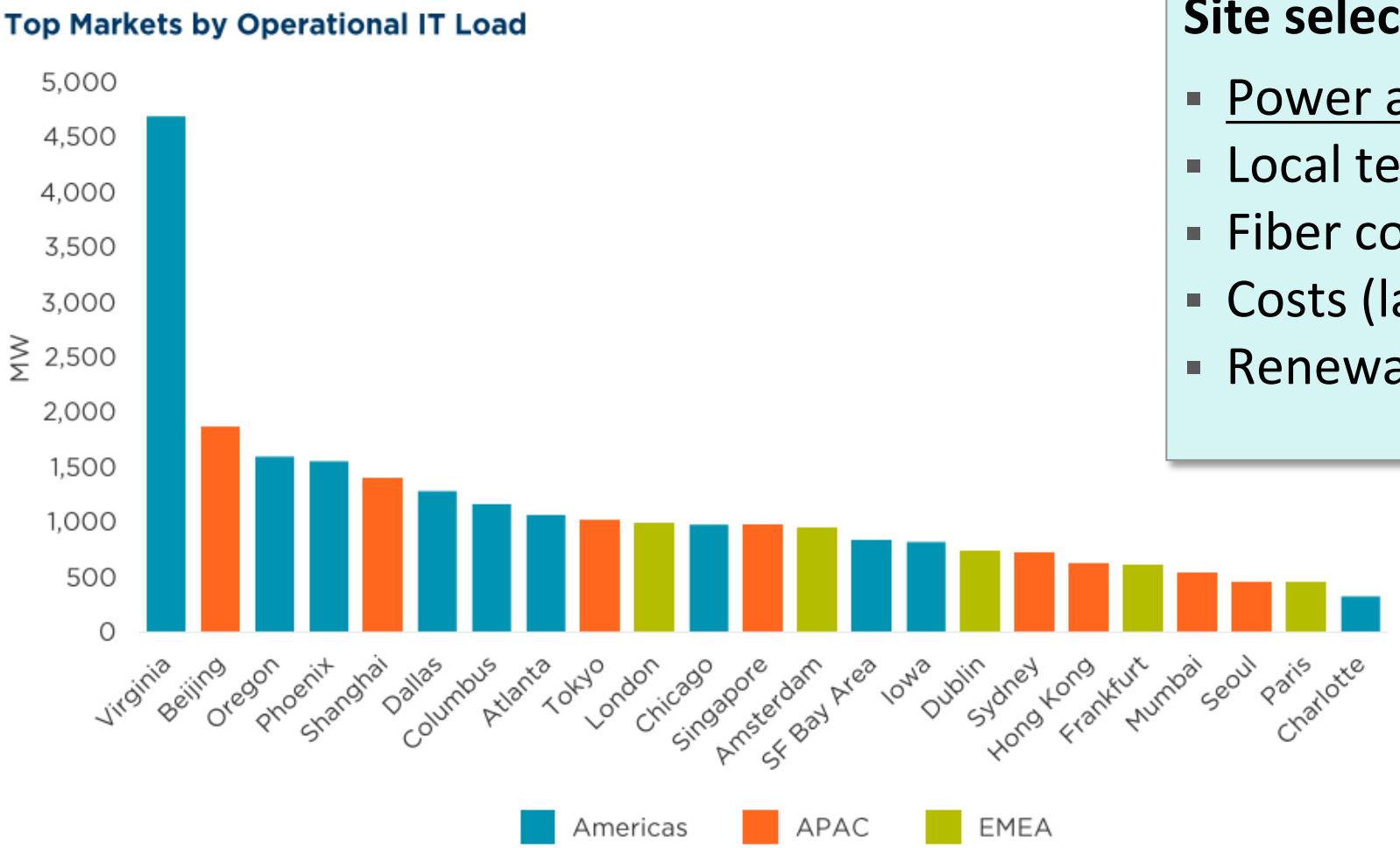
SCENARIO	ANNUAL GROWTH RATE	% OF 2030 ELECTRICITY CONSUMPTION
Low growth	3.7%	4.6%
Moderate growth	5%	5.0%
High growth	10%	6.8%
Higher growth	15%	9.1%

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, *Powering Intelligence*

Data Centers Today are Concentrated Regionally … But are Spreading



Source: Cushman & Wakefield Research, datacenterHawk, DC Byte, Structure Research

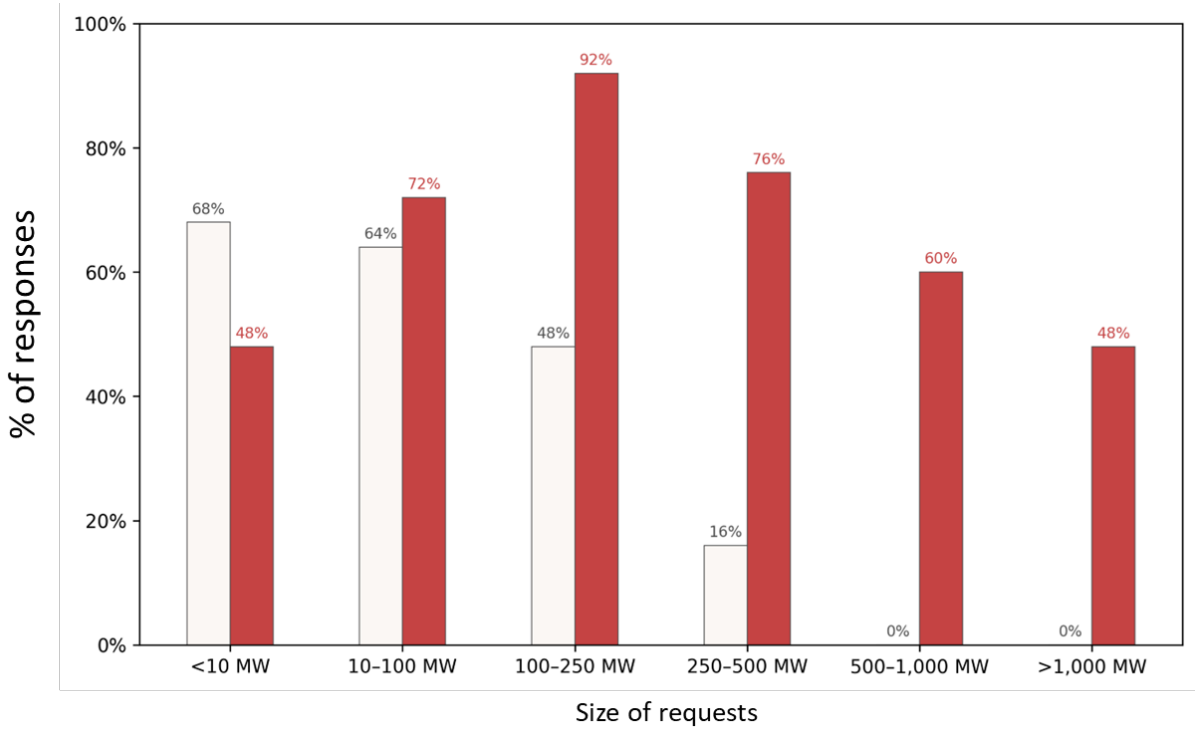
Site selection criteria:

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

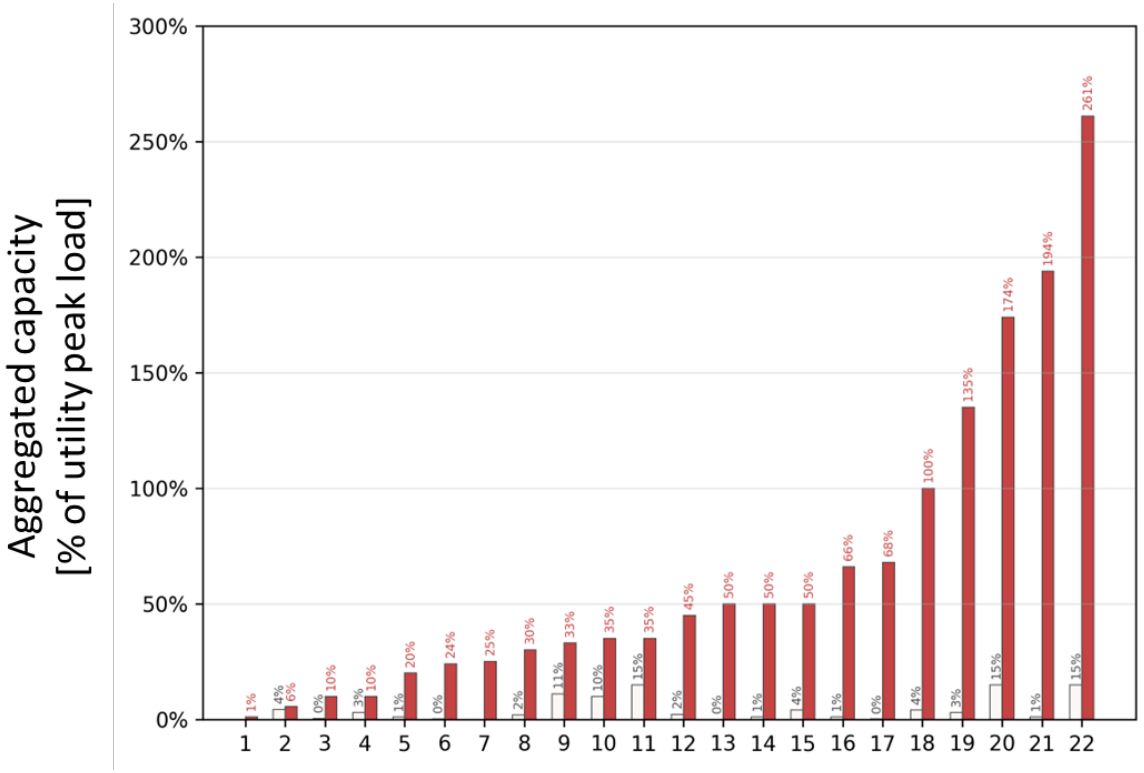
Source: Cushman & Wakefield (2024)

Data Center Requests (survey responses from 25 utilities) Are …

Getting Larger for Individual Sites

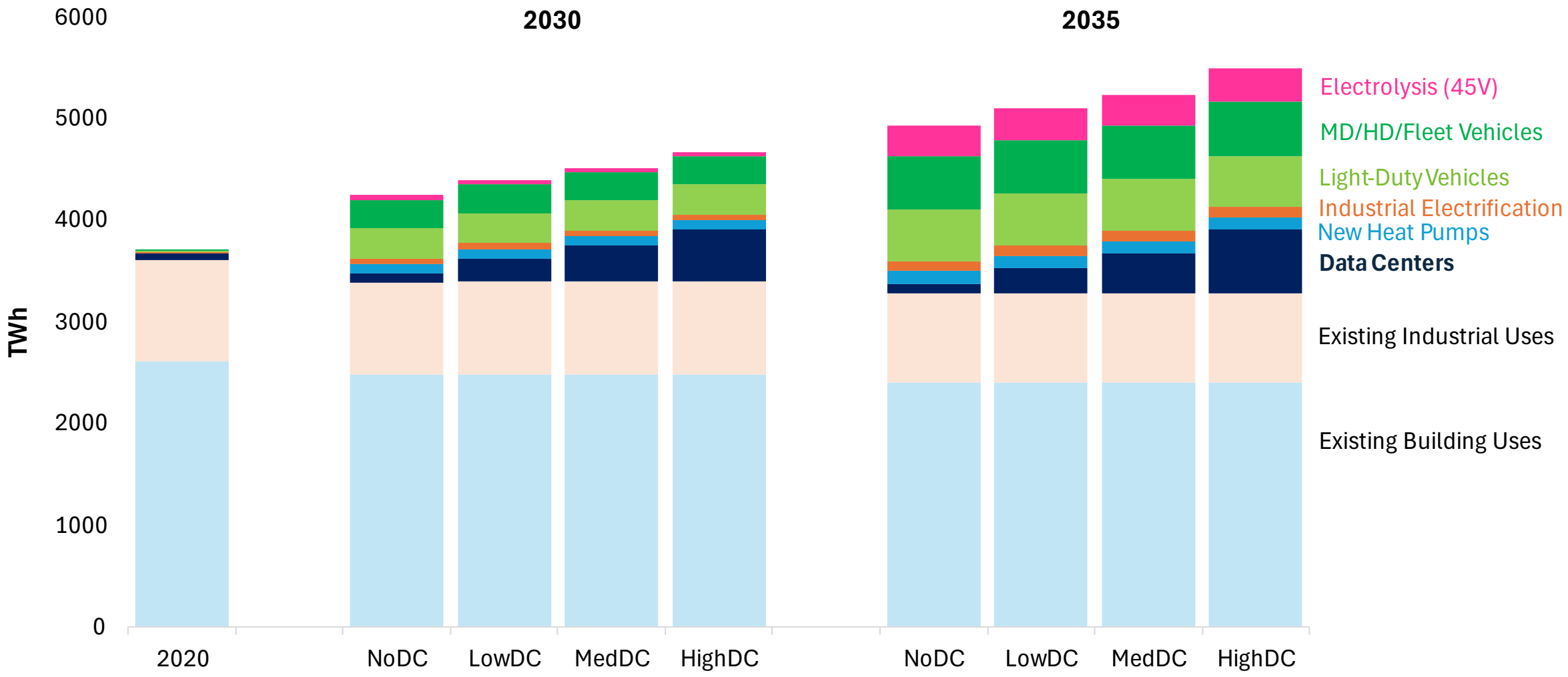


… and Represent an Increasing Fraction of System Load



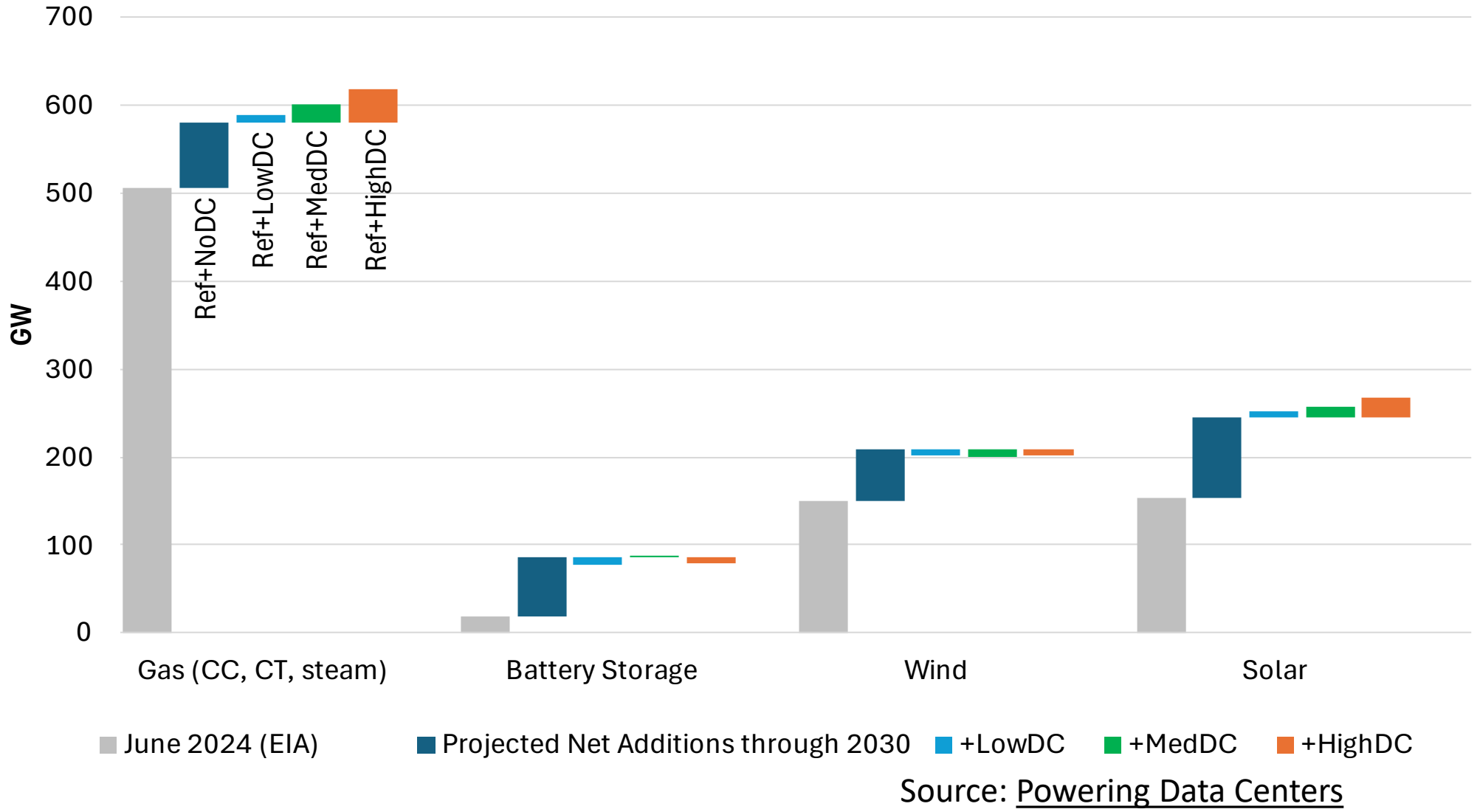
Source: Utility Experiences and Trends Regarding Data Centers: 2024 Survey. **EPRI, Palo Alto, CA: 2024. 3002030643.**

Data Center Load Growth vs. Other Drivers of Change



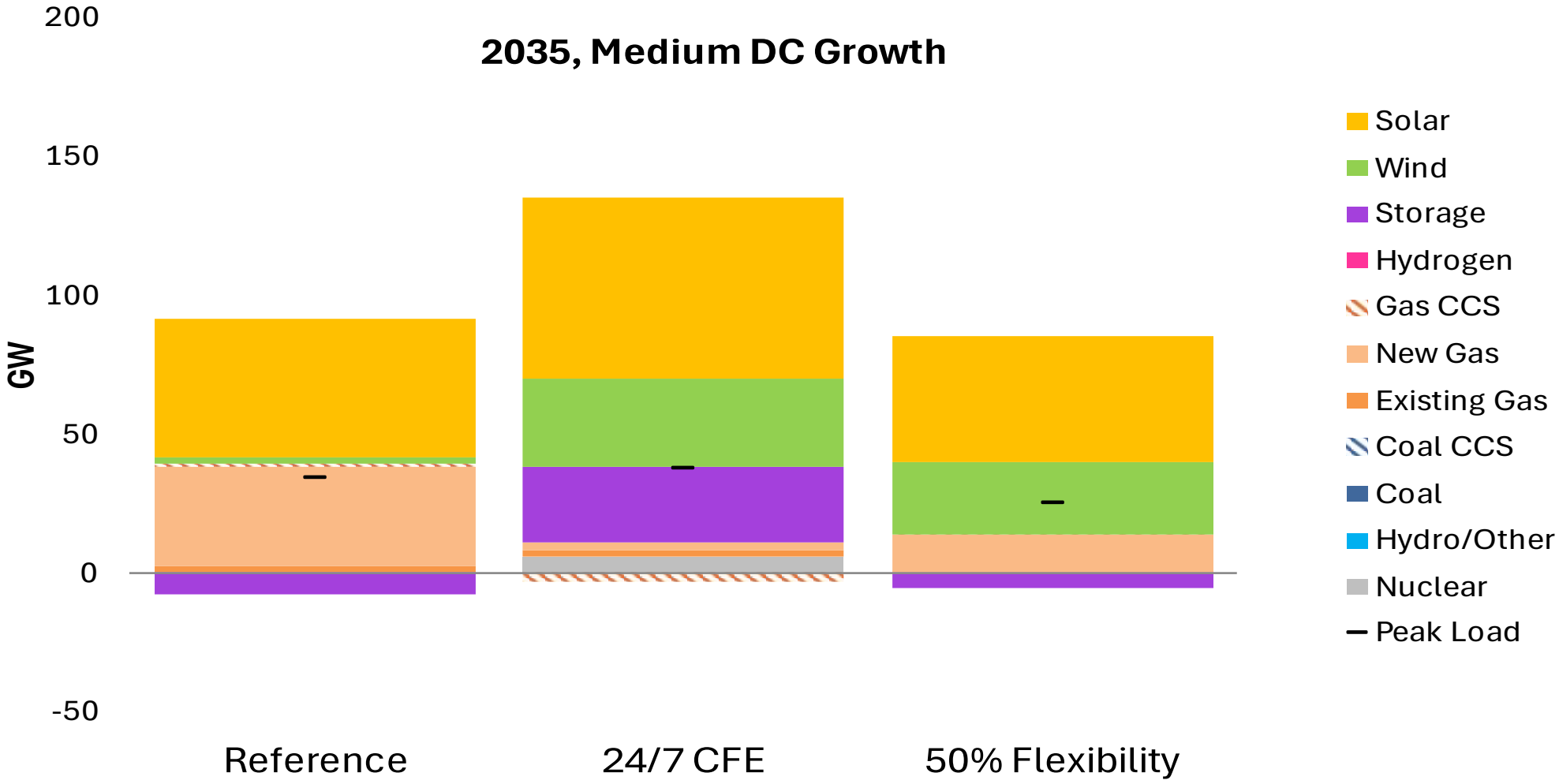
Source: Powering Data Centers

Capacity Additions Through 2030 by DC Growth Scenario … Without Voluntary Commitments or Flexible Operation



Source: Powering Data Centers

Capacity Changes to Support Data Center Load: Potential Impacts of Voluntary 24/7 CFE and Flexibility



Source: Powering Data Centers

Enhancing grid reliability by leveraging data centers as flexible resources

Flexible Data Center Designs

Enabling data centers to become grid resources through development and application of reference architectures:

Transformational Utility Programs

Programmatic options to orchestrate data center flexibility, provide appropriate incentives, and support market structures

Operational Flexibility Framework

Standardized taxonomy for grid-data center communications and flexible operations

3-year initiative launched October 29: https://msites.epri.com/dcflex

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