

7 NORTH AMERICAN DATA CENTRE MARKET OVERVIEW

DC Byte, 15 May 2023

GLOBAL DATA CENTRE MARKET

The post-pandemic surge in global data centre activity in 2021 extended into 2022. The global colocation data centre market is expected to experience a robust growth trajectory, with revenue projected to increase at a compound annual growth rate ("CAGR") of 11% between 2020 and 2026F. This growth is anticipated to be driven by a surge in demand from a variety of sources including enterprises, public cloud service operators, and IT firms. Enterprises are expected to require additional leased data centre space due to the phenomenon known as data gravity. As the data mass grows, the greater the gravitational pull it exerts, pulling applications and services closer to the data. This results in a compounding effect as the movement of the data will incur an exponentially high cost and time as the scale of the data grows.

Established data centre markets are facing challenges for data centre construction due to government policies, power constraints and land availability. These have resulted in a shift in growth of data centre supply to emerging data centre markets.

In addition, supply chain challenges have led to delayed construction timelines, resulting in a significant portion of the supply pipeline to be pre-leased across all regions. Most of the vacant new supply will only be delivered in late 2023 or 2024, resulting in lower live absorption rates seen in 2023 as compared to 2022. Supply chain delays are likely to continue in 2023, with issues such as limited natural resources and labour shortage contributing to increasing operating and acquisition costs.

Rising gas prices and interest rates as well as technology sector contractions in the first half of 2022 also saw inflationary and price pressures affecting the global data centre market. However, commodity prices have since levelled out due to supply chain improvements and government intervention. Data centre operators and users are adjusting to longer timelines while manufacturers source for alternative supplies, indicating a return to normalcy.

Certain data centre markets such as Singapore have made preliminary strides, as the government has begun lifting its moratorium on new data centre developments and introducing sustainable development protocols. The pilot scheme was launched in 2022 to evaluate development applications for up to 60 megawatts ("MW") of data centre capacity. While the applications are still under review, these initiatives are expected to drive growth and attract investment in the Southeast Asia region's data centre market.

Regional Data Centre Growth

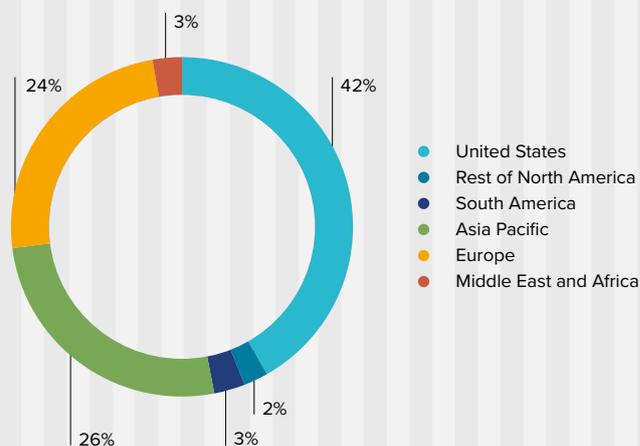
The Asia Pacific region has seen rapid growth in the data centre industry, driven by the region's burgeoning population, economic growth, and demand for digital services via cloud, IT services and social media platforms. The second largest region after the United States, it accounted for about 26% of the global live IT capacity, growing by 1.8% from 6,431MW in 2021 to 6,549MW in 2022.

Europe accounted for about 24% of the global live IT capacity and was the third largest region. Cloud computing continues to drive demand in established European data centre markets, while growth in secondary markets in the region was underpinned by the hyperscale data centre operators' decentralised approach to power availability. However, Microsoft, AWS and Google's earnings reports at the end of 2022 reflected a slowdown in growth as consumers adopted a more cautious approach towards spending on cloud applications and infrastructure.

The United States took up the world's largest share of live IT capacity at 42%, underpinned by the region's mature technology market. Core markets in the United States faced increasing pressure due to limited power and land resources. Northern Virginia, the world's largest data centre market, experienced a multi-year pause on development in certain submarkets as utility companies rushed to deliver a significant development pipeline.

FIGURE 1: GLOBAL DATA CENTRE DISTRIBUTION (BY REGION)

Breakdown of Data Centre Live IT Capacity by Region as at 4Q2022



Source: DC Byte

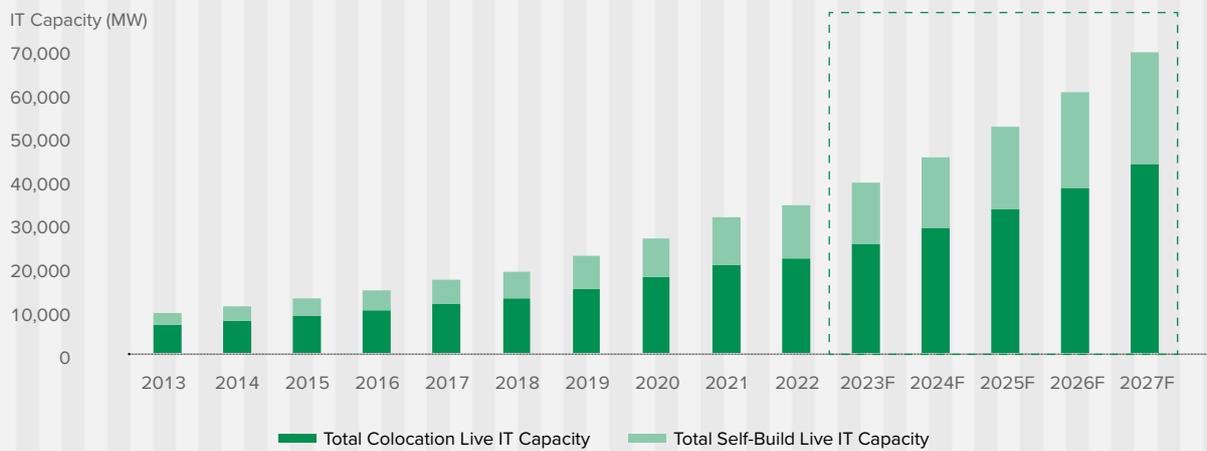
Self-build and Colocation Data Centres

Self-build data centres have seen unprecedented growth in recent years and comprised about 35.5% of the global live IT capacity in 2022. Over the past five years, self-build data centres recorded a five-year CAGR of 16.7% from 2017 to 2022. This growth trajectory is expected to continue, driven by the rising demand for data storage and processing from hyperscale and cloud service providers, and the need for greater control over IT infrastructure, data security and cost concerns.

Colocation data centres have also experienced a significant increase in use by businesses in recent years and comprised a larger share of the global live IT capacity at 64.5% in 2022, recording a five-year CAGR of 14.2% from 2017 to 2022. Colocation data centres remain part of the core strategy for enterprises requiring a scalable and flexible IT infrastructure option to meet processing needs by leveraging on the expertise of third-party providers. Cloud service providers have also traditionally looked to wholesale colocation to complement their self-build strategies, especially owing to the long lead times of new developments.

FIGURE 2: COMPOSITION OF COLOCATION AND SELF-BUILD DATA CENTRES

Worldwide Colocation and Self-Build Data Centre Live IT Capacity



Source: DC Byte

Key Data Centre Markets in North America

In 2022, the North American data centre market (encompassing the United States and Canada) had a total IT capacity of over 25,000MW, including IT capacity that was live, under construction, committed and in early development stages. Over half of the IT capacity was live while 13.8% was under construction. The committed and early development stage IT capacity made up 35% of market supply.

The North American market has experienced steady growth in recent years, averaging 12.3% year-on-year over the past five years (2017 to 2022), underpinned by the rising demand from cloud service providers for self-build and wholesale colocation facilities and a strong social media industry as well as enterprises undergoing digital transformation and moving from on-premises data storage/computing to colocation or public cloud data centres. Close to half of the new IT supply that came live in recent years can be attributed to self-build cloud service providers like OVHcloud, Google, Microsoft, Meta, AWS and Apple.

Wholesale colocation operators top the North American data centre market share in terms of live IT load at 36%, followed by self-build public cloud at 27%, retail colocation at 19% and self-build social media platforms at 11%. The market share of retail colocation is expected to shrink, replaced by wholesale colocation, cloud and hyperscale data centres.

There is growing interest in secondary markets as investors and operators turn their focus to untapped submarkets with more readily available land and power resources, such as data centre markets in Portland, Phoenix, Columbus, and Canada. However, established markets such as Northern Virginia, Silicon Valley, Chicago, Dallas, and Atlanta still have significant momentum for new builds.

The rapid growth of cloud computing is expected to continue in the age of digital transformation, as organisations leverage cloud adoptions to reduce capital expenditure and to transition towards a hybrid work environment. The top cloud service providers in the North America market, in terms of live IT load, are AWS, Meta, Microsoft and Google. Self-build cloud growth averaged 16% per annum from 2017 to 2022.

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The proliferation of Internet of Things among consumers and businesses are driving global data centre growth. Big data and business analytics are pushing the need for data processing and storage at ever growing volumes. Meanwhile, the population’s need to remain connected via its ecosystem of devices generates significant data. In addition, technological advancements such as artificial intelligence (“AI”) and machine learning are being implemented across different uses, including healthcare, driving,

finance and retail. International Data Corporation (IDC) projects the AI market to grow by 18.6% from 2022 to 2026F to reach US\$900 billion.

These top 16 data centre markets in North America (as shown in Figure 4) accounted for over 55% of the region’s total live supply of data centres and totalled 14,721MW of IT capacity (live, under construction, committed and early development stage).

FIGURE 3: SUPPLY, TAKE-UP AND CONTRACTED CAPACITY OF DATA CENTRE IN NORTH AMERICA

North American Colocation Data Centre Live Supply, Take-up and Contracted Capacity

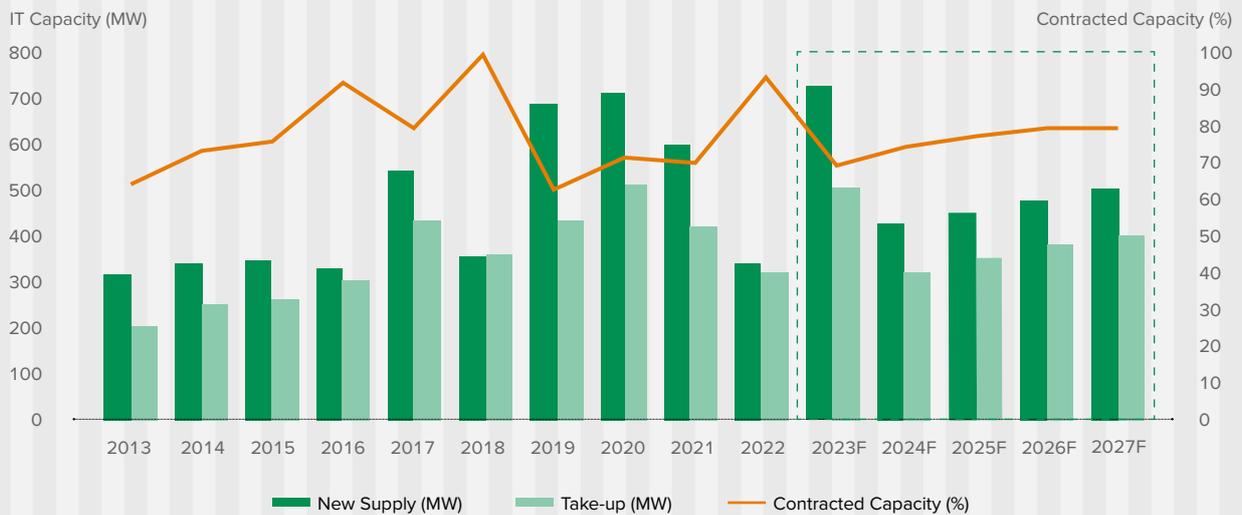


FIGURE 4: TOP 16 KEY MARKETS IN NORTH AMERICA

Rank	Top Key North American Data Centre Markets
1	Northern Virginia
2	Dallas
3	Silicon Valley
4	New York/New Jersey
5	Chicago
6	Phoenix
7	Atlanta
8	Toronto (Canada)
9	Montreal (Canada)
10	Portland
11	Southern California
12	Boston
13	Seattle
14	Houston
15	Philadelphia
16	Denver

FIGURE 5: TOP 15 SECONDARY MARKETS IN NORTH AMERICA

Rank	Top Secondary North American Data Centre Markets
1	Omaha
2	Salt Lake City
3	Las Vegas
4	San Antonio
5	Nashville
6	Sacramento
7	Charlotte
8	Kansas City
9	Austin
10	Cincinnati
11	Miami
12	Minnesota
13	Pittsburgh
14	Indianapolis
15	Cleveland

Northern Virginia

Total Live IT Capacity*	Total Under Construction Capacity*	Vacancy Rate**	Number of Data Centres
2,707	865	7%	192

* Total includes both colocation and self-build data centres.
 ** Applies to the live colocation IT power and does not include pre-sold power that is under construction, committed or in the early development stage.

Northern Virginia’s strategic location and proximity to the seat of federal government, Washington DC, with a dense fibre network and reliable power supply contribute to its position as the top data centre market in North America.

In addition, its attractive business environment ensures a steady pool of skilled labour and data centre demand from the state, financial institutions, and technology companies.

The Northern Virginia data centre market totalled 5,254MW in IT capacity (including colocation and self-build facilities that are live, under construction, committed and in early development stage) as at 4Q2022. Over 51.5% (or 2,707MW) of the IT capacity was currently live, 16.5% (865MW) of the IT capacity are under construction, 29.5% (or 1,550MW) are committed, and 2.5% (or 132MW) are in the early development stage.

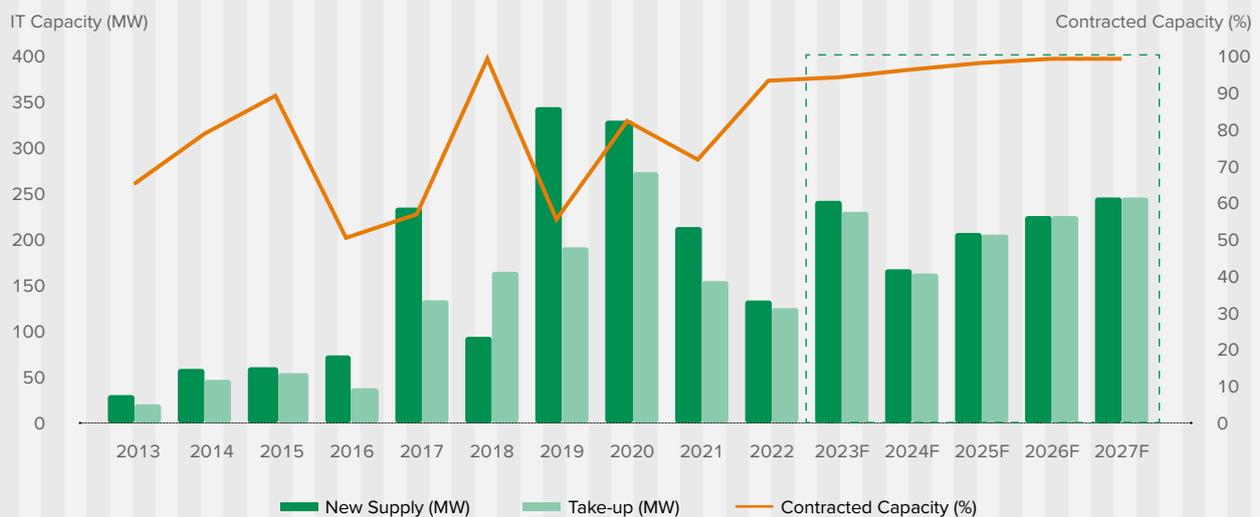
The colocation market segment had the largest market share at 83.6%, driven by the growth in the colocation wholesale market. Meanwhile, the self-build market segment is driven by the growth in public cloud.

2022 recorded a yearly take-up of 126.5MW of IT capacity in colocation data centres, with the contracted capacity rate peaking at 94.1%. The total colocation live supply faced tremendous growth by over 100% over five years (from 2017 to 2022) and a CAGR of 19% over the same period. The key growth momentum in Northern Virginia’s colocation data centre demand is observed from the public cloud segment seeking capacity in colocation facilities, as well as the social media firms.

There are currently 865MW of data centre capacity (or 16.5% of the total IT capacity) under construction, but power constraints from a major energy supplier to distribute power to substations are causing delays in completions for some new facilities through 2026. Loudon County, home to many of the existing data centres, is the most affected. Despite this, the demand for data centre space in the region is not expected to slow as the focus shifts to surrounding markets including Prince William County, Manassas, Sterling, Leesburg, Maryland and Culpeper.

FIGURE 6: NORTHERN VIRGINIA DATA CENTRE SUPPLY, TAKE-UP AND CONTRACTED CAPACITY

Northern Virginia Colocation Data Centre Live Supply, Take-up and Contracted Capacity



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Atlanta

Total Live IT Capacity*	Total Under Construction Capacity*	Vacancy Rate**	Number of Data Centres
365	218	28%	50

* Total includes both colocation and self-build data centres.
 ** Applies to the live colocation IT power and does not include pre-sold power that is under construction, committed or in the early development stage.

The Atlanta data centre market ranked the seventh largest in North America and totalled 1,304MW in IT capacity (including colocation and self-build facilities that are live, under construction, committed and in early development stage) as at 4Q2022. Only a small portion of the IT capacity was currently live, at 28.0% (or 365MW), while the majority of the total supply was in the early development stage at 42.5% (or 554MW). 16.7% of the total supply (218MW) was under construction and 12.8% (or 167MW) was committed supply.

The colocation market segment makes up majority of Atlanta’s market share at 70% while the self-build market segment makes up 30%. There has been a rise in interest from hyperscale data centre operators, including Google’s 70MW data centre in Douglas County and Meta’s data centre in Stanton Springs estimated at 24MW.

2022 saw a yearly take-up of 18.55 MW of IT capacity in colocation data centres in Atlanta, with the contracted capacity rate at 76.1%. Meanwhile, the total colocation live supply grew by over 62.4% in five years (from 2017 to 2022) and a CAGR of 10% over the same period. Demand for colocation data centre space has more than doubled as compared to five years ago.

The Atlanta data centre market growth is driven by the expanding presence from technology companies, the power constraints in Northern Virginia, and business-friendly legislations including tax incentives.

FIGURE 7: ATLANTA DATA CENTRE SUPPLY, TAKE-UP AND CONTRACTED CAPACITY

Atlanta Colocation Data Centre Live Supply, Take-up and Contracted Capacity



Southern California

Total Live IT Capacity*	Total Under Construction Capacity*	Vacancy Rate**	Number of Data Centres
168	13	19%	64

* Total includes both colocation and self-build data centres.
 ** Applies to the live colocation IT power and does not include pre-sold power that is under construction, committed or in the early development stage.

The Southern California ("SoCal") data centre market totalled 235MW in IT capacity (including colocation and self-build facilities that were live, under construction, committed and in early development stage) as at 4Q2022. Over 71.6% (or 168MW) of the IT capacity is currently live, 5.6% (13 MW) under construction, 21.7% (or 51MW) committed, and 1.1% (or 3MW) in the early development stage.

The colocation market segment made up majority of SoCal market share at 94.1% while the self-build market segment consisted of small legacy facilities and made up only 5.9% of SoCal's total IT capacity. US-owned colocation players like CoreSite, Equinix and Digital Realty had a foothold in SoCal market and captured the largest market share in terms of live colocation capacity.

The SoCal data centre market growth is fuelled by California's burgeoning population, the growing social media industry, and Silicon Valley's thriving technology sector. Demand has shifted from retail colocation to wholesale colocation, as cloud and hyperscale data centre providers such as Google, Meta, and AWS look for flexible scaling options. Self-build data centres by telecommunication operators also contributed to the total data centre supply, with Verizon's acquisition of a 11MW building in Los Angeles in 2022.

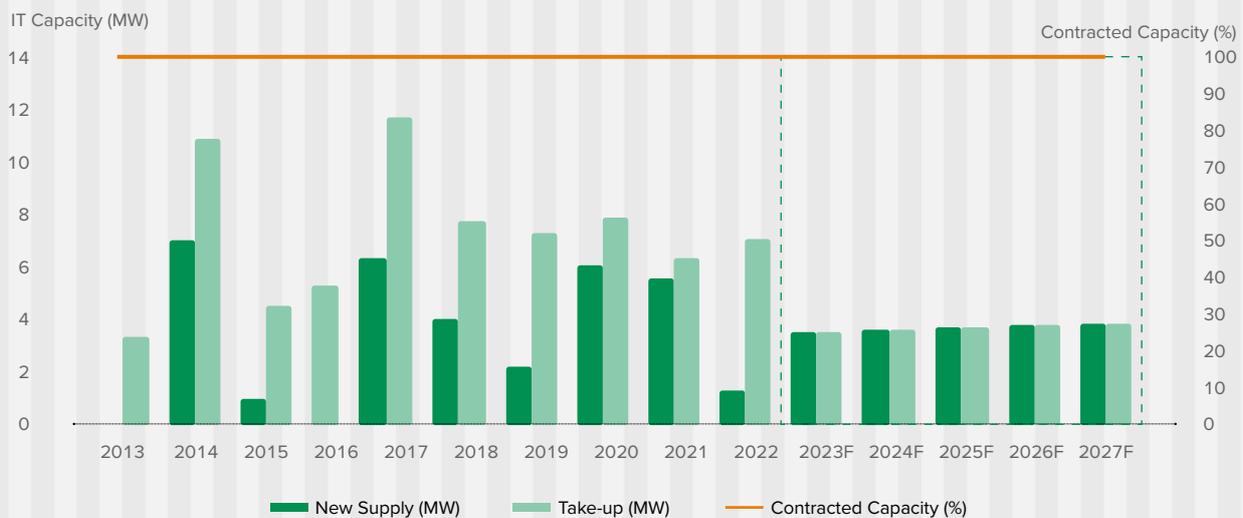
Los Angeles remains the top data centre submarket in SoCal, sustained by demand from an international customer base and its trans-Pacific connectivity as the landing point for subsea cable networks connecting to Asia Pacific. The Greater Los Angeles area sees the greatest number of upcoming data centre developments and existing data centres, followed by San Diego.

2022 recorded a yearly take-up of 7MW of IT capacity in colocation data centres in SoCal, with the contracted capacity rate at full capacity due to the demand exceeding the limited supply pipeline, which was caused by the lack of availability of suitable large-scale facilities for new data centre developments. The total colocation live supply grew by over 13.5% over five years (from 2017 to 2022) and saw a CAGR of 3% over the same period.

Owing to space constraints, developers are looking at expansion and retrofitting of existing facilities as well as building on smaller land plots. Several new data centre projects have been announced in the region. For example, Equinix is expanding its existing facility in El Segundo by adding a new 8MW data centre.

FIGURE 8: SOUTHERN CALIFORNIA DATA CENTRE SUPPLY, TAKE-UP AND CONTRACTED CAPACITY

Southern California Colocation Data Centre Live Supply, Take-up and Contracted Capacity



GLOSSARY

Colocation: facilities built for the leasing of space and IT power within from a dedicated third party provider of data centre space. Colocation includes retail, wholesale, and build-to-suit facilities. The facilities are typically tagged to the colocation operator, however in the case of the tenant (typically cloud service provider) leasing a shell for its own use, the facility is tagged to the shell owner.

Committed Capacity: the estimated IT power that has a high likelihood to be added to a market's overall supply; however, it does not refer to sold data centre space. This includes powered shell data centres.

Contracted Capacity: proportion of IT capacity that is taken up as compared to new supply during the period.

Early Development Stage Capacity: IT power that has been announced or speculated but has not secured all the required elements (government, land, power, etc.) for development.

New Supply: IT power that came live during the period.

Live IT Capacity: IT power that is currently live, fully fitted out with mechanical and electrical infrastructure.

Retail Colocation: third party data centre space that offer smaller customer deployments, typically under 500 kilowatts.

Self-build Operators: operators that run data centres that are build for their own use. Examples may include banks, telecoms companies or, more recently, hyperscale companies such as the US or Chinese tech giants.

Take-up: for self-build data centres, take-up represents where IT power is either Live or Under Construction, since at that point they are committed to the cost of the scheme. For Colocation data centres, take-up may occur for Live, Under Construction or Committed IT power.

Under Construction Capacity: the estimated IT power that is currently having the mechanical and electrical plant installed to support it.

Vacancy Rate: applies to the live colocation IT power and does not include pre-sold power that is under construction, committed or in the early development stage.

Wholesale Colocation: data centres are developed at scale for large customer deployments.