THREE ON THURSDAY

FIRST TRUST ECONOMICS

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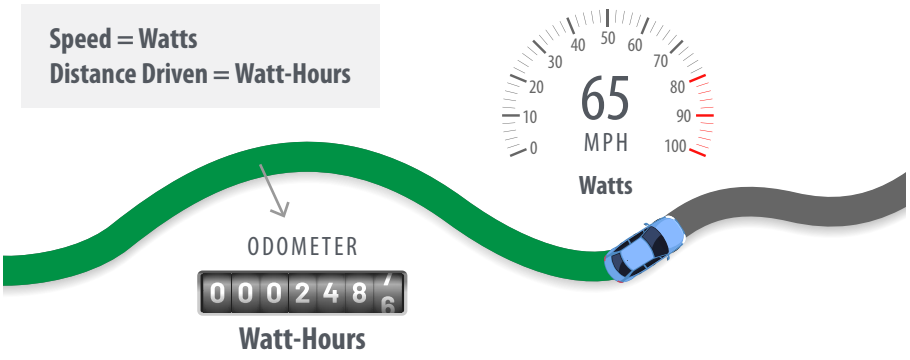
## Watts, Watt-Hours, and What's Ahead

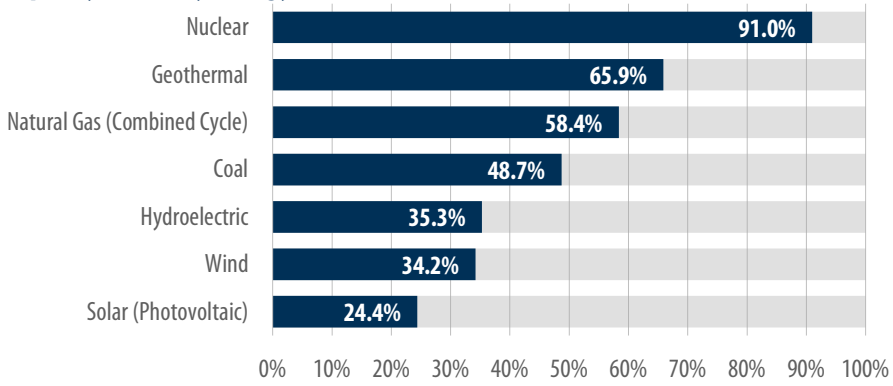
In 2025, the United States generated a record 4.43 thousand terawatt-hours (TWh) of electricity, a 2.8% increase from 2024. Recent growth has been driven in part by data centers and the industrial sector, but the real story is what comes next: a surge in electricity demand unlike anything seen in decades. The challenge is that most people don't have an intuitive sense of what a "watt" or "watt-hour" actually represents. In this week's "Three on Thursday," we translate these concepts into real-world terms and show just how much new electricity the U.S. will need to power the next phase of economic growth. For greater insight, view the three charts below.

### Watts vs. Watt-Hours




Watts (W) and watt-hours (Wh) are different metrics, but understanding the distinction is critical to making sense of electricity usage. A watt measures power—the rate at which electricity is being used at any given moment. A watt-hour, by contrast, measures energy—the total amount of electricity used over time. The easiest way to think about it is through a car analogy. Watts are like the speedometer on the dashboard—miles per hour—showing how fast you're going at a given moment. Watt-hours are like the odometer—total miles driven. Driving at 100 mph tells you how fast you're going (watts), but not how far you've gone. Distance (watt-hours) depends on how long you keep driving.

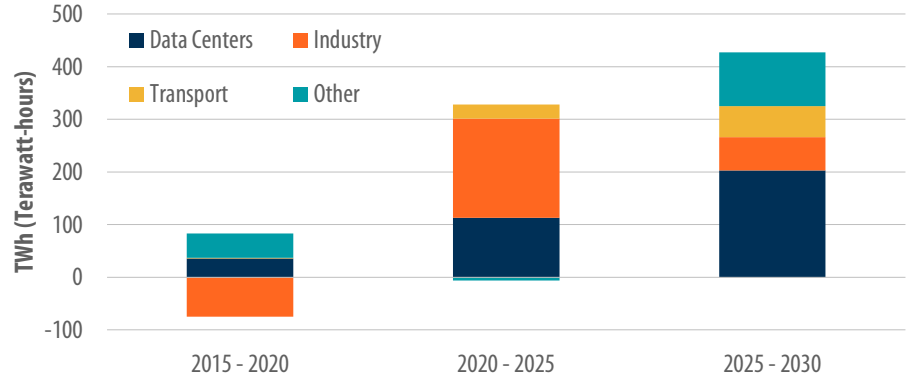
### Capacity Factor by Energy Source




Source: International Energy Association, First Trust Advisors. Most recent data as of 2025.

Another key concept is capacity factor. This is where watts and watt-hours come together. Watts tell you how much power a plant can produce at any moment, while watt-hours tell you how much it *actually* produces over time. Capacity factor bridges the two by measuring how much a plant generates versus its maximum potential if it ran nonstop. Using the car analogy: watts are your top speed, watt-hours are total miles driven, and capacity factor is how often you're actually driving at top speed. A car that can go 100 mph but averages 50 mph has a 50% capacity factor. This matters because not all power sources are equal. Nuclear plants run nearly nonstop, with capacity factors around 90%, while solar is intermittent, typically around 20–25%. So even if both are rated at 1 megawatt (MW), a solar plant will produce far fewer total watt-hours than a nuclear plant. This is why nuclear is only 8% of US electricity generation capacity (watts view), but 18% of total US electricity generation (watt-hours view).

### Change in U.S. Electricity Demand by End Use




Source: International Energy Agency, First Trust Advisors. Data after 2025 are estimates.

From 2025 to 2030, U.S. electricity demand is projected to increase by roughly 400 terawatt-hours (TWh). To put that into perspective, electricity is measured in units that scale quickly—and each step up is 1,000 times larger than the last. A kilowatt-hour (kWh) is 1,000 watts used for one hour—the unit that shows up on your electricity bill. It's roughly equivalent to running a dishwasher, and the average U.S. home uses about 30 kWh per day. A megawatt-hour (MWh) is 1,000 kWh—enough to power about 30 to 40 homes for a full day, or a small neighborhood. A gigawatt-hour (GWh) is 1,000 MWh—enough to power 30,000 to 40,000 homes for a day, or a small city. Finally, a terawatt-hour (TWh) is 1,000 GWh—enough to power roughly 100,000 homes for an entire year, representing electricity use at a regional scale. That additional 400 TWh of demand is not spread evenly—it represents a continuous increase in power usage. Converted into real-time electricity demand, it equates to roughly 45 gigawatts of constant, 24/7 power.