MEMORANDUM May 31, 2024

TO: Members of the Subcommittee on Energy, Climate, and Grid Security

FROM: Committee Majority Staff

RE: Hearing titled "Powering AI: Examining America's Energy and Technology Future"

I. INTRODUCTION

On Tuesday, June 4, 2024, at 10:00 a.m. (ET) in 2123 Rayburn House Office Building, the Subcommittee on Energy, Climate, and Grid Security will hold a hearing titled "Powering AI: Examining America's Energy and Technology Future." The hearing will examine the economic, energy, regulatory, and geopolitical considerations of electricity demand growth, including from increasing data center and artificial intelligence (AI) usage.

II. WITNESSES

- **Philip J. Dion,** Sr. Vice President, Customer Solutions, Edison Electric Institute
- **Tony Clark,** Senior Advisor, Wilkinson Barker Knauer, LLP
- **Tom Hassenboehler**, Chair, Advisory Committee, Electricity Customer Alliance
- **Melissa C. Lott**, Professor, Climate School, Columbia University

III. BACKGROUND

After years of minimal growth, electricity demand in the United States is projected to grow nationally at a significant pace and rate through the end of the decade.[1] This growth will come from a surge in the number of data centers and the growing uses of artificial intelligence (AI) by data centers, onshoring of industry and manufacturing, and increased electrification. These opportunities provide local and statewide economic development; but also create new challenges as increased demand for electrical power at a projected scale that has not been experienced in the United States in decades. This trend coincides with warnings regarding the electric grid's ability to meet existing demand reliably, even with little to no growth. Further complicating the ability to meet this surging power demand are various state and federal policies, corporate commitments, and regulations targeting the existing dispatchable generation vital to meeting existing and future growing demand.

Electricity Demand Growth Driven by Technology

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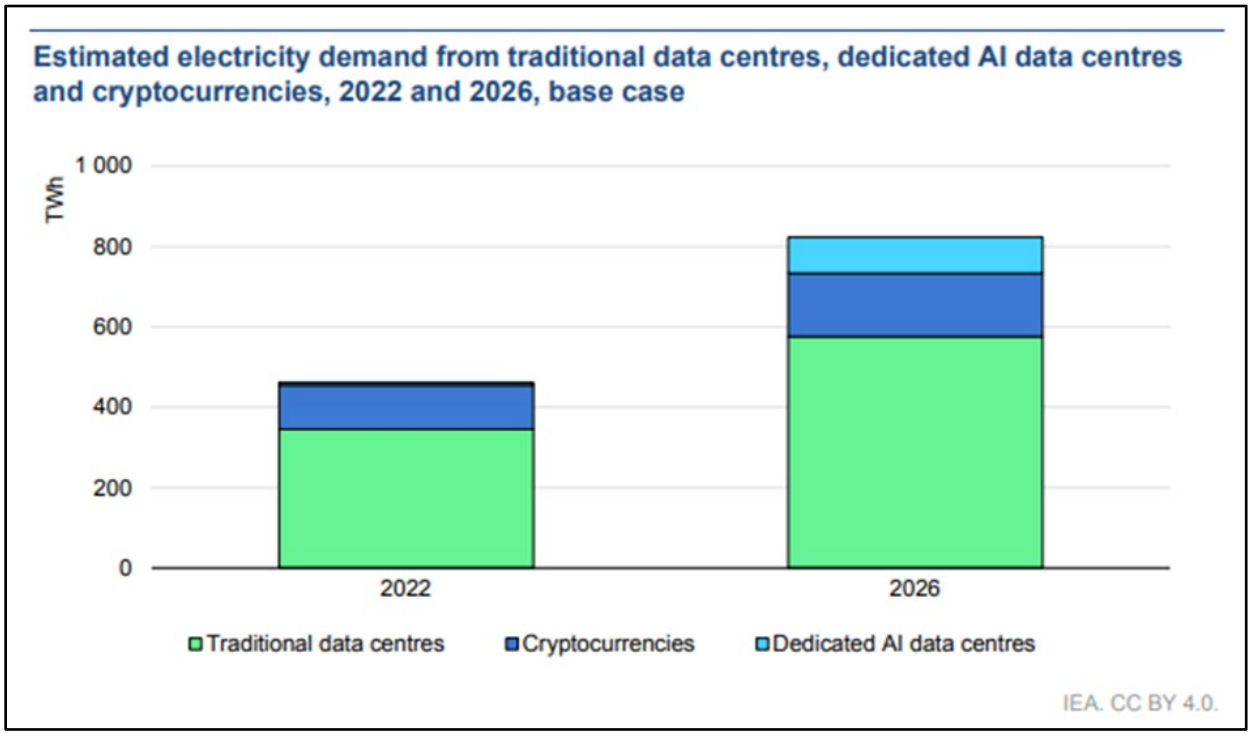
[1] https://www.iea.org/reports/electricity-2024/executive-summary; https://gridstrategiesllc.com/wp-content/uploads/2023/12/National-Load-Growth-Report-2023.pdf; https://www.utilitydive.com/news/electricity-load-growing-twice-as-fast-as-expected-Grid-Strategies-report/702366/; https://www.reuters.com/world/us/us-power-use-reach-record-highs-2024-2025-eia-2024-02-06/.

According to the Department of Energy, electricity consumption in the United States grew by about 0.5 percent per year in the last decade; however, estimates show annual growth of 5 to 6 percent through the end of the decade, a tenfold increase from current levels.[2] Much of this growth is expected to come from data centers and the increasing use of AI.[3] Data centers house servers and other computing infrastructure required to store, process, and share data used for digital applications and services. Expanded use of AI, machine learning, and cloud services by data centers drives up electricity demand as these processes continuously perform energy intensive applications.

Electricity consumption in the United States totaled 4,292 TWh in 2022, of which just under 400 TWh was used by traditional data centers.[4] That total is expected to grow to nearly 600 TWh in 2026, with another approximately 50 TWh used by AI data centers.[5] This rate of growth is expected through the end of the decade as companies compete on a domestic and international level in the race to capture the AI market and expand digital services into all manner of industry and manufacturing. By the end of the decade, data centers that are driving increases in electricity demand could consume as much as 9.1 percent of all electricity in the United States.[6]



Source: International Energy Agency Analysis and Forecast to 2026

[2] https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=USA&fuel=Electricity%20and%20heat&indicator=TotElecCons.
[3] https://www.nmrk.com/storage-nmrk/uploads/documents/2023-U.S.-Data-Center-Markets.pdf.
[4] https://iea.blob.core.windows.net/assets/18f3ed24-4b26-4c83-a3d2-8a1be51c8cc8/Electricity2024-Analysisandforecastto2026.pdf.
[5] *Id.*
[6] https://www.epri.com/research/products/3002028905.

Availability of Electricity

A primary consideration for data centers is electricity, especially the ability to consume electricity on a consistent basis without interruption. Unlike traditional loads that consume electricity at low energy density, many data centers consume electricity at a density of almost 90 percent. In other words, this new infrastructure consumes large quantities of power at a near constant level throughout the year.

This surge in demand for affordable, reliable, and dispatchable generation comes at a time when the North American Electric Reliability Corporation (NERC) has repeatedly raised concerns over the adequacy and reliability of the grid due to a confluence of factors like state and federal policies that have forced premature retirements of reliable generation without adequate replacement generation resources and electric infrastructure. While much of the new generation consists of wind and solar, these intermittent resources cannot meet the reliability needs of hi-tech manufacturing and data centers on their own as they are not a one-to-one replacement of existing resources like coal, natural gas, and nuclear. Without consideration of the need for baseload and dispatchable generation, restrictions on the use and development of fossil fuels, along with regulations that lead to premature retirement of reliable, firm power resources threaten to undermine long-term planning, affordability, and strain an already taxed electric grid.

The nation's largest grid operator, PJM Interconnection (PJM), predicts net energy growth of 2.4 percent per year from 2024 through 2034 due primarily to data centers, resulting in an increase of summer peak demand from 151,254 MW in 2024 to 178,895 MW in 2034.[7] At the same time this growth is occurring, PJM and its market monitor are forecasting 40,000 to 58,000 MW of thermal generator retirements in the region by 2030 due in large part to regulations and policies and their effect on the economic viability of these resources.[8] The Electric Reliability Council of Texas (ERCOT) expects an additional 40,000 MW of load growth by 2030. Load growth from data centers is expected in other states and regions in the country, including Arizona, Georgia, and Ohio, among many others.[9]

[7] https://insidelines.pjm.com/pjm-publishes-2024-long-term-load-forecast/.
[8] https://www.utilitydive.com/news/pjm-coal-gas-power-plant-risk-retirement-market-monitor/710518/#:~:text=Power%20plant%20owners%20have%20said,2026%2C%20according%20to%20Monitoring%20Analytics..
[9] https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/rising-datacenter-demand-forces-reckoning-with-us-utility-decarbonization-goals-80889360.

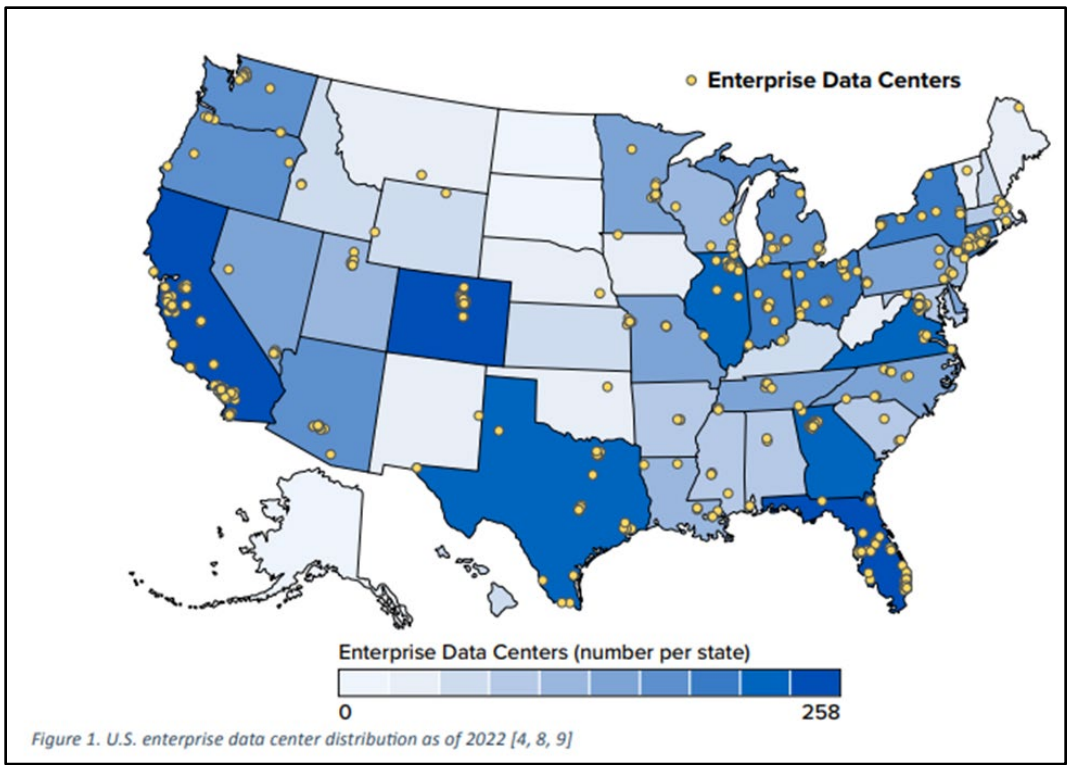


Figure 1. U.S. enterprise data center distribution as of 2022 [4, 8, 9]

Source: EPRI Powering Intelligence 2024 White Paper

Further exacerbating demand growth and generator retirement numbers is the pace at which data center growth is projected. Data centers are becoming operational at a much quicker pace than electric infrastructure can be planned, approved, and built. In addition to the need for generation, transmission and distribution, infrastructure investments will be needed to accommodate the concentrated data center loads. Ensuring proper communication and planning by localities, data center companies, utilities, grid operators, and governments can expedite the build out of necessary infrastructure for load growth. Relevant stakeholders and decision makers must ensure that costs for infrastructure are borne by cost-causing customers and are not disproportionately spread to residential ratepayers and other captive customers.

Economic Development

The growth of AI and data centers has the potential to bring economic development to large urban areas as well as less developed rural areas. Localities and states that embrace the expansion of this industry see economic benefits in the form of job creation, tax base expansion, and infrastructure development. Economic growth from data centers is not exclusive to the data centers and data center companies; but spreads throughout the local and regional economy. By one estimate, each job in the data center industry supports six jobs in the broader U.S. economy. For example, in 2022 alone the data center industry added over 560,000 direct jobs and supported 4.2 million total jobs across the United States.[10]

[10] https://static1.squarespace.com/static/63a4849eab1c756a1d3e97b1/t/65048f92e74c956b68a419e4/1694797719030/Data+Center+Impact+Study+Executive+Summary.pdf.

IV. ISSUES

The following issues may be examined at the hearing:

- Impacts of increased load growth from data centers, including AI, on grid reliability and affordable electricity;
- The pace and scale of demand growth from data centers and their impacts on utility planning;
- National security, development, and economic impacts of data center growth;
- Policies and regulations that affect affordable, reliable power as load growth increases.

V. STAFF CONTACTS

If you have any questions regarding this hearing, please contact David Burns, Peter Spencer, or Mary Martin of the Committee staff.