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WILL THE POWER GRID BE ABLE TO HOLD THE CHARGE?

On-shoring, AI, and EVs portend a future of record-high energy demands. How will the aging power grid deliver?

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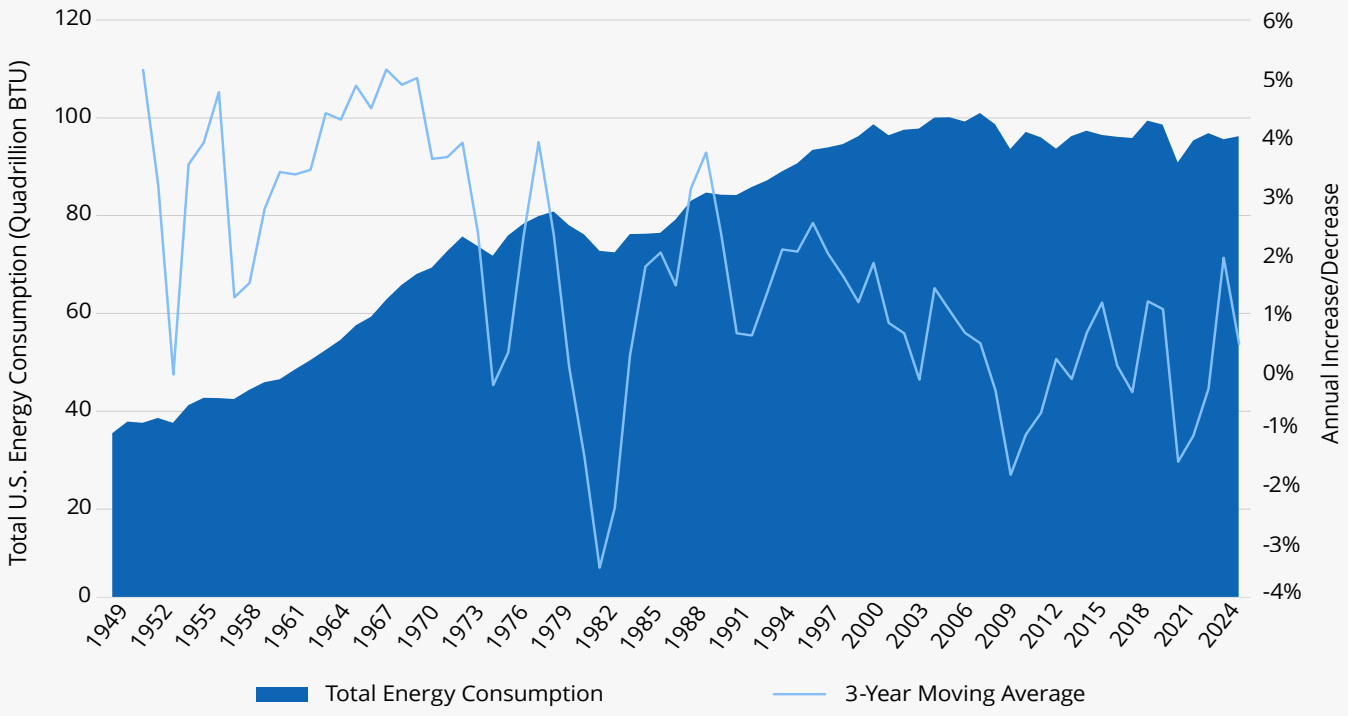
From 1950 until the late 1990s, annual electricity demand in the U.S. dependably saw low double-digit increases, a surge fueled by a growing post-World War II economy, commercial and industrial manufacturing, and emerging technologies that made possible electric marvels such as televisions, refrigerators, microwaves, and washers and dryers.

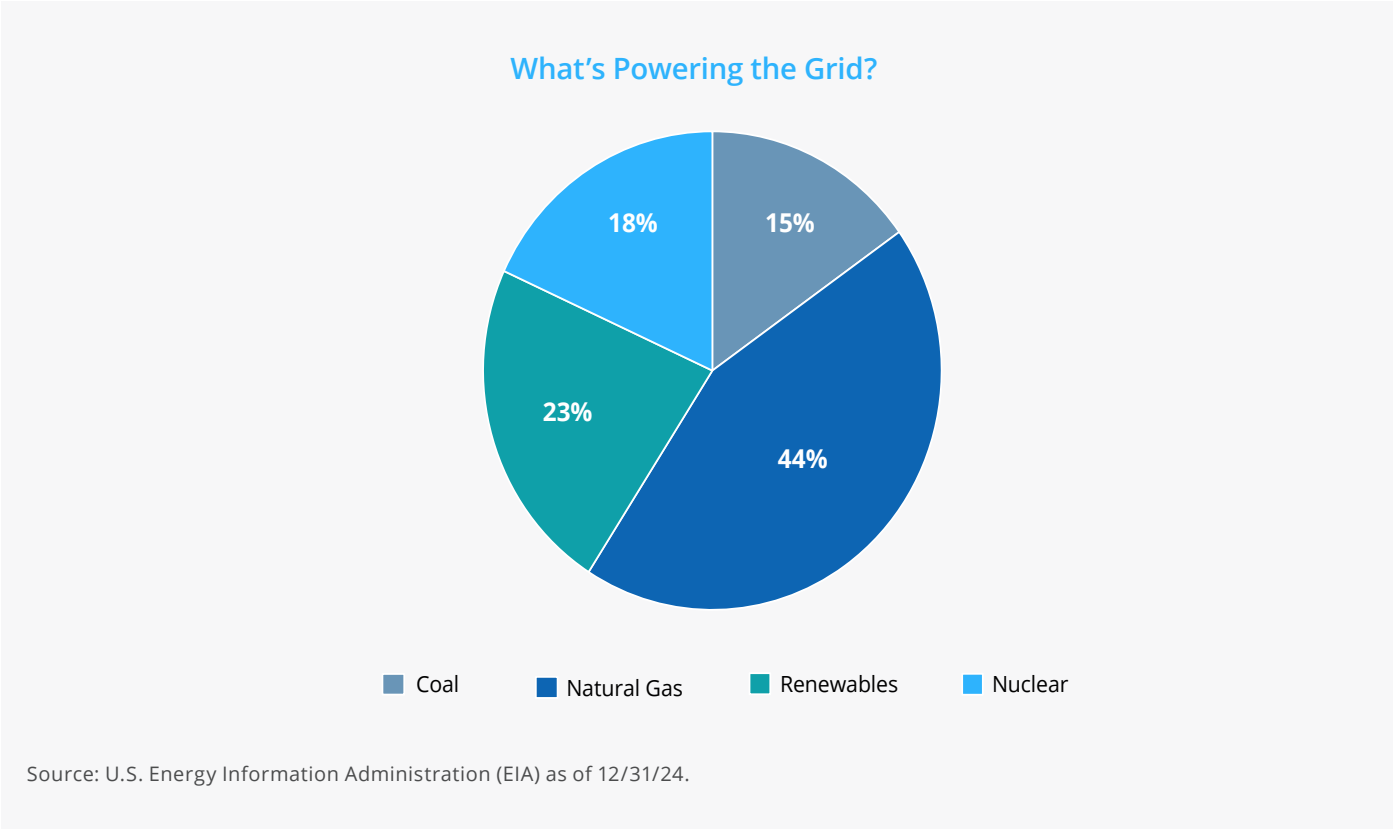
Energy Consumption Has Leveled Off—For Now



Source: U.S. Energy Information (EIA) as of 5/27/25.

But in the first quarter of the 21st Century, increased demand for electricity dropped precipitously to around 1% annually, thanks largely to energy-saving technology. But that's rapidly changing thanks to new onshoring facilities, energy-hungry data centers for AI, and the migration to electric vehicles.

By 2050, U.S. energy use is predicted to double, but the surge has already started to happen. At data centers, annual energy consumption is expected to double from under 500 terawatt-hours to more than 1,000 terawatt-hours by 2026. For some context, 1,000 terawatt-hours is the equivalent of the entire annual electricity consumption of Japan.



Source: U.S. Energy Information Administration (EIA) as of 12/31/24.

How Will Increasing Demand Be Met?

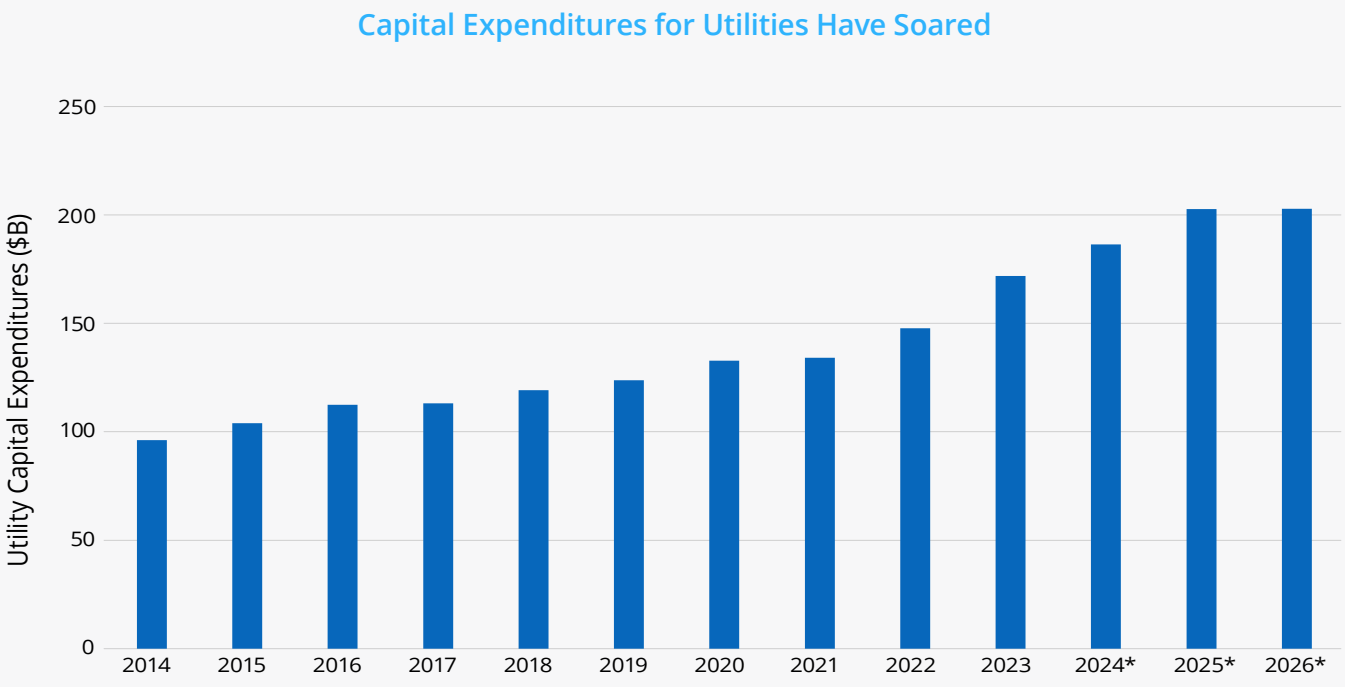
How will the increasing energy demand be met? Right now, the U.S. gets about 44% of its energy from natural gas, 23% from renewables, 18% from nuclear energy, and 15% from coal. The U.S. still gets most of our energy from natural gas and coal, but renewables and other clean energy sources—which are capturing an increasing share of energy production—will be critical in meeting future needs. But for now, natural gas in the U.S. is plentiful and relatively inexpensive, so it will likely be the leading source of energy for some time.

And then there's nuclear power. It used to be feared as an unsafe energy source, but technology has advanced quite a bit in recent decades. Now, the main hurdle is cost. The last large-scale nuclear plant in the U.S. was originally expected to cost $14 billion and completed in 2017. It ended up costing upwards of $30 billion, and it didn't go online until 2024, seven years late.

Given that experience, regulated utilities in general are not interested in building nuclear plants, though some have elected to extend the life of older nuclear plants. Down the line, I think utilities may try to work together with the government to provide a financial backstop. We'll see. An exciting new development in the field of nuclear energy is small modular

reactors, also known as SMRs. These are much smaller in scale and can power data centers, hospital systems, military bases and the like. But those likely won't be commercially viable until at least 2030.

In the meantime, failure of the power grid is not imminent. Currently, the grid can become stretched during peak summer months, but it's manageable. The danger might come in a half-dozen years when soaring demand really tests the strength of the power grid.



Source: Edison Electric Institute as of 7/31/24. *Projected.

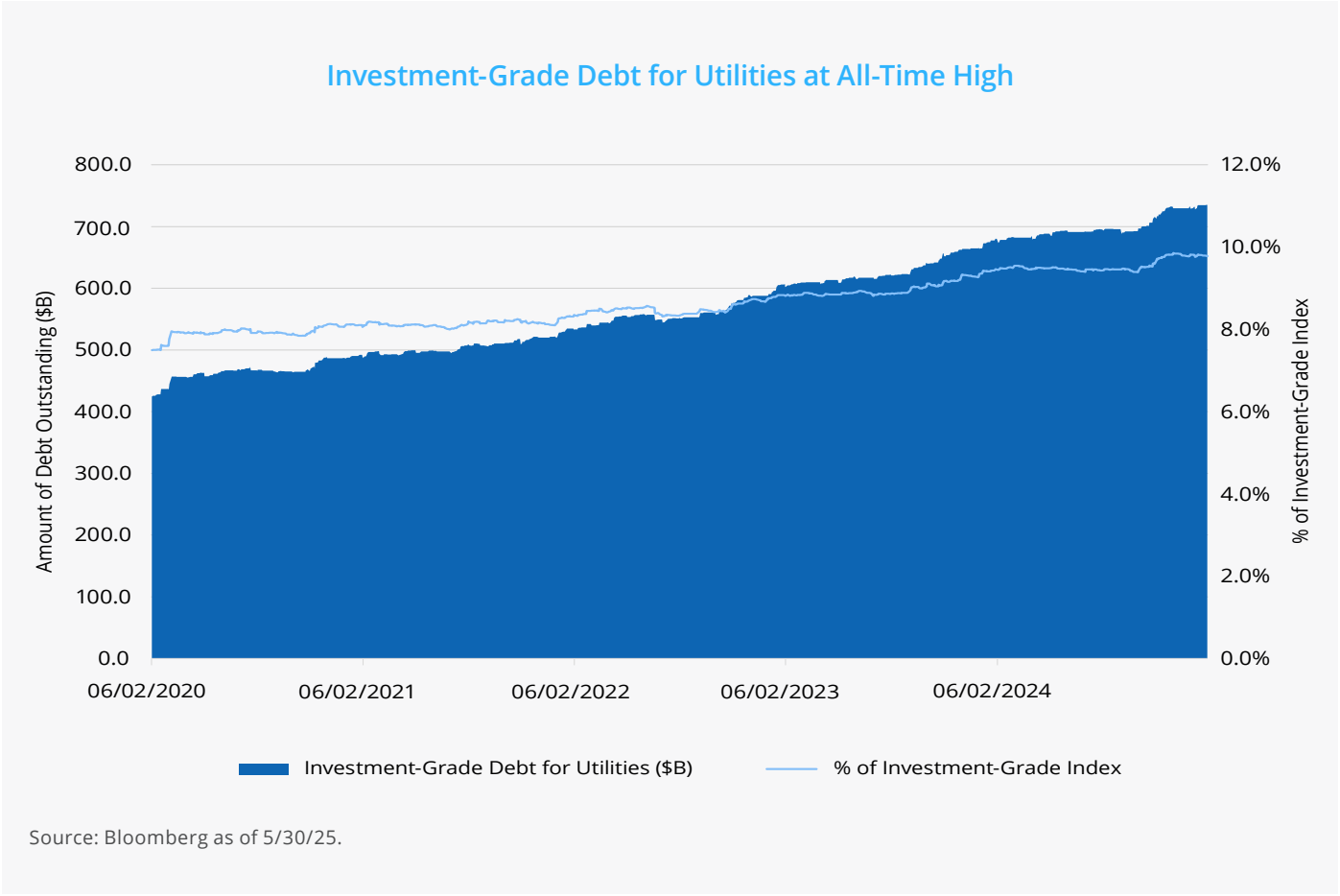
Aging Infrastructure and Extreme Weather

Complicating the race to meet future demand are an aging infrastructure and extreme weather, which has become increasingly frequent due to global warming. Utilities are constantly working to improve their infrastructure, but that takes time and money. One utility CEO told me that by the time you finish the last mile of upgrades, it's time to upgrade the first mile again. It's a constant, expensive process. The International Energy Agency (IEA) has forecasted U.S. utility companies will need to spend $2.5 trillion for infrastructure through 2030.

That said, I'm not sure people appreciate how sturdy the grid has gotten over the years, especially through undergrounding of the powerlines. Technology has also helped. Today, if power goes out, utilities can quickly rewire the power grid so there's a minimal impact on consumers. At times, it can literally take just fractions of a second to reroute power. Because of all this, utilities have significantly reduced the frequency and the likelihood of outages.

But Mother Nature is not as easily tamed. In recent years, we've seen hurricanes, tornadoes, wildfires, windstorms, ice storms, and other weather events significantly impact the gird. We also have rising average temperatures, which can reduce efficiency of the power plants

themselves. To combat this, the utilities have been hardening the power grid by undergrounding as many lines and weatherizing the exposed lines.



Source: Bloomberg as of 5/30/25.

Financing the High Cost of Infrastructure

This, of course, is all expensive. In 2025, U.S utilities are expected to spend $200 billion on capital expenditures through raising funds from both the debt and equity capital markets. U.S. utilities are well anchored as a relatively low risk investment-grade industry, but these additional costs will likely stretch company balance sheets and leverage metrics for the foreseeable future.

All this all translates into higher utility bills for the customer. Utilities are building out all this power to support higher demand and eventually need to recover the cost. Sometimes these costs can be delayed and spread out over multiple years, but there's no getting around customers will have to foot the bill for these costs.

Shifting Government Mandates

Complicating matters are the sometimes-conflicting government directives. The Trump administration has shifted focus to fossil fuels, especially coal. They have signed executive orders to encourage offshore drilling. They're trying to eliminate any specific EV mandates in favor of consumer choice. They're less in favor of offshore wind. President Trump recently signed the One Big Beautiful Bill Act, which makes significant changes to clean energy tax credits enacted under the Biden's administration's Inflation Reduction Act. Among the biggest changes, the One Big Beautiful Bill Act terminates production tax credits and investment tax credits for wind and solar projects placed in service after Dec. 31, 2027.

The one thing that has stayed consistent between the last administration and this administration is support for stabilizing the power grid by streamlining the administrative process to build infrastructure more quickly.

The states have their own mandates. Twenty-four states have net-zero admission goals, meaning they want a balance between greenhouse emissions produced and taken out of the atmosphere. For instance, California's goal is to produce 100% carbon-free electricity by 2045, New York's target date is 2040, and Rhode Island's is 2033. To me, it's important to note that the net-zero targets assume technologies that don't exist or are not viable right now—like the small nuclear plants. Also, the estimated price tag for a net-zero planet is $21 trillion.

At the same time the states are working toward meeting these mandates, President Trump recently signed an executive order looking at these state green-energy initiatives to potentially repealing them. So, there's a bit of policy whiplash going on between federal and state governments.

The Future

Going forward, it's inevitable that sources of energy will shift in the coming decades, with coal phasing out and natural gas serving as a bridge between fossil fuels and cleaner energy. However, the adoption of green energy will likely continue to be slower than expected due largely to cost (nuclear plants, for example) and the pace of technological development, including how to store enough solar and wind energy to compensate for cloudy and/or windless days. In addition, the increasing demand for energy will put further strain on aging infrastructure, which will require significant capital expenditures to maintain and improve. As of now, the grid is holding up, and there is an adequate amount of generation to support current electricity needs. However, as demand for electricity continues to increase, it remains to be seen how effective utilities and power companies will be able to meet that demand with adequate capacity in an economically feasible way.

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6 of 6