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INTELLIGENCE UPDATE

The growing PUE advantage of larger data centers

Jacqueline Davis 6 Aug 2026

The Uptime Institute Global Data Center Survey 2026 revealed an industry-wide annual average PUE of 1.52. This long-running benchmark of facility efficiency (tracked since 2007) has decreased slowly and predictably in recent years, owing to the large, diverse and consistent sample of operators surveyed. New (and ever larger) facilities with industry-leading power and cooling systems routinely report PUEs at 1.3 or lower. These facilities are being built at a rapid pace — yet their pull on the headline average remains diluted by the many older facilities still in operation.

An alternative calculation of average PUE, in which larger facilities are given proportional weight, produces a significantly lower PUE of 1.36. This outcome is intuitive, as it captures the influence of energy-efficient designs that are increasingly commonplace and well publicized. Additionally, this capacity-weighted PUE has improved at a faster rate than the per-facility PUE figure since at least 2024.

This alternative view of the industry's PUE better reflects the energy overhead that is typical of an average unit of IT power across the industry, as well as the pace of improvement delivered by new data center designs. PUE is becoming a compliance metric in current and pending legislation, with some regions set to mandate lower PUEs in the future. Today's capacity-weighted average PUE can make proposed facility efficiency targets seem less daunting — if data center builders maintain high standards of efficiency in design and operations.

Legacy data centers persevere

Uptime's global survey collects several key data center attributes from respondents, including facility age, size (as commissioned IT capacity), rack density and PUE, among other metrics (see *Uptime Institute Global Data Center Survey 2026*). This report will examine facility age and PUE trends by IT capacity; subsequent reports will examine rack density data.

Averages calculated from a large sample of operator respondents (more than 800 this year) tend to reveal gradual year-on-year changes rather than sudden shifts. This trend reflects both the stability of the respondent pool itself and the moderating influence of a large number of legacy facilities still in operation beyond their original 10- to 15-year lifespan. As long as data center construction capacity remains constrained, many of these facilities will persevere. They often support conventional enterprise workloads, sometimes on legacy IT hardware that is not trivial to replace — and they almost universally have smaller IT capacities and lower rack

densities.

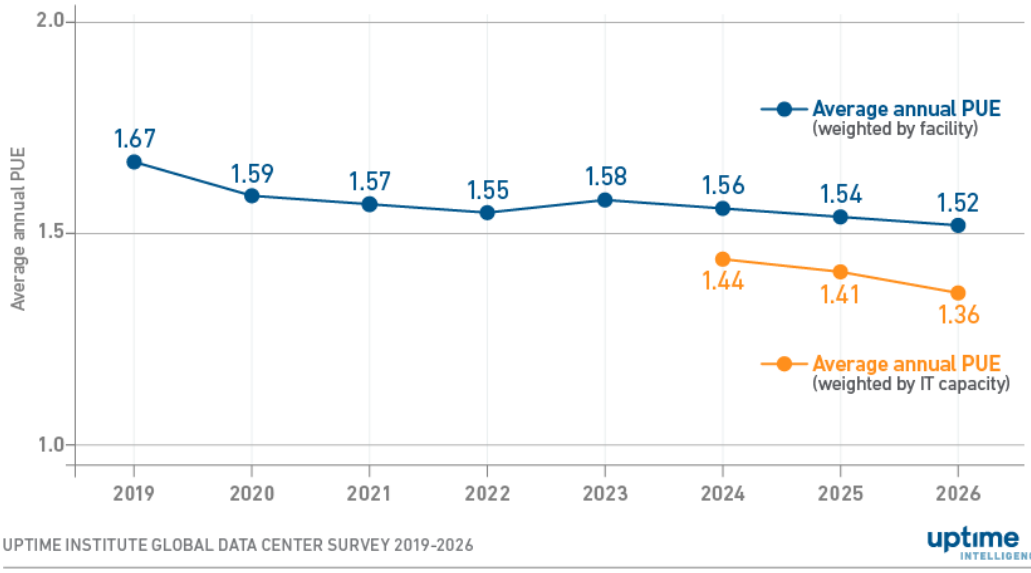
In 2026, over a quarter (27%) of operator respondents reported working primarily at a data center more than 15 years old (since commissioning), which is consistent with data collected since 2024. In the current age of gigawatt-scale facilities, these data centers are comparatively small: their average IT capacity is 38 MW. Mean facility age in the survey is 11.9 years.

Industry press and vendor marketing naturally focus on new and upcoming facilities. In contrast, survey data that includes facilities of any age provides a more complete view of the typical data center environment and the challenges operators face to meet end-user requirements.

Calculating capacity's contribution

The survey's annual headline PUE figure (1.52 in 2026) is calculated relative to the number of respondent facilities. This year, Uptime produced a supplemental calculation weighted instead by commissioned IT capacity. This provides an alternative estimate of the energy overhead of a typical unit of IT power — one in which larger facilities exert a proportional influence on the average. The 2026 PUE data, weighted per MW, averages to 1.36 (see **Figure 1**).

Figure 1 PUE is decreasing faster on a per-capacity basis



The headline PUE figure has inched toward 1.5 for years, a round number that has very little grounding in data center physics or economics. Instead, it reflects that, among hundreds of operating data centers across virtually all regions and climates in the data set, many were commissioned 15 or more years ago when average PUEs were around 2.0 or higher.

Capacity-weighted averages are lower for both PUE and facility age. This suggests that new facilities are delivering efficiency gains at a pace and scale sufficient to counterbalance the persistence of legacy data centers, when the comparison accounts for their respective shares of the sample's IT infrastructure. Recent data also shows that capacity-weighted PUE has been decreasing faster than the per-facility average PUE since at least 2024 (down from 1.44). This view of the sample suggests efficiency's true "middle" is close to the 1.2-1.3 PUE range that is becoming commonplace in new data center builds — and getting closer.

Previous research has upheld that larger data centers tend to be both newer and more efficient.

The capacity-weighted average facility age (average age of a typical unit of IT capacity) is now 9.5 years, which is significantly lower than the per-facility average age of nearly 12 years. This figure's decrease from 10.2 years in 2024 does not appear large at first glance (see *How much capacity is in aging data centers?*). However, it represents enough new data center capacity in the survey sample (and comparatively few decommissioned older facilities) to offset 2 years of aging in the remainder of the sample.

Combined, these capacity-weighted industry benchmarks show the efficiency gains realized by facilities constructed with new designs, optimized around efficient cooling and leveraging economies of scale. Target PUE values are already embedded in current legislation in some regions — and this regulatory approach is likely to become more common in the next few years. As data center capacity expands and consumes more energy, operators face growing pressure to demonstrate they use this energy efficiently. As a result, PUE targets are likely to become more stringent.

Although it may seem encouraging that the average unit of IT capacity is already at 1.36 PUE, broad applicability of a single PUE standard to current and future facilities warrants caution. Sustainable resource stewardship needs to consider metrics other than facility energy consumption.

Operators can also select and optimize cooling systems that are water-efficient and are suited to the local area's water availability (or scarcity). For example, modern adiabatic spray or trickle systems can produce better PUE in regions with abundant water (see *Water is local: generalities do not apply*). A single PUE standard (among other metrics) can guide adoption of best practices — but it tends to favor larger facilities.

Smaller data centers may still be necessary for some workloads, such as those requiring compliance with strict data governance or proximity to users for low latency. Effective and enforceable PUE standards should consider not only the cooling types that are feasible in a given climate, but also a reasonable lower limit on capacity to avoid placing an undue burden on smaller facilities that consume only a fraction of the energy used by larger data centers.

The Uptime Intelligence View

The industry-wide average PUE figure continues its slow and predictable march toward an apparent asymptote at 1.5, even as large new data centers are built and publicized with a significantly improved PUE. This occurs amidst warnings that PUE requirements will increasingly become embedded in legislation — raising concerns about the gap between current typical efficiency levels and future expectations.

Larger size (greater IT capacity) is correlated with higher facility efficiency and an average PUE weighted by IT capacity offers an alternate model by which "typical" efficiency can be estimated. This capacity-weighted average shows that a typical unit of IT capacity is, in fact, more efficient than the average facility — and is improving efficiency at a faster rate.

Other related reports published by Uptime Institute include:
Uptime Institute Global Data Center Survey 2026
How much capacity is in aging data centers?
Water is local: generalities do not apply

ABOUT THE AUTHOR

Jacqueline Davis

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Jacqueline is a Research Analyst at Uptime Institute covering global trends and technologies that underpin critical digital infrastructure. Her background includes environmental monitoring and data interpretation in the environmental compliance and health and safety fields.

jdavis@uptimeinstitute.com

About Uptime Institute

Uptime Institute is the Global Digital Infrastructure Authority. With over 4,000 awards issued in over 122 countries around the globe, and over 1,100 currently active projects in 80+ countries, Uptime has helped tens of thousands of companies optimize critical IT assets while managing costs, resources, and efficiency. For over 30 years, the company has established industry-leading benchmarks for data center performance, resilience, sustainability, and efficiency, which provide customers assurance that their digital infrastructure can perform across a wide array of operating conditions at a level consistent with their individual business needs. Uptime's Tier Standard is the IT industry's most trusted and adopted global standard for the design, construction, and operation of data centers.

Offerings include the organization's Tier Standard and Certifications, Management & Operations reviews and assessments including SCIRA-FSI financial sector risk assessment, the Sustainability Assessment, and a broad range of additional risk management, performance, availability, and related offerings. Uptime Education training programs have been successfully completed by over 100,000 data center professionals, such as the much-valued ATD (Accredited Tier Designer) and AOS (Accredited Operations Specialist). The Uptime Education curriculum has been expanded by the acquisition of CNet Training Ltd. In 2023.

Uptime Institute is headquartered in New York, NY, with offices in London, Sao Paulo, Dubai, Riyadh, and Singapore, and full-time Uptime professionals based in over thirty-four countries around the world.

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