

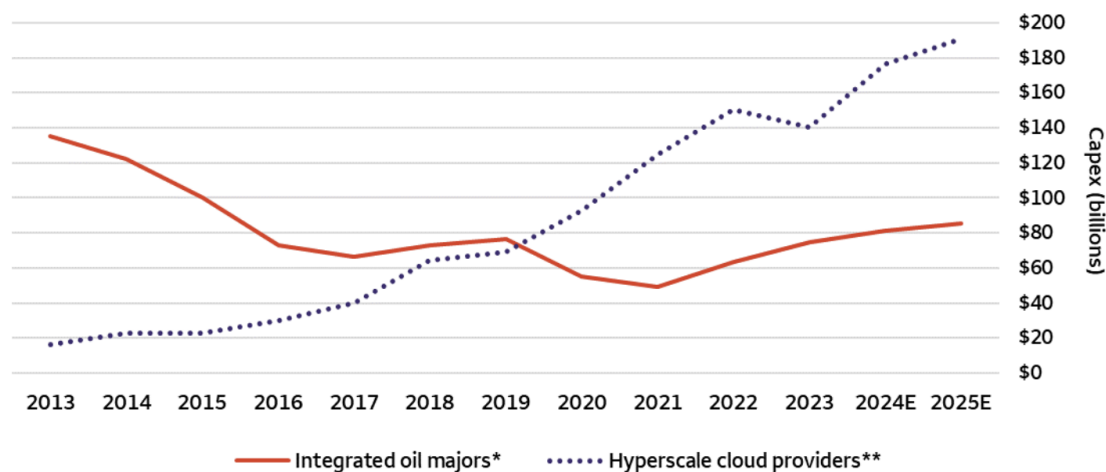
Market Commentary: Generative AI-How Does Your Garden Grow

The new artificial intelligence revolution is being driven by generative AI. Generative AI feels like the computers we were promised in 1950s Science Fiction—imbuing us with a childlike sense of wonder. The hope that computers can solve our problems without the human error that has caused us to fall short. ChatGPT is still a far way from Multivac¹. To realize our dreams of such a strong general-purpose AI, we will need to see expansion of our data centers and the infrastructure surrounding them to realize what current artificial intelligence companies are actually currently offering.

Generative AI and the Chatbot

OpenAI and other AI companies are not selling a general-purpose AI like Multivac. Instead, they are offering assistance to increase worker and company productivity. The current Generative AI offerings are conceptually exciting and have the potential to spur economic growth.²

Capital expenditures for hyperscale cloud providers outpacing integrated oil majors



Sources: FactSet and Wells Fargo Investment Institute. Based on calendar year data; 2024 and 2025 data represent consensus estimates from FactSet. *Four largest global integrated oil majors by market capitalization (BP p.l.c, Chevron Corporation, Exxon Mobil Corporation, Royal Dutch Shell Plc). **Four largest cloud infrastructure companies by market capitalization (Alphabet Inc., Amazon.com, Inc., Meta Platforms Inc, Microsoft Corporation). Forecasts and targets are based on certain assumptions and on views of market and economic conditions which are subject to change.

3

AI companies are often discussed concerning their potential impact on industries. Wells Fargo Investment Institute projects the needed capital expenditure for Artificial Intelligence to reach its potential impact will continue to grow.

¹ Multivac is a general purpose AI that occurs in multiple Isaac Asimov short stories. It is an early example in science fiction of a computer as an artificial intelligence.

² Goldman Sachs Research estimates AI has the potential to contribute over \$2.6 trillion annually to the global economy.

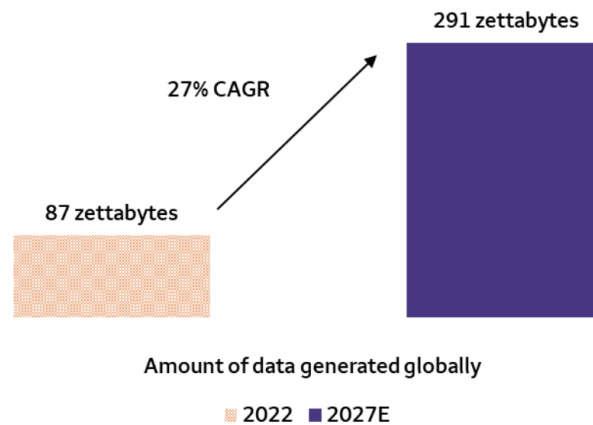
³ Data visualized by Wells Fargo Investment Institute in Sector Insight--Generative AI transforming data center landscape | March 25, 2024.

So, what is needed for generative AI to grow to its projected potential and where will this capital be targeted? We will discuss two areas where expenditures are seen: data center construction and ongoing energy demands.

Data Centers

Artificial Intelligence has long grown past being able to run just on your laptop. Artificial Intelligence computations are instead performed from servers at data centers with the computer’s memory stored on servers at, potentially, a different data center. This all require chips for the computers, data centers to house them, and energy to power it all. Dgtl Infra estimates 35%-45% of the cost to build a data center is related to land, building, and building outfitting.⁴ They project electrical and HVAC systems are expected to take up the remainder of data center costs.⁵

Data centers are mostly owned by established cloud infrastructure providers; an area that still has demand for growth with Vertiv projecting data generated to have a 27% compound annual growth rate from 2022 to 2027.



Sources: Vertiv 2023 Investor Conference. Date: November 29, 2023. CAGR = compound annual growth rate. E = estimate

6

Data generated will need to be stored in the infrastructure of data centers. Construction of data centers is similar to industrial construction with large factory floors for the server racks to do their work.

The data center does not have a clear price point partially because geography and size are variables that do not generalize well. We can look at a recent example from March 2024 in which Amazon Web Services purchased a 960-megawatt data center campus for \$650 million.⁷ This data center comes with being physically next to a large nuclear powerplant giving it priority access to its greatest need: power.

Energy

⁴ Building a Data Center: An In-Depth Guide to Construction – Dgtl Infra

⁵ Ibid.

⁶ Data visualized by Wells Fargo Investment Institute in Sector Insight--Generative AI transforming data center landscape | March 25, 2024.

⁷ [Amazon buys nuclear-powered data center from Talen](#)

Energy is a requirement for data centers to run, and Dgtl Infra projects it to take a plurality of the operating cost of them.⁸ McKinsey & Company projected U.S. Data center electricity consumption would increase by approximately 10% annually to 2030. This specific energy demand will occur in areas with data centers; the energy demand concentrated in areas with a higher number of data centers.

Wells Fargo Investment Institute sited energy costs as one of the barriers to companies “scaling the technology to be profitable.”⁹ Backup generators and fuel for them to maintain the data centers in case of power outages are also expected to contribute to the cost of scaling power supply.¹⁰

Conclusion

When reviewing what is needed for companies to scale Generative AI for increased productivity, we see a broad economic base being positively effected. The effects may reach wider than just expansion with the Walls Street Journal reporting that coal-fired power plants could continue operations for longer.¹¹ The AI expansion has the effect of forcing the continued use of legacy technology as these investments expand on top of the existing infrastructure, which can push back planned phase outs.

The Wells Fargo Investment Institute recently upgraded their economic forecast one percent being due to sectors benefitting from the build out and development of new Generative AI facilities.

-The AKD Wealth Partners Team Commentary and research provided by: Samuel Chapin—Client Associate

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⁸ Dgtl Infra numbers are from the Wells Fargo Sector Insite from March 25th, 2024

⁹ The ascent of generative AI—What Investors should know | September 8, 2023

¹⁰ Sector Insights—Generative AI transforming data center landscape | March 25, 2024

¹¹ [Big Data Hubs Slow Green Shifts](#)