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The Carlyle Compass



By **Jason Thomas**
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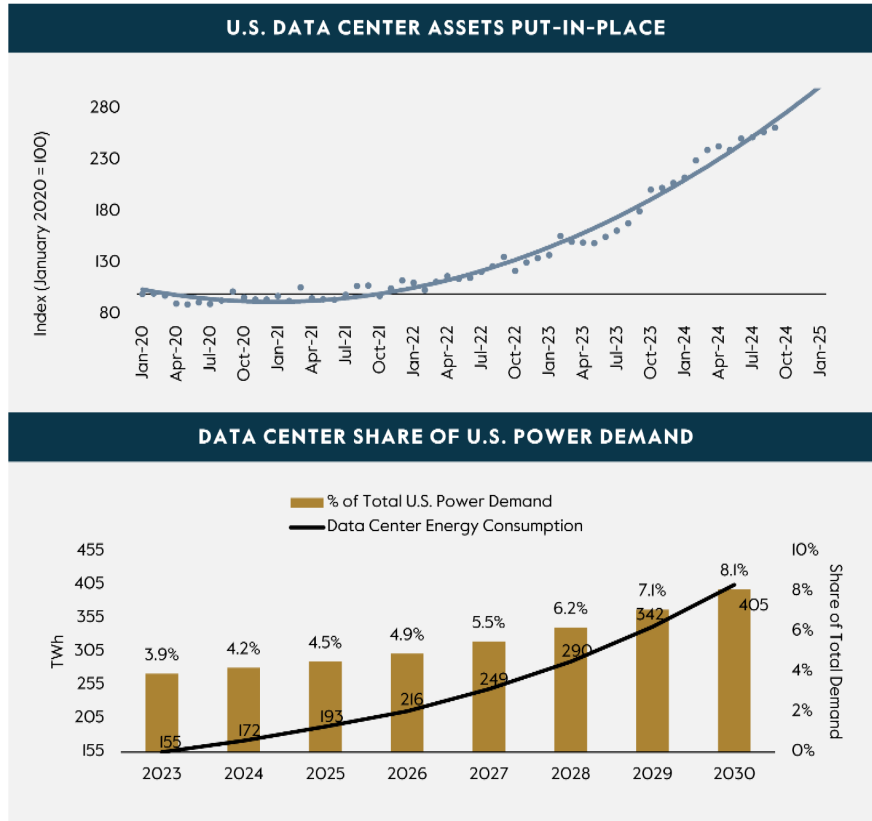
Welcome back to **The Carlyle Compass**, your weekly newsletter that brings together the latest research and market insights from our global team.

In September 2023, we came across an unusual [job posting](#). Microsoft was in the market for a “Principal Program Manager” with an educational background in *nuclear* engineering and professional experience in *nuclear* energy technologies and *nuclear* regulatory affairs. Judging by the disjuncture between industry (software development; NAICS: 5132) and employment (nuclear engineer; NAICS: 221113), this would be as improbable from the perspective of labor statistics as a real estate brokerage hiring a dentist.

Microsoft had embarked on an ambitious plan to [triple](#) its data center capacity to meet surging demand for foundational and generative AI models. And those data centers require lots of electricity to run information technology equipment and cooling systems. Among the constraints facing hyperscalers, none looms as large as power adequacy.

How much electricity is AI likely to consume? That’s one of those questions where no answer, however hyperbolic, seems too ridiculous to countenance. The International Energy Agency [expects](#) data centers to consume more electricity by the end of 2026 than the entire economy of Japan. At current fixed investment rates, data centers’ share of U.S. electricity generation increases at the rate of nearly 1% per *month* (Figure I).

Figure 1: Data Center Boom Faces Power Generation Constraints

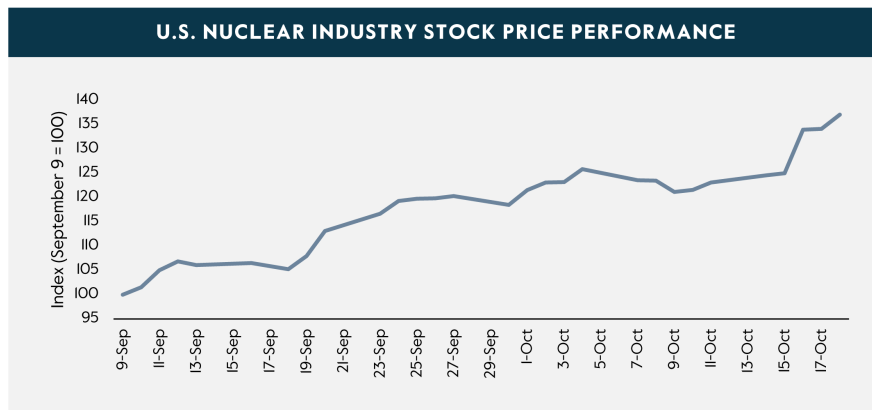


Source: Carlyle Analysis; U.S. Census Bureau, McKinsey Energy Solutions Global Energy Prospective 2023, BofA Global Research, October 2024. There is no guarantee any trends will continue.

Microsoft’s first nuclear breakthrough came last month when it reached a 20-year power purchase agreement with Constellation Energy to [restart the Three Mile Island reactor](#). This marks the second time that a shuttered U.S. nuclear plant will come back into service, and the first time a single customer has contracted for the entirety of the power it generates. Nuclear has particular appeal because the cost of power interruptions is estimated at [\\$7,500 per minute](#).

Competitors have entered the chat. Last week, Alphabet [announced](#) a partnership with start-up Kairos Power to build seven reactors. Two days later, Amazon [revealed](#) it was involved in a \$500 million financing round for X-energy Reactor and signed deals to explore small modular reactor development across the U.S. Hyperscalers’ interest in nuclear technology has been great news for the industry, which has enjoyed a 40% increase in its aggregate stock market value over the past six weeks (Figure 2).

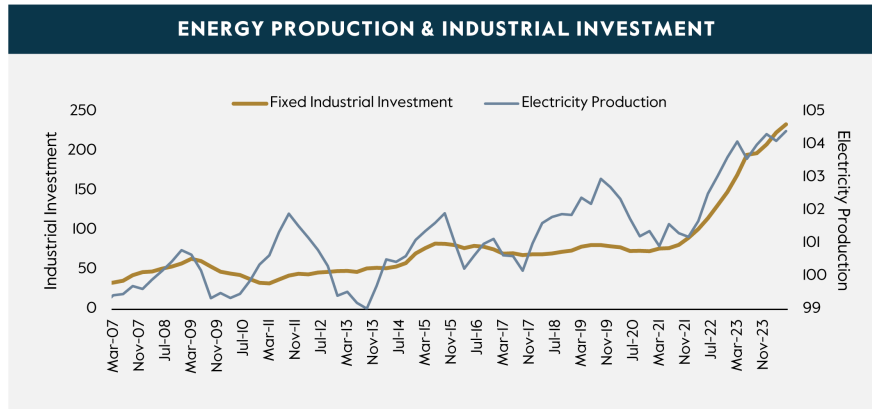
Figure 2: Tech Interest Sends Nuclear Stocks Soaring



Source: Carlyle Analysis; Bloomberg, October 2024. There is no guarantee any trends will continue.

To this point, discussions surrounding energy transition mainly involved the electrification and decarbonization of *existing* energy consumption. Power consumption had been [flat for the last twenty years](#), tracking the trends in industrial capacity. But data centers and reindustrialization changed the calculus (Figure 3).

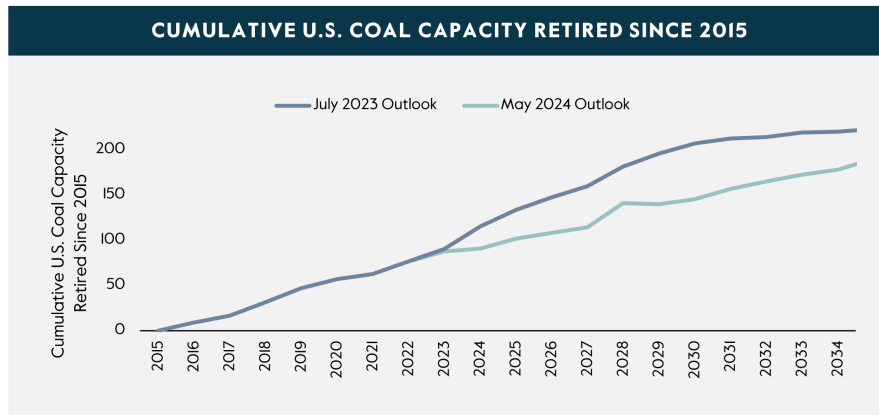
Figure 3: “Transitioning” to World of More Industrial Power Demand



Source: Carlyle Analysis; Federal Reserve, Bureau of Economic Analysis, October 2024. There is no guarantee any trends will continue.

Massive solar and storage capacity additions—accounting for [over 80%](#) of the record 62.8 GW added to the U.S. grid in 2024—have not achieved the hoped-for reduction in carbon emissions because new sources of power demand (mainly but not exclusively data centers) meant that [coal-fired](#) power plants [couldn't be retired on schedule](#) (Figure 4). Solar and storage needs are as great as ever; nuclear has simply emerged as a carbon-free power source to plug the incremental hole that's opened. It has also helped that [the technology underpinning small modular reactors](#) has made great strides, making them more cost-effective and faster to build.

Figure 4: Nuclear Needed to Keep Coal Retirements on Prior Schedule



*Only includes retirements in lower 48 states
Source: Carlyle Analysis; Financial Times, S&P Global Commodity Insights, October 2024. There is no guarantee any trends will continue.

A caveat is in order here, because we may have seen [this movie](#) before. The internet boom was expected to cause electricity demand to surge, but in fact efficiency gains meant that electricity demand growth was rather more subdued. Moreover, the investment made in anticipation of internet-related power demand growth that wasn't led to a wave of bankruptcies. [Given the right motivations](#), we could see efficiencies in AI computing—and thus power consumption—as well.

This time may be different, however, because the companies who have the clearest visibility on AI related power demand are the ones investing in electricity supply. We haven't seen the spike in electricity demand yet, but that doesn't mean it isn't coming.

These are the sorts of developments that send a deeper message about the U.S. business environment. If the price of curtailing energy consumption is retarding technological development, policymakers are [not willing to pay it](#), as perhaps best exemplified by California's about-face on the [Diablo Canyon reactor](#). The Inflation Reduction Act included

[three new tax credits](#) for nuclear power and earmarked funds for the development of a domestic enriched uranium market. As the Biden Administration implicitly concedes, the power needed to facilitate technological advancement will be generated, the choice is simply whether it will be free of [GHG emissions](#).

Contrast this with the European Union, where a regulation to document the [power](#) and water needs of data centers recently [took effect](#). Far from an unalloyed good, data centers are something that need to be monitored to determine whether their appetites exceed prudential limits. This follows the General Data Protection Regulation (GDPR) of 2018, which [dramatically increased](#) the cost of storing data and depressed EU firms' data storage and processing relative to similarly situated U.S. competitors.

President Coolidge's description of the American political economy holds as true today as when he uttered the phrase [nearly 100 years ago](#): "The business of America is business!"

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