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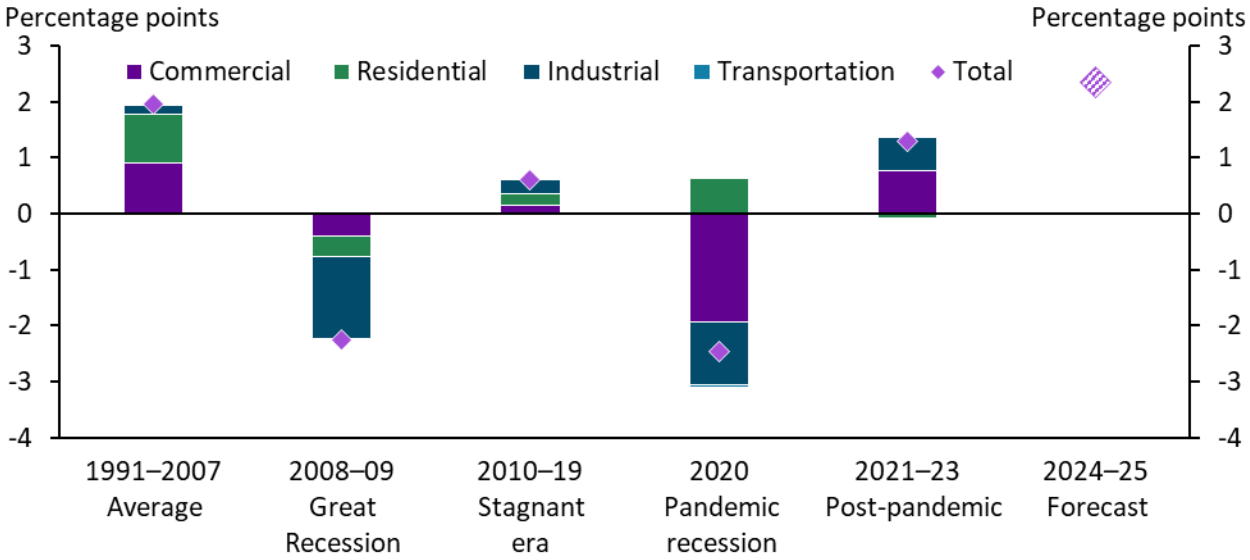
Powering Up: The Surging Demand for Electricity

By Nida Çakır Melek and Alex Gallin

After years of stagnant growth, U.S. electricity demand recently surged. This increase was driven in part by the commercial sector, particularly the rapid expansion of data centers and the adoption of artificial intelligence. The surge is expected to continue, signaling a shift toward a more electrified economy, with significant implications for economic competitiveness and energy infrastructure.

After years of minimal growth, U.S. electricity demand recently began to accelerate. Chart 1 shows that for a decade before the pandemic (2010–19), growth in electricity demand was nearly flat (purple diamond). Although population growth and the economic recovery from the Great Recession increased electricity use during this period, these increases were partly offset by widespread adoption of energy-efficient technologies such as LED bulbs and modern HVAC systems. Over the past three years, however, electricity demand has grown on average 1.3 percent per year—more than twice the average rate during 2010–19. Moreover, this surge is expected to continue, with the projected average growth rate for power demand (indicated by the shaded diamond) exceeding rates seen in the two decades before the Great Recession.

Chart 1: After a decade of stagnant growth, U.S. electricity demand has surged, driven largely by commercial demand

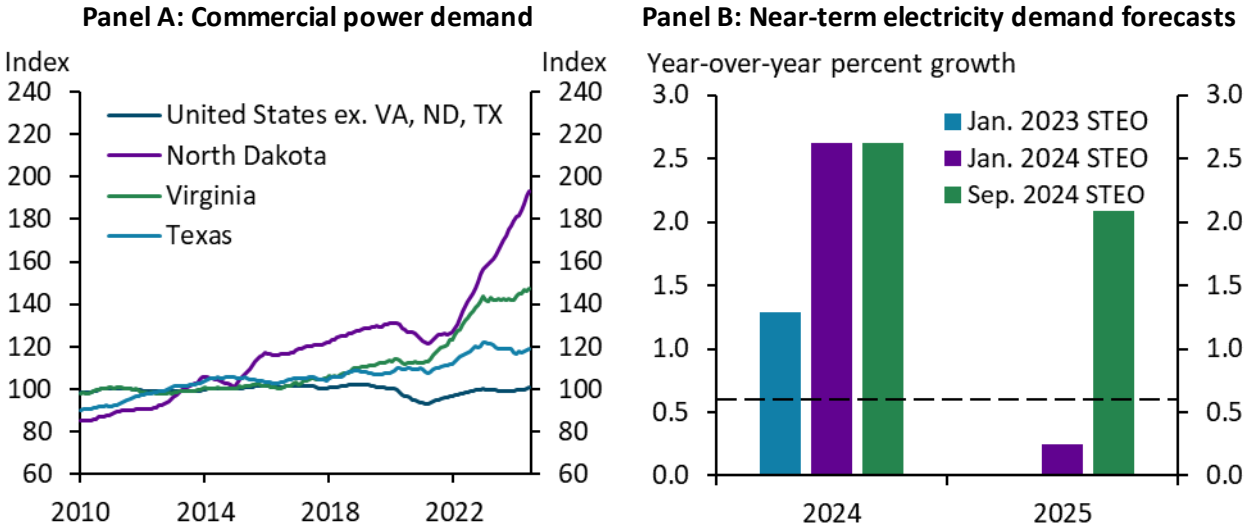


Notes: Stacked barsshow the contributions of each component to growth in total electricity demand over the periods considered. The transportation component makes a very small contribution. Shaded diamond represents the average projected growth in total electricity demand from the September 2024 U.S. Energy Information Administration (EIA) Short-Term Energy Outlook (STEO) for 2024 and 2025. Data are annual.
Sources: EIA and authors' calculations.

A key driver of this recent surge has been the commercial sector, as shown by the purple bars in Chart 1. Commercial electricity demand accounted for 60 percent of growth in total U.S. power demand during 2021–23. Panel A of Chart 2 shows that this growth has been concentrated in Virginia, North Dakota,

and Texas, while commercial electricity use in the rest of the United States has remained relatively stable (dark blue line).[1] North Dakota has experienced the fastest relative growth in commercial electricity demand, partly due to the establishment of large computing facilities supported by the state's abundant and competitively priced energy sources. Virginia has emerged as a major hub for data centers, driven in part by its access to a high-capacity fiber-optic network and to subsea fiber cables that facilitate fast and reliable data transmission. And Texas, one of the most densely populated states with data centers, has also seen significant demand growth due in part to its lower energy costs, robust economic activity, and population growth.

Chart 2: Rising U.S. power demand growth and revised near-term forecasts

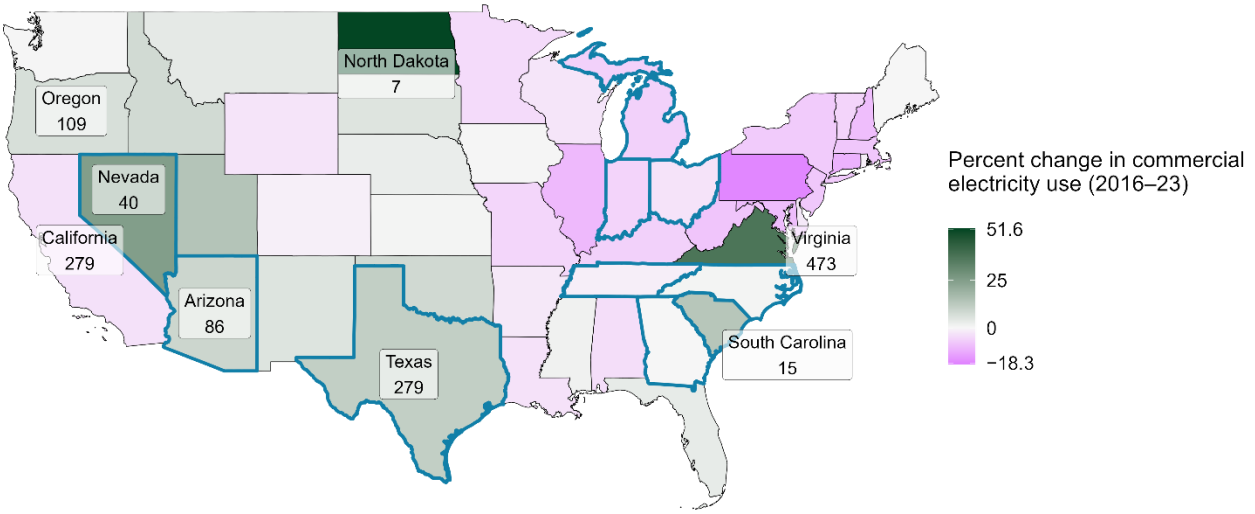


Notes: Panel A shows 12-month moving averages indexed to the 2010–16 average. Panel B shows forecasts of U.S. total electricity demand from EIA STEO reports. Dashed line represents average electricity demand in 2010–19.
Sources: EIA and authors' calculations.

Near-term forecasts for U.S. electricity demand have been revised up substantially. Panel B of Chart 2 shows electricity demand forecasts for 2024 and 2025. The 2024 forecast rose from 1.3 percent in the January 2023 EIA report to 2.6 percent in the September 2024 report. The 2025 forecast has been revised even more dramatically: the demand growth forecast in the September 2024 report is more than eightfold that of the January 2024 report. Forecasts for both years are well above the 2010–19 average growth (dashed line). These upward revisions underscore the uncertainty in projecting electricity demand, particularly as AI adoption and data center growth ramp up.

Map 1 further highlights the role of data centers in driving commercial electricity demand, particularly in states that have become major or emerging hubs for these facilities. The cross-industry adoption of generative AI—which requires data centers for the necessary computational power and storage capacity—has accelerated this trend. For example, data retrieved from Bloomberg ESG show that companies such as Google and Microsoft more than quadrupled their electricity use from 2016 to 2023, citing expansions in AI and data centers among the drivers of their increased electricity consumption. This boom, combined with other trends such as industrial onshoring and clean energy investments, is contributing to a marked increase in forecasts of electricity use.[2] In some states, those investments are already driving up demand, with further increases likely as more projects come online.

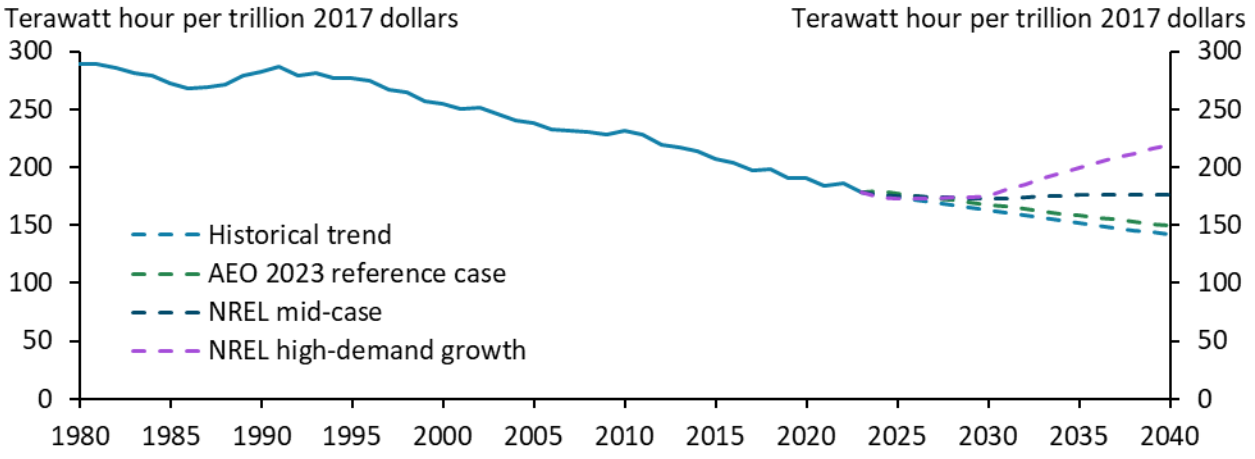
Map 1: Data center boom appears to be an important factor in driving commercial power demand



Notes: Blue outlines indicate the top 10 states for announced clean energy investment. Numbers represent data centers in certain states selected to illustrate a range of electricity demand trends. Virginia and Texas have the most data centers and saw significant power demand growth, while California, with many data centers, saw a decline in demand. Nevada, Oregon, and Arizona have both many data centers and rising demand. North Dakota has few data centers but the highest power demand growth. And South Carolina, which is leading clean energy investment under the IRA, has seen increasing power demand.
Sources: EIA, Data Center Map, E2, and authors' calculations.

Higher electricity demand signals a more electrified economy. Chart 3 shows the electricity intensity of U.S. GDP (that is, the amount of electricity used per unit of GDP) since 1980 alongside long-term projections. Overall, U.S. electricity intensity has been declining since the early 1990s. However, this trend may reverse if recent demand growth continues. For example, a high-demand growth scenario from the National Renewable Energy Laboratory (NREL) suggests that electricity intensity could increase by 23 percent by 2040 (dashed purple line), driven by the widespread adoption of electrification technologies.[3] This increase would represent a significant departure from the historical trend (dashed light blue line), which implies a 50 percent decline in electricity intensity over half a century, and highlights the potential for a more electricity-intensive economy.[4]

Chart 3: U.S. economy is likely to become more electricity-intensive



Notes: All projections assume 2 percent growth in real GDP. The historical trend assumes electricity use grows at the same average pace as during the 2010–19 period. The AEO 2023 uses the reference case projections from the EIA's Annual Energy Outlook. The NREL mid-case and high-demand growth scenarios use the corresponding projections under current policies from the NREL's 2023 Standard Scenarios Report.
Sources: EIA, NREL, U.S. Bureau of Economic Analysis (Haver Analytics), and authors' calculations.

The surge in U.S. electricity demand, particularly within the commercial sector, underscores the ongoing transformation toward a more electrified economy. The integration of advanced technologies such as AI, automation, and data centers into the U.S. economy is energy-intensive but important for maintaining economic competitiveness. Countries that efficiently power these technologies are likely to lead in innovation and productivity gains. To fully realize the potential benefits of this electrification, substantial investments in energy infrastructure may be necessary. This includes expanding transmission and distribution networks, modernizing the grid, and increasing renewable energy capacity. These investments will not only support growing electricity demand but also ensure that the U.S. economy can continue to grow competitively and sustainably.

Endnotes

[1] VA, ND, and TX have seen the highest increases in annual electricity sales to commercial customers. Overall, commercial demand began taking off around 2016 and accelerated after the pandemic as data center usage expanded.

[2] Real manufacturing construction spending more than doubled from late 2021 to mid-2024, driven largely by the Inflation Reduction Act (IRA) and CHIPS Act. Real data center construction spending has also surged, reaching $18 billion in 2017 dollars as of June 2024, up from around $9 billion in late 2022.

[3] The mid-case scenario serves as a baseline, reflecting current electric sector policies and trends. The high-demand growth scenario is primarily driven by increased electrification across various sectors, including transportation, buildings, and industry. This scenario includes the widespread adoption of electric vehicles, electric heat pumps, and other end-use electric technologies, which significantly increase overall electricity demand.

[4] The projections in Chart 3 may still be conservative, particularly when considering forecasts such as those from Goldman Sachs and the Boston Consulting Group, which highlight the potential for AI and data centers to drive electricity demand growth even higher.

References

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