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AI-Driven Surging Electricity Demand: Emerging Opportunities for Burden Sharing in the U.S.–Japan Alliance

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Overview

The development of AI is profoundly shaping the future of human society. It is a source of both hope and anxiety. The spread of AI is not only set to increasingly impact daily economic and social activities, but it has also become a matter of national security. The United States currently hosts approximately 40 percent of the world's AI-related data centers. However, as the competition between the United States and China intensifies, securing cutting-edge AI technology and maintaining a technological advantage over China has also become an inevitable national defense challenge.

U.S. energy policy under the Trump administration has been formulated in a way that is inextricably linked to national security issues. The accelerated proliferation of AI is causing a rapid increase in electricity demand. This makes ensuring the necessary power supply a matter of paramount national security that goes beyond an energy issue. Meanwhile, curbing the surge in electricity prices, particularly for households, against the backdrop of a tightening supply and demand, is becoming one of major issues for both Democrats and Republicans in winning the support of voters.

The Trump administration gutted the Inflation Reduction Act (IRA), introduced by the Biden administration to promote decarbonization, and has supported maximizing the use of fossil fuels. However, many states have already started to adopt renewable energy sources. This includes "red states," where the Republican Party has a strong base of support, as well as "swing states," where Republican and Democratic support are balanced. Meanwhile, electricity prices are also rising sharply in "blue states," including the New England region in the Northeast, where the Democratic Party has a strong base of support.

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Sooner or later—and particularly after the current administration's term ends—given the growing bipartisan concern over how to address soaring electricity prices, U.S. energy policy is likely to take a new direction that goes beyond the traditional debates focused on climate change measures and the merits of fossil fuels. For the United States, the renovation and modernization of its electric power infrastructure—which has remained largely untouched for many years—has become a critical issue that extends beyond energy concerns to impact national security as well. Japan could find significant investment opportunities in strengthening the resilience of the U.S. energy system, which would also serve as a form of burden-sharing in the context of the U.S.-Japan alliance.

Electricity Demand Driven by AI

Electricity demand in the United States is surging against the backdrop of the expansion of data centers, which are necessary for the widespread adoption of AI and result in an increase in energy consumption. Although demand reached a record high in 2025 for the second consecutive year, the U.S. Energy Information Administration's (EIA) Short-Term Energy Outlook (STEO, June 2026) projects that demand will reach 4,271 billion kilowatt-hours (kWh) in 2026 (a 1.8% increase from the previous year) and 4,397 billion kWh in 2027 (a 2.9% increase). The surge in residential electricity rates, which rose 3% and 5%, respectively, in 2024 and 2025, is becoming increasingly severe. Rates are projected to rise 5.4% and 2.1%, respectively, in 2026 and 2027.

Grid Strategies forecasts that U.S. electricity demand will grow at an annual rate of 5.7% starting in 2026. Peak demand is expected to increase by 166 GW compared to 2025 levels in 2030. Data center consumption is expected to account for approximately 55% of that increase.

According to the EIA's Annual Energy Outlook 2026, U.S. electricity demand grew at an annual rate of 2.1% between 2020 and 2025, after remaining largely flat for 15 years. However, it is expected to gradually increase at a rate of 0.9% to 1.6% through 2050. Furthermore, under the "High Electricity Demand Scenario" (which assumes an exponential increase in the number of AI servers installed by 2025), data center server electricity consumption alone is projected to reach 818 billion kWh by 2050, over 16 times the 2020 level.

As of March 2026, electricity prices in the United States rose by 5.8% year-over-year in the commercial sector, while prices in the residential sector rose by 10.2%—a rate far higher than that of the commercial sector. Amid rising electricity rates driven by the rapid dissemination of AI, major U.S. tech companies are implementing various measures—such as covering the costs of new power infrastructure construction and bearing the burden of electricity rates—in response

to a request from the Trump Administration.

Key Electricity Policies Under the Trump Administration

In April 2025, the executive order "Strengthening the Reliability and Security of the United States Electric Grid" was signed. It emphasized that ensuring the reliability of the electric grid is critical to national and economic security. The order also directed the streamlining of procedures under which the Department of Energy (DOE) may order power generators to increase their electricity supply in the event of a power shortage pursuant to Section 202(c) of the Federal Power Act. The executive order issued in July of that year, "Accelerating Federal Permitting of Data Center Infrastructure," directed the Department of Commerce to provide financial support, including loans, grants, and tax incentives, for data centers requiring new capacity of more than 100 megawatts (MW), infrastructure projects related to data center energy needs, and data centers (including related infrastructure) designated by the Secretaries of Defense, the Interior, Commerce, or State. That same month, the White House released Winning the AI Race: America's AI Action Plan, which emphasizes the need to develop a comprehensive strategy to strengthen and expand the power grid, as well as stabilize and maximize the use of the existing grid, in order to secure the electricity essential for maintaining and strengthening the United States' international leadership in AI development.

In May 2025, the Trump administration announced a series of executive orders that aim to streamline the review and approval processes for constructing nuclear power plants. The orders also seek to significantly strengthen support for building 10 new large-scale reactors by 2030, as well as for developing and deploying next-generation reactors, including small modular reactors (SMRs). The orders set a target of expanding installed capacity to 400 GW by 2050, which is four times the 2004 level. In April 2026, President Trump authorized the Secretary of Energy, under the Defense Production Act of 1950, to implement policies and financial measures aimed at expanding the infrastructure used to transport, process, and store natural gas, as well as strengthening the electricity supply chain, including power lines and substation facilities.

Regarding coal-fired power generation, the DOE ordered power plants originally scheduled to close in 2025 to remain operational, adding up to more than 17 GW. In February 2006, the DOE announced that it would provide $175 million for the renovation and modernization of six coal-fired power plants, and $500 million for those of 13 plants—pursuant to a presidential order issued under the Defense Production Act— in June of the same year.

Key Initiatives Among Hyperscalers [1]

Major tech companies are scrambling to secure new sources of electricity. Google has sourced all of the electricity it consumes from renewable energy since 2017, but it is now under pressure to diversify its power sources. In February 2026, the company signed contracts to purchase 1.9 GW from Xcel in Minnesota and over 1.5 GW from AES in Texas (both for 20 years; both sources are solar and wind power). Meanwhile, in October 2025, Google announced that it would purchase 400 MW of electricity from a gas-fired power plant equipped with CCS (carbon capture and storage) at the Broadwing Project in Illinois—the company's first purchase of this kind. Google is reportedly considering getting involved in gas-fired power projects that do not incorporate carbon capture and storage (CCS). The company plans to procure nuclear power from NextEra Energy's nuclear power plant in Iowa, the only one in the state planned for restart, as well as from Kairos Power's planned SMR project in Tennessee.

In September 2024, Microsoft signed a contract with Constellation Energy to restart Unit 1 of the Three Mile Island Nuclear Power Plant (in Pennsylvania)—which had been offline since 2019—and to purchase its entire power output (835 MW) for 20 years. Like Google, Microsoft has had a target of achieving 24/7 CFE (Carbon-Free Electricity, 24 hours a day, 365 days a year) by 2030 as a key part of its corporate strategy; however, faced with a rapid surge in electricity demand, it is reportedly considering the possibility of postponing or withdrawing the original target. In June 2026, the company signed a contract with Chevron to procure natural gas-fired power (approximately 2.67 GW) for a data center it is building in Texas.

In June 2025, Meta signed a 20-year contract with Constellation Energy to purchase over 1.1 GW of electricity from the Clinton Clean Energy Center nuclear power plant in Illinois, beginning in 2027. In January 2026, Meta announced that it had secured up to 6.6 GW of electricity by 2035 through several agreements. These include an agreement to purchase electricity from the sodium-cooled fast reactor that TerraPower is planning to build in Wyoming, support for an SMR that Oklo Inc. is developing, and power purchase agreements with these advanced reactors. Meta also signed agreements to purchase electricity from Vistra's existing nuclear power plants in Ohio and Pennsylvania.

In October 2024, Amazon Web Services, Inc. (AWS) signed agreements to collaborate with Energy Northwest in Washington and with Dominion Energy and X-energy in Virginia on SMR

[1] We do not address the distinction between the strict definitions of "hyperscalers" and "major tech companies" because it does not affect the argument here.

construction projects. In April 2025, the company also entered into a contract with Talen Energy to purchase carbon-free electricity (1.92 GW through 2042), based on the assumption that the Susquehanna Nuclear Power Plant (in Pennsylvania) will expand its capacity and potentially introduce SMRs.

Current Status and Challenges by Power Source

Nuclear power enjoys bipartisan support, even if Democrats and Republicans have different reasons.[2] However, the lead time from planning the construction of a new nuclear power plant to commencing commercial operation is lengthy. Even regarding SMRs, which are attracting increasing attention, opinions vary on the timing of commercial operation and widespread adoption. The current reality is that it will take time for a clear timeline to emerge.

Regarding gas-fired power generation, the Global Gas Energy Monitor reports that installed capacity reached approximately 252 GW by 2025 (more than three times the previous year's level), as U.S. domestic natural gas production continues to reach record highs. If all currently planned power plants are constructed, that capacity is expected to grow by approximately 50%. However, shortages in gas turbine production are becoming increasingly severe in response to growing demand for gas-fired power plant, not only in the United States but also worldwide. Some studies suggest that, depending on the scale of future growth in global LNG demand, U.S. domestic gas prices may rise, which could reduce the economic competitiveness of gas-fired power.

Given that the Trump Administration proactively supports coal-fired power generation, there have been a series of decommissioning plan postponements and cancellations as emergency measures to meet increased electricity demand caused by extreme weather events, such as summer heat waves and winter cold snaps. In 2025, only four power plants were decommissioned, totaling 2.6 GW—the fewest since 2010. The DOE announced its support for constructing new coal-fired power plants in West Virginia and Alaska and for modernizing existing ones. However, the general consensus that coal's role in power generation will gradually decline remains largely unchanged. Nevertheless, if electricity demand becomes even more strained in the future, or if plans to expand nuclear or gas-fired power generation encounter obstacles, it cannot be ruled out entirely that the importance of coal-fired electricity as a baseload power source will be reconsidered, even more seriously than it is now.

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[2] Generally speaking, the major difference of supporting nuclear generation between the Democratic and Republican parties is that the former emphasizes the importance of decarbonized power sources as a measure to combat climate change.

Despite facing headwinds under the Trump administration, prioritizing fossil fuels, power generation from renewables is projected to increase down the road. According to an EIA report, the installed capacity of wind and solar power increased by 4% and 23%, respectively, in 2025 compared to the previous year. It is projected to grow by an additional 7% and 21%, respectively, in 2026 and 2027. As of March 2026, the "red states" of Texas, Iowa, Oklahoma, and Kansas held the top four spots for wind power generation (MWh). California, a "blue state," held the top spot for solar power. "Red states" took the second and third spots (Texas and Florida, respectively), while "swing states" from the 2024 presidential election took the fourth through seventh spots (Arizona, Nevada, North Carolina, and Georgia, respectively). In other words, the Republican camp could also face political consequences if it blindly continues to reject renewable energy despite rising electricity prices.

Yet, this energy source is also shrouded in uncertainties. In recent years the Production Tax Credit (PTC) and the Investment Tax Credit (ITC) reduced the installation costs of wind and solar power facilities. With the passage of the "One Big Beautiful Act" in July 2025, which effectively nullified the IRA passed under the Biden Administration, these tax credits will be phased out. However, the future of tax incentives for renewable energy under the next administration and beyond remains unpredictable. Besides, although the United States is pursuing a national strategy to reduce its dependence on China for critical minerals needed for the manufacture of wind turbines, solar panels, and other products, it remains unclear when it will be able to secure sufficient alternative sources to keep pace with the rapid expansion of renewable energy.

The Worsening Power Infrastructure Crisis

The cost of renovating and upgrading power infrastructure in the United States—including transmission and distribution networks and substation facilities—has accounted for a much larger share of rising electricity prices than power generation itself. According to a Rhodium Group survey, this is primarily due to increased procurement prices of the materials needed to build this infrastructure, such as wires, cables, and transformers. As of 2024, these prices were 50–152% higher than in 2019, far exceeding the 29% increase in the Consumer Price Index (CPI) over the same period.

In the United States, renovating and modernizing the aging power infrastructure is an urgent priority and unavoidable in order to meet the surge in electricity demand. Most of the power grid was built between 40 and 70 years ago, and approximately 70% of transformers have been in service for over 25 years.

In July 2025, the DOE released a report, "Evaluating the Reliability and Security of the United States Electric Grid," which warns that construction of power generation and transmission facilities is not keeping up with the rapid surge in electricity demand: If appropriate measures—such as accelerating construction or revising the operational plans for power plants originally scheduled for decommissioning—are not taken, the risk of power outages could increase up to 100-fold by 2030. Furthermore, only 19 GW of the 154 GW of power generation capacity nearing completion is capable of stable, 24-hour operation. If the decommissioning of aging nuclear power plants (totaling 104 GW by 2030) proceeds as planned, the stability of the power grid could be threatened by severe power shortages. In other words, even if renewable energy increases its share of the power mix, a power system that is harmoniously integrated with nuclear, natural gas, and coal-fired power generation is still necessary.

The New Phase of U.S. Energy Policy and Its Implications for Strengthening Japan–U.S. Cooperation

The following factors are key to assessing investment risk in formulating a business strategy:

1) In the short term, whether the Democrats will regain a majority in both houses of Congress in the November 2026 midterm elections.

2) In the medium term, whether the post-Trump administration, which will take office in January 2029, will be Republican or Democratic.

3) The extent to which the Trump Administration's fossil-fuel-focused policies will remain sustainable is unclear, given the outcomes of 1) and 2). Specifically, if the Democrats regain power, how far might the pendulum of energy policy swing in the opposite direction? To what extent could a decarbonization agenda be revived?

Concerns about the tight balance between electricity supply and demand are growing, driven by the rapid proliferation and development of AI. It can be said that resolving this bottleneck hinges not on choosing energy sources, but on rebuilding the electricity infrastructure. In short, it would be difficult to resolve policy differences between Republicans and Democrats if the issue were limited to prioritizing decarbonization in power generation. However, it would be easier to find common ground when it comes to strengthening the power infrastructure to stabilize the rapidly increasing energy supply—an urgent and unavoidable challenge for both Democrats and Republicans. This is precisely the kind of issue that should be a key pillar in identifying

investment opportunities and formulating a long-term business strategy for the energy sector in the United States.

Enhancing the resilience of electricity infrastructure is not only essential for the United States to maintain its leading position in AI technology, but it is also of critical importance from the perspectives of Japan's economic security and national security. Therefore, this should be approached as a priority area for public–private cooperation that goes beyond mere business opportunities. Japan's significant involvement in and support for AI development in the United States can be seen as a way of implementing burden-sharing as an ally and will likely become even more important down the road.

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