

# MARYLAND DATA CENTERS ANALYSIS GROUP

Better Data | Better Decisions

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## WHAT INVESTORS ARE SAYING

This news brief provides a digest of investor perspectives on a specific topic relevant to data centers and their development in Maryland. Each brief will showcase a different topic and if applicable provide updates on previous topics.

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### **Are Efficiency Gains Reducing Resource Consumption Or Are We Caught in Jevon's Paradox?**

Data centers are the factories for AI, the warehouses and distribution centers for the storage and dissemination of data for websites, streaming services and cloud computing. There are 11,000 registered data centers worldwide according to IEA and most are not involved in AI. Their numbers and energy demand are expected to grow significantly. Projections by IEA, EPRI, McKinsey and Barclays for annual growth in data center power demand through 2030 suggest a range between 7 to 18 percent. Given that range, can increasing efficiency in data center technology actually reduce overall resource consumption? (data sourced from Barclays Impact Series)

Efficiency for data centers is measured by power usage effectiveness or PUE. It is calculated by dividing Total Facility Energy with IT Equipment Energy. It is a measure that some in government and industry believe should be a way to benchmark performance. The average PUE according to recent surveys is between 1.56-1.58. Some larger companies operating hyperscale data centers have achieved 1.09. At 1.58, roughly 60+ percent of the energy is used by IT equipment and the remainder for non-IT functions or waste energy. Checking performance against the industry average can indicate whether inefficiencies exist at the facility level. (data sourced from Uptime Institute)

While trends in chip manufacturing have led to improved design and configuration for maximizing performance, another measure of design performance is power densities. This measure looks at energy delivered per square foot in a facility. Power densities have risen significantly over the last ten years. According to the 10<sup>th</sup> Annual Uptime Institute's Global Survey power densities were 4-5 kW and today they are closer to 12 kW and heading rapidly toward 50 kW. (See Uptime Institute)

Along with trends in chip manufacturing, proper cooling can double the life of a semiconductor. The design and configuration of equipment in a data center are as important as the performance of the equipment itself. Considering that downtime costs average approximately \$5,600 per minute (according to Gartner as cited by Jetcool), if a data center design does not

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## ABOUT DCAG-MD

Bringing verifiable information sources to counties around the state for community groups, local governments and other interested parties.

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## UPDATES

Watch this space for future updates on reported topics

## SOURCES

AWS, What is Compute? Cloud Computing Concepts Hub

Barclays Impact Series No. 13 AI revolution: Meeting massive AI infrastructure demands

Blackstone, Cutting Through the Noise: The Long-term Case for Data Centers, May 2025

Jetcool, How Power Density is Changing in Data Centers and What it Means for Liquid Cooling, March 2024

Uptime Institute, Research and Reports

As of: November 5, 2025

account for power density increases, it will reach a point when it no longer supports the IT equipment. Given the fact that most internal data center designs have a lifespan of ten years; significant downtimes are unsustainable. (data sourced from Jetcool)

So given these performance improvements, shouldn't there be a positive outlook on the future of our resources? Not so fast.

Here is the rub—compute has been getting more efficient both in cost and energy such that it has been doubling every 2-3 years for several decades. What exactly is compute? It is a generic term used to reference processing power, memory, networking, storage and other resources required for the computational success of any program as explained by AWS. The number of tasks completed per unit of compute has doubled. As capabilities improve for AI and costs come down, usage is exploding. New platforms, including those focused on consumer use, have grown exponentially with massive investment under girding these trends (data sourced from Blackstone).

*This leaves us coping with Jevon's Paradox. While most governments and industries expect to see efficiency gains reduce resource consumption, under Jevon's Paradox when demand is highly price elastic, the lower cost will drive that demand higher, thus increasing resource consumption.*

With use of AI platforms up 4x year over year and Open AI having well over 500,000 million users, start-ups are entering this market at a great neck pace, and revenues are growing rapidly. How long these trends last is anybody's guess, but what can be said based on the above is that current efficiency gains in the aggregate will not save resources until this market stabilizes. However, individual facilities could achieve performance levels that might indeed save local resources so a voluntary or mandated benchmarking and reporting system could help state and local governments determine if resource conservation is possible in their jurisdictions. (data sourced from Barclays)