

# Empowering Intelligence

## Empowering Intelligence: Data Centers and AI

Generative Artificial Intelligence (AI) is a technological leap forward in our use of data that touches every aspect of our economy. As we think through the secondary effects of such a change, we expect to see impacts that extend beyond technology. The increase in data generation driven by AI has transformed information processing and storage, leading to greater demand for computing power. Data centers, vital for processing large AI datasets, now face the critical challenge of meeting the escalating needs caused by this demand.

## Data Centers Are Critical to AI

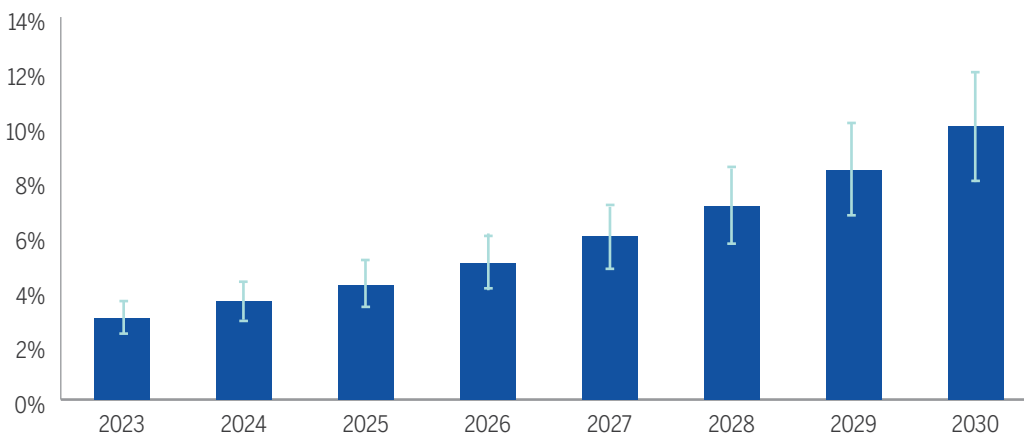
AI is quickly becoming table stakes for modern technologies, fueling applications like virtual assistants, optimization, and cybersecurity. In order to support these data-hungry applications, data centers become critical for AI programs to access vast reservoirs of information. Notably, generative AI, exemplified by large language models (LLM) like ChatGPT, relies on substantial training data to produce high-quality text, images, and music. Data centers offer a robust framework for the vast quantum of data AI applications churn out. To serve AI, data centers employ high-performance computing clusters, comprised of numerous servers interconnected through swift networks which enable parallel processing, speeding up training durations. To ensure the seamless operation of the embedded hardware, data centers are fitted with tailored power and cooling systems. Growth of these systems, in our view, will be critical to support the seemingly boundless demand for AI applications.

The surge in data generation spawned by AI has revolutionized how we handle, store, process, and transfer information. Data centers, offering large scale server farms, make it possible to bring AI to market accessibly, at a more reasonable cost. However, in order to build out the next generation resources, the tech-industry must grapple with a persistent and looming challenge: ensuring sufficient power to data centers.

## Utilities—an AI Beneficiary?

One of the most exciting aspects of recent growth in AI is the impact on seemingly orthogonal industries such as utilities infrastructure. As demand for AI capabilities grows, the addition of GPUs which are highly efficient computer chips designed for processing AI tasks, could meaningfully increase power demands due to their high energy consumption. As can be seen in Figure 1 below, the percentage of electricity consumption in the U.S. driven by data center demand is likely to increase from an estimated 3% in 2023 to close to 10% in 2030.

Figure 1: **Data Center as % of Electricity Consumption in the U.S.**



Source: Edison Electric Institute and Alger estimates from 2023 through 2030. Error bars represent +/- 10% of variability.



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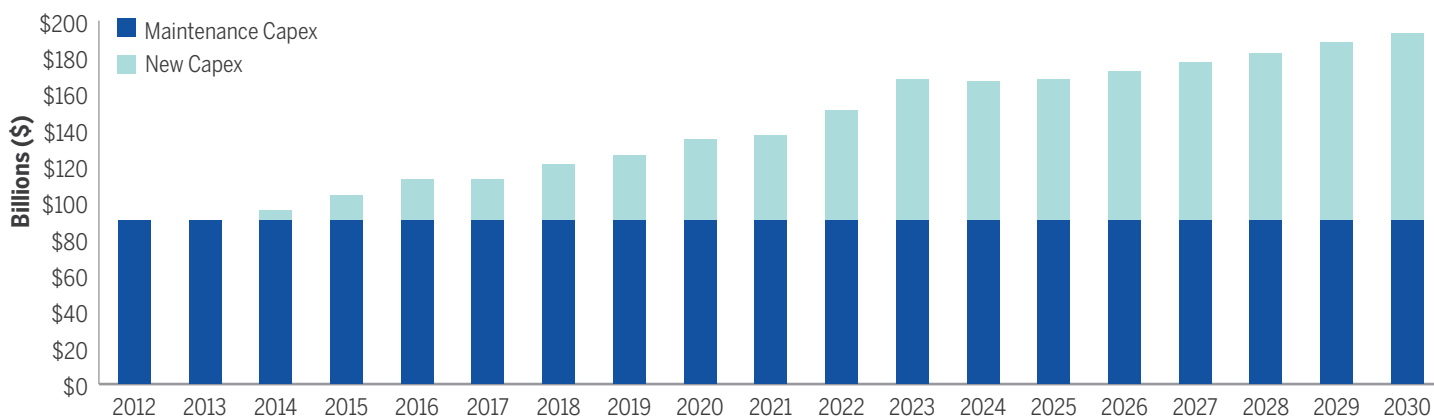
As a result, utilities will have to invest in their infrastructure to satisfy this new demand. We estimate that U.S. Electricity Utility Capital Expenditures (Capex) could grow from \$160B in 2023 to nearly to \$200B by 2030. We believe this growth in utility capex will be driven by new capex spend, as seen in Figure 2 below.

In our view, this increase in capex spend will feed through to increased demand for employees, which in turn will support consumer demand, driving GDP growth and leading to an even stronger requirement for AI capabilities. We see companies like Quanta Services, a premier provider of specialty infrastructure solutions, as particularly well-placed to capitalize on this trend. With utility capex on the rise due to grid modernization, we believe Quanta's specialization in electric power transmission and distribution aligns them with key opportunities in this ongoing upgrade cycle.

### A Virtuous Cycle for the Economy?

In short, we believe that as AI continues to make strides in technological advancements, its reliance on data centers is undeniable. These centers not only provide the necessary computational power but also contend with the challenges of energy consumption and effective cooling solutions. As AI tasks intensify, innovative approaches to energy and cooling will be paramount so data centers can sustainably support the seemingly exponential demand for AI computing. What does this mean for the broader economy? In our view, the development of AI is set to potentially be an engine of growth not only for AI companies themselves, but also for the industries required to support their growth. Given this dynamic, we believe that this growth could be self-reinforcing, creating a virtuous cycle that may significantly benefit the broader U.S. economy.

Figure 2: U.S. Electric Utility Maintenance Capex vs New Capex



Source: Edison Electric Institute and Alger. Estimates are from 2023 through 2030.

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The Edison Electric Institute (EEI) is an association that represents all U.S. investor-owned electric companies. Members of the Edison Electric Institute are investor-owned utility companies, meaning that they are privately held companies that supply power and electricity to businesses and consumers.

The following positions represent the noted percentages of Alger assets under management as of September 30, 2023: Quanta Services Inc. 0.29%; OpenAI 0.00%.

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