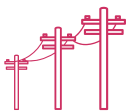


# The Grid is Essential for Progress, Yet Vastly Underfunded

The electric grid is the backbone of modern society and the lifeblood of our economy. Regarded as the greatest engineering achievement of the 20th century, our ubiquitous electric grid drives all of our major industries and provides services and safety to nearly every household. Yet we now often take it for granted. Our 21st-century commerce, government and communities rely all the more on a reliable power supply, yet we have not invested in the grid sufficiently to meet demand. As we've seen in weather-related disasters around the country, when the power grid goes down, our people, businesses and way of life are all at risk.

**The U.S. is facing a \$197 billion grid investment shortfall by 2029 and a \$338 billion shortfall by 2039.<sup>1</sup> To ensure reliable power, and avoid future catastrophic disruption and suffering, we need to start a \$340 billion investment right now.**



**OUTDATED CRITICAL EQUIPMENT:** Most of the electricity transmission and distribution system was built in the 1950s and 1960s<sup>2</sup> with a 50-year planned useful life that is past due for replacement with more capable solutions. Investing in modern technologies will minimize today's risk and improve service for all.



**SOCIETAL COSTS:** NOAA reports that there were 27 billion-dollar weather and climate-related disasters in 2024, resulting in 568 deaths and economic losses estimated at \$183 billion<sup>3</sup>. Given the likelihood such events will continue, investing in the grid now could save trillions over the next two decades.



**ACCELERATING CHANGE:** Rapidly evolving technologies such as artificial intelligence (AI) and industrial electrification are upending market dynamics, increasing demands on the grid. We must deploy new techniques and tools to create a robust grid infrastructure and ensure all segments of society benefit.

## An Advancing Society Requires an Advancing Grid

The electric grid is the platform for meeting our nation's thirst for energy, as the only means to connect the growth in diverse energy resources with demand across the country. The need is immediate! For example, nuclear power is undergoing a resurgence, in part due to AI, with estimates that nuclear plant generation could triple by 2050, an increase of 200 GW<sup>4</sup>. In another example, Fortune estimates annual growth of 29% through 2030 for virtual power plants (VPPs) that harness the capacity of millions of distributed energy resources (DERs) to respond to supply and demand signals<sup>5</sup>.

Efficient integration of supply and demand is our best chance for leveraging this diversity of resources. Investing in a capable grid ensures power for every segment of society.

- **Newly rising demand:** After staying flat for decades, demand for electricity is forecasted to rise significantly across several sectors of society, led by data centers that drive AI. Demand from data centers is forecast to increase by about 400 terawatt-hours, a CAGR of about 23%.<sup>6</sup>
- **Utility buy-in:** Major utilities understand the need to upgrade their systems and are increasing their investments as much as their business models allow. For example, spending on transmission tripled, and spending on distribution rose 160%, over the last two decades.<sup>7</sup>

## Flexibility for Continuous Innovation Across Sectors

Balancing increasing demand with a growing portfolio of generation assets, in an era of more extreme weather events, will require significant expansion of grid flexibility. Grid operators need flexibility to manage supply- and demand-side resources to ensure resource adequacy as environmental and market conditions change. Expanding the use of demand-side resources as grid assets significantly increases the flexibility that our electric grid needs to deliver on-demand.

- **Dispatchable capacity:** At 43% of electrical generation in 2023, natural gas generation is the U.S.'s largest source of energy, in large part because it can ramp up and down quickly to meet changing supply and demand conditions.<sup>8</sup>
- **Utility assets:** The U.S. market for utility-scale energy storage is projected to increase 32% year-over-year for a total of 62 GW by 2028.<sup>9</sup>

## Resiliency to Dire Weather Events and Losses

There have always been threats to continuity of electric supply. However, today's frequency and magnitude of disturbances is highly disruptive. Of the 27 billion-dollar weather and climate-related disasters in 2024, utilities and communities had to survive hurricanes, winter weather, wildfires, heat waves, floods, and other terrible events. Moreover, access to energy is the first order of business in responding to a crisis, ensuring safety, and beginning to rebuild. We have to ensure investments in predictive technology and grid hardening keep pace with demands we have for continuous supply of energy.

- **Lost power:** From 2000 to 2023, about 80% of major power outages in the U.S. were due to weather events. The number of such outages in the decade 2014-2023 was double that of the first decade of this century.<sup>10</sup>
- **Trillion-dollar issue:** The U.S. has sustained 403 weather and climate disasters since 1980 where overall damages/costs reached or exceeded \$1 billion (including CPI adjustment to 2024). The total cost of these 403 events exceeds \$2.915 trillion.<sup>11</sup>
- **AI fights back:** A Texas utility has deployed a smoke detection camera system that uses AI to detect wildfires very early, generate GPS coordinates for first responders and warn the utility of dangers to specific parts of its infrastructure.<sup>12</sup>

## Universal Access to Affordable Energy

Electrification during the middle part of the 20th century provided access to rural Americans that had become commonplace in urban areas. Utilities of all ownership models provided affordable electricity to customers across their service territory. Meanwhile, all of us have become more dependent on digital access to information and services. Many are disproportionately disadvantaged by the costs and availability of reliable energy. As the grid evolves, the benefits of the system must be accessible to the most vulnerable communities. Affordable delivery of power is important to all segments of society.

- **Millions disadvantaged:** Energy burden – the percentage of household income spent on energy – measures 15% and 18% for most low-income households, compared to just 3-5% for all households.<sup>13</sup>
- **Paying more:** In the five states with the highest low-income energy burden – Mississippi, South Carolina, Alabama, Georgia and Arkansas – low-income households use 36% more electricity than the low-income national average.<sup>14</sup>
- **Affordability drives economic growth:** Greater electricity use, access, reliability, and affordability are tightly linked to economic growth. Effective infrastructure ensures productive use of that energy.<sup>15</sup>

## Reducing Danger of Physical and Cyber Threats

Safety and security of the energy system has always been at the front of grid operators' minds. As the threats to critical infrastructure increase, utilities are being required to strengthen their cyber protection. At the same time, extremist groups are attacking distribution centers and other grid infrastructure in an attempt to disrupt civil society. It is critical that the US maintain world-class security and cyber security capabilities to continuously monitor and proactively mitigate any potential security threats to the system.

- **Spikes in cyber attacks:** Check Point Research documented 1,162 cyberattacks on utilities, a 70 percent increase compared with the same period in the prior year.<sup>16</sup>
- **Targeting physical infrastructure:** Over 118 attacks on grid power stations occurred in 2022 alone, including an attack in North Carolina that cut off power for more than 45,000 people.<sup>17</sup>

## Today's Investment Ensures Innovation and Prosperity

Our society relies on our electric system more than ever before. We need a power grid that is diversified, resilient, flexible, affordable and secure – not just to maintain our way of life, but to continue to progress all of our national priorities. The technologies we need to tackle the challenges are proven and ready to deploy with sufficient priority and funding. The benefits of proactive investments today will be realized by every segment of citizens and businesses and help to propel the U.S. to a more competitive, secure and prosperous future.

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<sup>1</sup> <https://infrastructurereportcard.org/wp-content/uploads/2021/03/Failure-to-Act-Energy-2020-Final.pdf>

<sup>2</sup> <https://www.infrastructurereportcard.org/wp-content/uploads/2019/02/Full-2017-Report-Card-FINAL.pdf>

<sup>3</sup> <https://www.ncei.noaa.gov/access/billions/>

<sup>4</sup> <https://www.energy.gov/ne/articles/us-sets-targets-triple-nuclear-energy-capacity-2050>

<sup>5</sup> <https://www.fortunebusinessinsights.com/u-s-virtual-power-plant-market-109146>

<sup>6</sup> <https://www.mckinsey.com/industries/private-capital/our-insights/how-data-centers-and-the-energy-sector-can-sate-ais-hunger-for-power>

<sup>7</sup> <https://www.eia.gov/todayinenergy/detail.php?id=63724>

<sup>8</sup> <https://www.eia.gov/todayinenergy/detail.php?id=61444>

<sup>9</sup> <https://www.woodmac.com/press-releases/2024-press-releases/us-grid-scale-energy-storage-installations-surge-setting-new-q2-record>

<sup>10</sup> [https://drj.com/industry\\_news/the-11-most-significant-weather-related-outages-of-2024/](https://drj.com/industry_news/the-11-most-significant-weather-related-outages-of-2024/)

<sup>11</sup> <https://www.ncei.noaa.gov/access/billions/>

<sup>12</sup> <https://austinenergy.com/about/news/news-releases/2024/austin-energy-announces-full-deployment-of-ai-driven-early-wildfire-detection-system>

<sup>13</sup> <https://nlga.us/wp-content/uploads/uh-energy-white-paper-energy-burden-june-6-edit.pdf>

<sup>14</sup> [https://www.energy.gov/sites/prod/files/2019/01/f58/WIP-Energy-Burden\\_final.pdf](https://www.energy.gov/sites/prod/files/2019/01/f58/WIP-Energy-Burden_final.pdf)

<sup>15</sup> <https://blogs.worldbank.org/en/energy/how-much-do-we-know-about-development-impacts-energy-infrastructure>

<sup>16</sup> <https://www.reuters.com/technology/cybersecurity/cyberattacks-us-utilities-surged-70-this-year-says-check-point-2024-09-11/>

<sup>17</sup> <https://time.com/6244977/us-power-grid-attacks-extremism/>



Grid Forward is an industry association promoting and accelerating grid modernization via advanced technology, policy progress and business innovation.

Need more information? Contact Bryce Yonker, Executive Director, Grid Forward or visit [GridForward.org](https://GridForward.org).