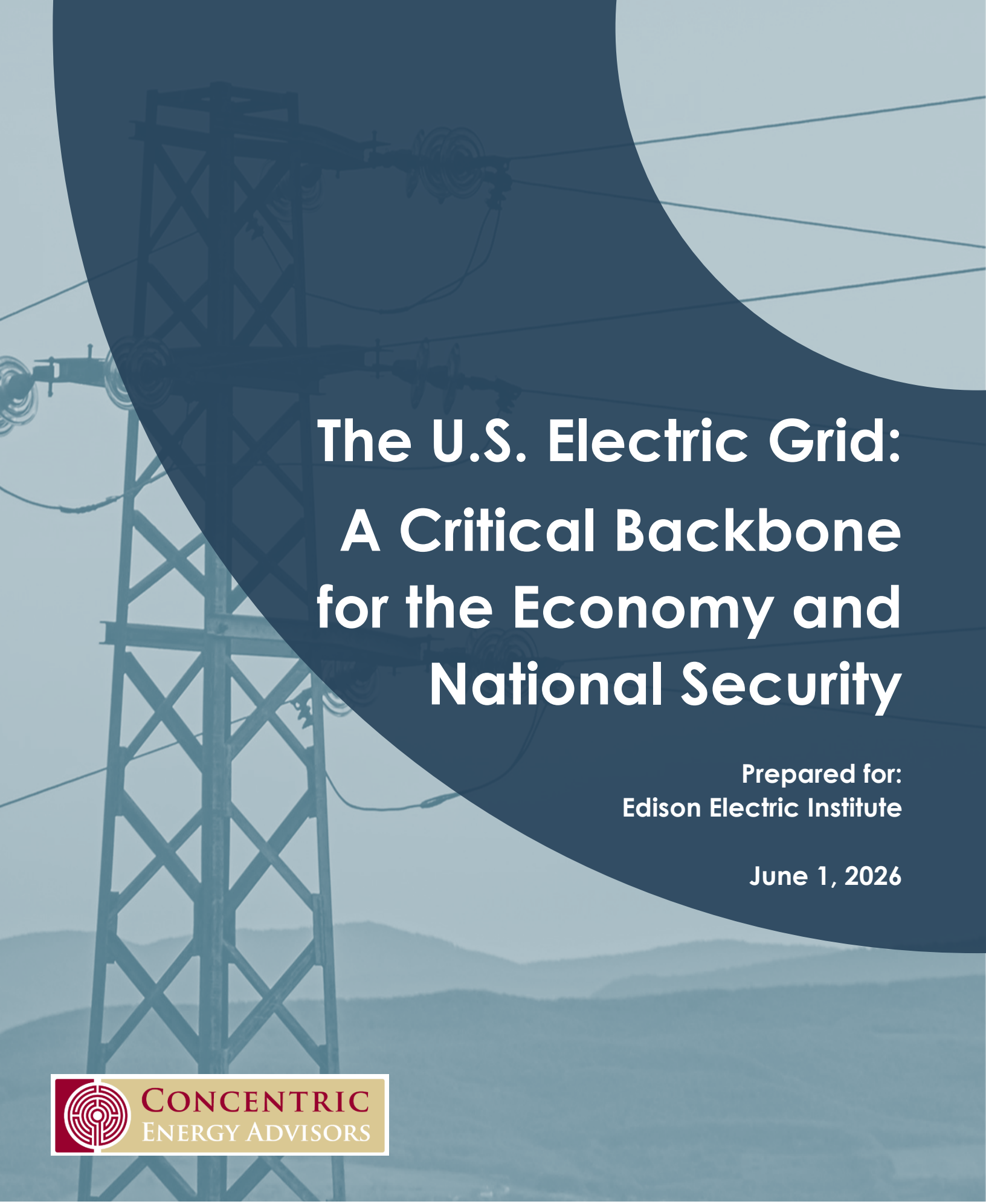

The U.S. Electric Grid: A Critical Backbone for the Economy and National Security

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CONCENTRIC ENERGY ADVISORS

EXECUTIVE SUMMARY

This report, prepared by Concentric Energy Advisors, Inc., examines the U.S. electric grid as a critical national asset and evaluates how utility investment, modernization, and integrated planning support economic growth and national security. The grid is an integrated system of critical infrastructure that generates, transmits, and delivers electricity to customers. It spans more than 22,000 generators, 55,000 substations, 642,000 miles of high voltage transmission lines, and 6.3 million miles of distribution infrastructure. This report provides data driven insights into grid reliability, resilience, and the importance of maintaining a highly interconnected system for an economy that depends on uninterrupted power. The report's key findings include:

- **The U.S. electric grid is critical to our economy, national security, and modern life.** The grid is the enabling platform for economic and national security by supplying reliable power to all sectors of the economy, including essential services such as defense, emergency response, water systems, and communications.
- **Utilities continue to invest steadily in the grid while prioritizing affordability for customers.** Utilities are driving sustained investments in the grid that support reliability and the deployment of new technologies to help keep energy as affordable as possible for customers. By making system-wide improvements at scale, utilities can deliver these benefits more cost-effectively than through smaller, stand-alone projects.
- **Utilities are leading the deployment of new technologies.** These new grid-enhancing technologies (GETs) and other innovative solutions help utilities identify issues earlier, make better use of existing infrastructure, integrate new energy resources, and serve growing demand more efficiently, all while keeping the lights on and maintaining high levels of reliability for customers.
- **New large customers should be connected to the grid.** New large customers broaden the customer base over which fixed costs are recovered and support investment in advanced technologies that benefit all customers. Leveraging the existing grid also avoids costly, duplicative infrastructure.
- **A modern, interconnected grid remains the most scalable platform for reliable power delivery.** Paired with integrated utility planning, continued investment in the grid is a foundational enabler of U.S. economic growth and prosperity. Any efforts to reduce investment in the grid could jeopardize this economic engine.

The Grid is the Backbone of U.S. Economic and National Security

The grid is the backbone of nearly all U.S. economic activity and public services. It is essential to national security, it supports the livelihood of every American, and it is becoming increasingly critical as the U.S. economy becomes more electrified. While the electric power industry is one of the sixteen critical infrastructure sectors identified by the U.S. Cybersecurity & Infrastructure Security

Agency (CISA), **the grid is an enabling platform for nearly all other critical infrastructure sectors**. The stable energy supply provided by the grid protects health and welfare and allows the U.S. economy to function. Investor-owned electric utilities focus on preventing long-duration outages, which the Lawrence Berkeley National Laboratory (LBNL) estimates could reduce regional Gross Domestic Product (GDP) by billions of dollars. **The grid has remained strong and stable over time, with an average reliability factor of 99.95%** according to the National Laboratory of the Rockies (NLR). This means that the grid's true value is not reflected just in electricity prices, but in the enormous economic activity that depends on uninterrupted power, and in the costly disruptions that are avoided when the grid works as intended.

The Grid is Resilient and Utility Investment Enables Continuous Modernization

The grid is not a single system but a layered network of generating facilities, transmission lines, substations, distribution systems, control equipment, and software. Utilities routinely inspect, upgrade, and replace components based on condition and performance to deliver high levels of reliability to support modern economic activity and public services. The North American Electric Reliability Corporation (NERC) found that **the bulk power system remained "highly reliable and resilient"** in 2024, while noting that severe weather and natural disasters, not routine equipment failure or asset degradation, caused the most severe outages. Utilities have been able to achieve this level of resilience by making ongoing investments in grid hardening and other upgrades, while federal programs complement these investments through targeted funding for grid resilience and modernization. NLR recently estimated that **every dollar invested in transmission infrastructure saves customers $1.60-1.80 in future system costs**. In addition, recent utility projects have demonstrated that dynamic line rating (DLR) technology can increase capacity ratings by 10-30% during favorable conditions, while reconductoring with advanced conductor lines can substantially increase line capacity, sometimes even doubling it. The electric utility sector's mutual assistance programs and interconnection across regions also provide redundancy and flexibility, enabling utility workers and grid resources to be rerouted during emergencies to accelerate recovery from disruptions. Altogether, **utility industry efforts are strengthening the capabilities of the grid** to serve customers during extreme events and enabling utilities to maintain essential services when they are needed most.

Grid Connected Large Customers Provide Advantages

The U.S. is experiencing one of the most significant shifts in electricity demand in decades, driven by growth in data centers, artificial intelligence, manufacturing, and electrification. As a result, reliable electric service is increasingly important for economic competitiveness and energy security. Connecting large customers to the grid provides clear advantages because **new large customers broaden the customer base over which fixed costs are recovered,** improve asset utilization, and support investment in advanced technologies that benefit all customers. In addition, the grid can deliver lower long-term costs through economies of scale and provide access to diverse generation resources. By contrast, widespread off-grid configurations can increase system-wide costs, reduce resilience, and put pressure on finite manufacturing capacity and critical supply chains. To ensure

reliability on their own, off-grid customers must build substantially more on-site generation and storage – often 70% or more above peak demand – than would be required if they were connected to the grid. A recent Concentric report estimates that if large load customers do not pay their share of fixed grid costs, the resulting cost shift to other customers could total between $120 billion and $169 billion over a 30-year period nationwide. Through thoughtful planning and appropriate cost allocation, **the integration of new large customers strengthens the grid and benefits all customers**.

Conclusion

The evidence provided in this report supports a clear conclusion: **the U.S. electric grid is a strategic national asset** that utilities continuously strengthen and modernize through sustained, strategic investment, operational improvements, and technology deployment. These actions deliver broad, economy-wide benefits and enhance national security by sustaining the energy backbone for defense, communications, healthcare, financial systems, water systems, and other critical infrastructure. This implies that the grid's economic value is not captured solely by the price of electricity, but by the avoided costs of disruption across the U.S. economy, which depends on continuous service. Additionally, connecting new large loads to the grid is the most efficient, reliable, and resilient approach to meeting rising electricity demand. In summary, **the U.S. electric grid enables economic growth and supports national security**, and it is the most scalable platform for reliable power delivery.

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