INTELLIGENCE UPDATE

How much capacity is in aging data centers?


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3 Oct 2024

Massive demand for capacity continues to drive the construction of many-megawatt data center facilities around the world, in anticipation of a steep growth in IT workloads turbo-boosted by generative AI models.

At the same time, many organizations are relying on older facilities that are approaching or exceeding their 10-to-15-year design lifespan. About half of the data center facilities are more than 10 years old, according to findings from the Uptime Institute Global Data Center Survey 2024.

This matters because if age and size are not accounted for, it will understate the developing trends in key areas such as energy performance and power density. Newer facilities tend to not only be more energy efficient but also house typically higher-density IT cabinets. All the while, older facilities persist in large numbers, which mutes progress in headline numbers for the industry average age of capacity, PUE and density.

In 2024, Uptime Institute's annual survey collected a more detailed account of respondents' data center size in designed IT load (see *Uptime Institute Global Data Center Survey 2024*). Although our sample is statistically not representative of the global population, results indicate that a majority of data center capacity is now in facilities that were commissioned in or since 2014.

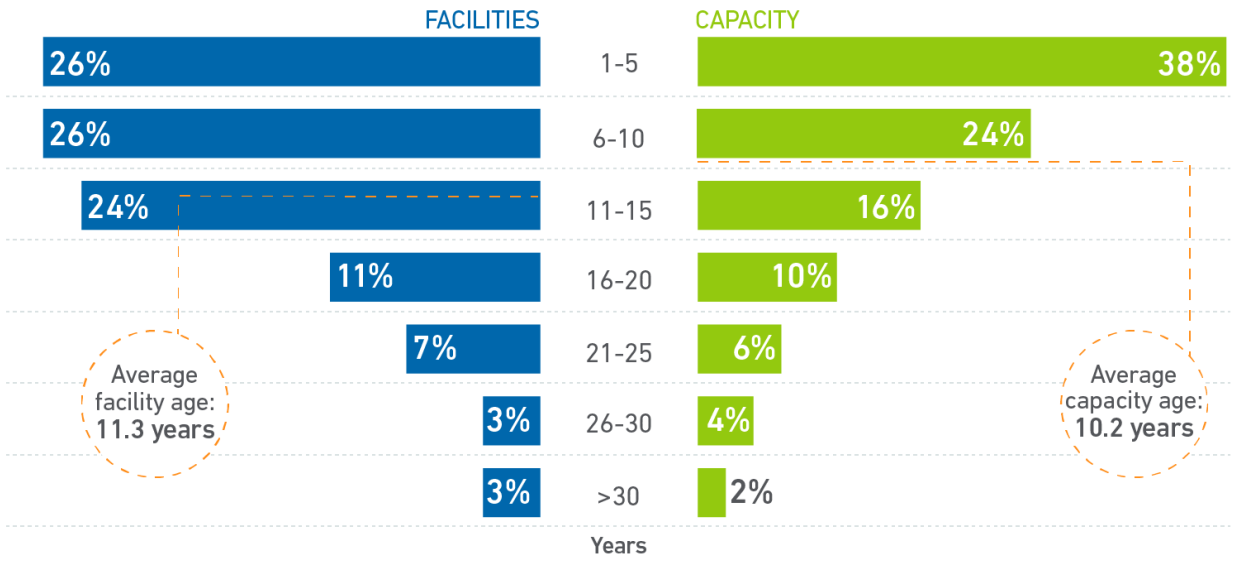
While capacity-weighted calculations will help better understand industry trends in future Uptime Intelligence reports, it does not invalidate prior findings. The average data center capacity in the survey works out to be 10.2 years old, a comparatively small difference from the average facility age of 11.3 years.

Average facility versus average megawatt

The mean age of a data center (of any size) in our survey is 11.3 years. Within a few percentage points, half have been operating for 10 years or less, and the remainder for more than 10 years (see **Figure 1**).

Individual data centers have considerable differences between them, and one of the most critical is their size. With this weighting factor, the average moves — but not by much. The "average megawatt" is 10.2 years old. Whereas older data centers (10-plus years) represent 48% of the survey sample, they contain 38% of the total IT capacity — still a large minority.

Figure 1. Average facility age compared with average capacity age



Number of respondents (n=772)

UPTIME INSTITUTE GLOBAL SURVEY OF IT AND DATA CENTER MANAGERS 2024

Interestingly, a more dramatic shift occurs within the population of data centers that have been operating for less than 10 years — well within the typical design lifespan. By facility count alone, there is an even split between the data centers that are 1 to 5 years old and those that have been in operation for 6 to10 years. But when measuring in megawatts, the newest data centers hold significantly more capacity (38%) than those with 6 to 10 years of service (24%).

This is intuitive; in the past five years, some data center projects have reached unprecedented sizes. Very recent builds are overshadowing the capacity of data centers that are only slightly older, even though the designs are not dramatically different. However, the weighted figures above suggest that even this massive build-out has not yet overcome the moderating influence of much older, potentially less efficient facilities.

Very large data centers are still new

Uptime Intelligence is tracking the construction of multiple data center campuses that are expected to reach about a gigawatt of capacity each (see *"Hyperscale colocation": the emergence of gigawatt campuses*). The gigawatt campus emerged only in the past few years. Data centers at this scale were unheard of 10 years ago when the average facility in the survey sample came online.

Even though these campuses are often an order of magnitude bigger than those of the past, their total share of the world's data hall space is still quite small. Gigawatt campuses are still too

new and too few to meaningfully shift the age profile of data centers. Industry expectations for the ongoing build-out of generative AI capacity loom large — but in 2024, the installed base of more conventional IT is still many times larger.

Further, the rush to build new capacity has not spurred a corresponding drop-off of older, smaller facilities. Customer appetite justifies using all viable data center space as demand continues to outpace construction. The capital savings from the reuse of existing infrastructure (such as building shell, power, networks and cooling) can often justify the higher energy expenses where efficient cooling upgrades are impractical. In much of North America, lower electricity prices cushion the cost impact of any energy inefficiencies, which is likely a factor behind this region's commanding share of facilities older than 15 years. At the same time, inefficient facilities waste utility substation capacity and frustrate corporate emission reduction pledges.

Outlook

The growth in demand for data center capacity shows no signs of slowing down in the years ahead. In addition to the new demands of generative AI applications, mainstream IT workloads continue to grow as well. New data center sites, on the scale of hundreds of megawatts each, will continue to proliferate to deliver digital products and services. This will make the age distribution of the installed data center capacity younger on average, as long as construction can keep up with demand.

However, many older data centers are likely to live on as well. The cost savings from upgrading or refurbishing existing facilities are compelling, and numerous operators are looking to keep pace with IT hardware evolution in their legacy sites for the coming years. All the while, the modernization of legacy facilities may not be appropriate for all applications — especially where the facility's power envelope cannot be enlarged either due to limits in the utility connection or to the impracticality of upgrading the on-site power infrastructure. However, Uptime Intelligence's survey data also suggests that there continues to be a large number of IT racks below 6 kW. At these densities, most legacy facilities will remain valuable for several years to come before they reach their end of useful life.

Further changes in the data center regulatory landscape could undercut the business case for older data centers. Tightened energy efficiency requirements may someday make legacy data facilities uncompetitive in cost or simply noncompliant — overcoming a sort of age inertia that the market could not move even by throwing gigawatts at it. However, such a scenario will also take years to play out, as is the case with the EU's Energy Efficiency Directive.

ABOUT THE AUTHOR

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About Uptime Institute

Uptime Institute is the Global Digital Infrastructure Authority. Its Tier Standard is the IT industry's most trusted and adopted global standard for the proper design, construction, and operation of data centers – the backbone of the digital economy. For over 25 years, the company has served as the standard for data center reliability, sustainability, and efficiency, providing customers assurance that their digital infrastructure can perform at a level that is consistent with their business needs across a wide array of operating conditions.

With its data center Tier Standard & Certifications, Management & Operations reviews, broad range of related risk and performance assessments, and accredited educational curriculum completed by over 10,000 data center professionals, Uptime Institute has helped thousands of companies, in over 100 countries to optimize critical IT assets while managing costs, resources, and efficiency.