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**Global Research** 

### 2021 Year-End Data Center Outlook

Insight into the industry's top trends in the second half of 2021

## Welcome

The pandemic and the Omicron surge disrupted supply chains and delayed projects across the globe for the data center sector. Despite these headwinds, the sector continues to record strong fundamentals supported by robust recordlevel demand. We hope everyone reading this report continues to stay safe as markets across the globe evolve with the pandemic.

JLL's Data Center Solutions Team is hard at work to bring our market-leading data center service across all service lines across the world. You can look forward to hearing from us about exciting new initiatives in 2022.



**David Barnett** Director, Americas Research

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## **Executive summary**

- M&A activity hit a new record in 2021, following a record year in 2020. A whopping \$34.5 billion of activity was executed in 2020, only to be outdone by the \$47.1 billion recorded in 2021. Notably, KKR and Global Infrastructure Partners (GIP) acquired CyrusOne for \$15.0 billion and will close in the first half of 2022.
- The data center sector continues to take action on sustainability. Globally, corporate power purchase agreement (PPA) volumes achieved 31.1 GW in 2021, an immense increase from just 0.1 GW in 2010. Hyperscalers are the top investors in the U.S. for PPAs as they look to increase their renewable energy portfolio performance.
- The global construction pipeline reached a new record in 2021, led by robust activity in the United States, amid supply chain disruptions and project delays in bringing space to market. In the United States, the construction pipeline grew by 18.9 percent year-over-year, reaching 727 MW in 2021.
- Demand reached yet another record in 2021. In the United States, absorption reached a mammoth total of 885.7 MW across 14 domestic markets. The core markets in Europe met earlier projections and recorded 219.3 MW in absorption, an increase of 9 percent year-over-year.



# Top global trends

### 1.

### M&A activity ramped up in 2021 with billion-dollar deals

M&A activity hit a new record in 2021, following a record year in 2020. A whopping \$34.5 billion of activity was executed in 2020, only to be outdone by the \$47.1 billion recorded in 2021.<sup>1</sup> Digital Realty's acquisition of Interxion at \$8.4 billion was a key highlight of 2020, but 2021 ushered in new megadeals.

New heights were reached in 2021 with major announcements of acquisitions among the top data center operators. The first of the three major deals was Blackstone's acquisition of QTS Realty for \$10.0 billion, which closed in August 2021. The deal significantly expands Blackstone's portfolio as QTS operates in over 14 markets across the globe. KKR and Global Infrastructure Partners (GIP) acquired CyrusOne for \$15.0 billion and will close in the first half of 2022. This will facilitate further expansion in global markets. The large cell tower company American Tower Corporation purchased CoreSite for \$10.1 billion, which closed in December 2021. The move will allow American Tower to combine its existing facilities with CoreSite's data centers, spreading its edge data facilities' interconnection across the nation. These megadeals enable large players, with strong financing, to scale rapidly both domestically and abroad. Blackstone's deal with QTS Realty illustrates this theme as it will look to scale QTS Realty's existing portfolio of 7 million square feet. It is also active in APAC, where it invested \$150 million into the Chinese provider 21Vianet.

REIT performance as of December 31, 2021, reflects the reentry and reopening of economies. Residential and retail recorded the highest returns in 2021. The data center sector, now reflecting three constituents, recorded 25.5 percent in returns. There continues to be an influx of cash in the sector, with investors targeting increased tenant demand.

As noted in previous JLL reports, the pandemic has accelerated data center demand and sparked interest among investors. The combination of remote work, projected increases in IT spend and even esports has contributed to robust demand. The once-niche industry of esports grew into a billion-dollar industry for the first time in 2021, reaching an audience of 474 million viewers.<sup>2</sup> Further highlighting the gaming industry's growth, Microsoft announced its plan to acquire game developer Activision Blizzard for \$68.7 billion. This industry is one of many that will increase the need for data center space.



#### Total Returns by Sector, FTSE Nareit U.S. Real Estate Index Series, as of December 31, 2021

Sources: JLL Research, Nareit, FTSE

\*Nareit defines returns as a "stock's dividend income plus capital appreciation, before taxes and commissions."

<sup>1</sup> Synergy Research Group

<sup>2</sup> JLL Research, "2021 Esports Real Estate"

## 2.

### Demand and goals for sustainability make way as metrics evolve

The data center sector has historically been a heavy user of energy resources, but many data center operators have made significant inroads to reduce their data center carbon emissions and increase their energy efficiency. Not only do data center operators have their own green goals they have set out to achieve, but they are also meeting hard requirements by their customers, who are also scrutinizing their supply chain as a means to meet their own goals. Major multinational companies across industries now have their own annual sustainability reports to meet ESG plans.

#### Metrics continue to evolve to meet green goals

One of the most known metrics in the data center sector is power usage effectiveness (PUE). PUE is a ratio used for measuring the energy efficiency of a data center. It is calculated by the total facility energy divided by the energy delivered to the IT equipment. A PUE score of 1.0 would indicate 100% efficiency while a score of 2.5 or above would indicate a very low level of efficiency.

According to the Uptime Institute's 2021 survey of IT and data center managers, PUE greatly improved since 2007 but has remained stable over the past five years. The report cites that many changes in older data center facilities have achieved gains already. Unless it is a new facility, there is little incentive to make substantial renovations to achieve lower PUE.



There are also a myriad of other metrics that operators are using. While 70 percent of those surveyed in Uptime Institute's survey stated they track and report on PUE in annual reports, 82 percent track IT and data center power consumption. The same report shows that more improvements can be made for the sector when it comes to more direct green metrics, including the source of renewable energy and water usage. Only a third of those surveyed measure carbon emissions and only a quarter track electronic waste.

The latest green effort in the industry includes SpaceDC's MNL1 development in **Cainta, Philippines**. The Singapore-based provider is set to deliver its campus in 2022 and it will be the largest data center campus in the country. The location will be fully powered by wind and geothermal supply with a PUE of just 1.3.

Source: SpaceDC

#### Strategies to help guide sustainability

PPA (power purchase agreement), REC (Renewable Energy Certification) and CCA (community choice aggregation) are popular methods for data center operators to enhance their renewable energy portfolios and lower their carbon footprint. The Americas led the PPAs market by purchasing 20.3 GW in 2021. Globally, corporate PPA purchase volumes achieved 31.1 GW in 2021, an immense increase from just 0.1 GW in 2010. Since 2010, the PPA volume reached a cumulative 109.0 GW. The technology sector has been the biggest buyer for PPAs in the last five years, with over 12,000 MW PPAs purchased in 2020 and 5,900 MW PPAs purchased in the first half of 2021. Driven by the billion-dollar tech companies located in the U.S., the U.S. is home to the most substantial number of corporations that bought PPA volumes globally.

Hyperscalers are the top investors in the U.S. for PPA deals as they look to increase their renewable energy portfolio performance. This enormous PPA contract volume shows that large data center operators are taking the initiative to work their way to carbon natural commitments and set up an industry standard for the rest of the enterprise and colocation data center operators. As the biggest offsite PPAs buyer, one hyperscaler signed a 118 MW PPA onshore wind deal with Southern Power in 2021. Technology evolution, government incentives such as FITs (feed-in tariffs) and PTCs (production tax credits) are the main factors that will drive more affordable renewable energy.



#### Annual corporate PPA volumes by region

6

## 3.

### Labor shortages amid the pandemic

Data center development, from construction to business operations, cultivates direct and indirect job opportunities in local economies. Despite strong growth over the past decade, the industry faces some labor headwinds over the next five years that could limit the rapid data center expansion currently under way.

According to Uptime, 2.0 million full-time employees will be needed globally in 2021 and the number will be close or equivalent to 2.3 million by 2025. Forty-seven percent of respondents in its latest survey said they are having a difficult time finding qualified candidates, an increase from 38 percent in 2018. In addition, nearly a third are having trouble retaining staff, which is up from just 17 percent in 2018.<sup>3</sup>

While there will be an overall shortage of data center talent across the globe, the conditions will vary by market, even within regions. In the **United States**, uneven job growth is

#### Data center job growth 2020-2025 by MSA

Atlanta-Sandy Springs-Alpharetta, GA Seattle-Tacoma-Bellevue, WA Phoenix-Mesa-Chandler, AZ Washington-Arlington-Alexandria, DC-VA-MD-WV Chicago-Naperville-Elgin, IL-IN-WI New York-Newark-Jersey City, NY-NJ-PA San Jose-Sunnyvale-Santa Clara, CA Los Angeles-Long Beach-Anaheim, CA Dallas-Fort Worth-Arlington, TX Salt Lake City, UT projected by 2025, with Atlanta, Seattle and Phoenix leading domestic markets, according to EMSI data. Contributing factors to the evolving labor conditions include the COVID-19 pandemic and its public health considerations and supply chain disruption, as well as demographic trends, education attainment and business environment.

#### How to mitigate the projected labor shortage

- Partner with universities and even high schools to build a labor pipeline.
- Build training programs for new employees, no matter where they are. Include augmented realty (AR) as part of these programs so you can train new employees with real-time guidance without the need to visit a facility.



Sources: JLL Research, EMSI

\*Data reflects data processing, hosting and related services occupations

-8.4%

<sup>3</sup> Source: Uptime Institute, Global Data Center Survey 2021

# State of the industry

### Construction

### The global construction pipeline reached a new record in 2021, led by robust activity in the United States.

The construction pipeline is at its highest level on record, amid supply chain disruptions and project delays. In the **United States**, the construction pipeline grew by 18.9 percent year-over-year, reaching 727 MW in 2021. Northern California contributed to this significant increase, recording 205 MW under construction for the year. Despite supply chain delays, the Northern California market continues to see robust investment interest. The Northwest and Phoenix also made significant gains in the construction pipeline, with 112 MW and 86 MW, respectively. Northern Virginia recorded 200 MW under construction, consistent year-over-year as it remains the premiere data center market. In Canada, Toronto recorded consistent supply as well, at 52 MW under construction. Despite supply chain issues and project delays, the pipeline remains strong and should continue to be robust through 2022.

#### Under construction (MW) by U.S. market, YE 2021



Source: JLL Research

The construction pipeline in **Europe** decreased from 418.2 MW at year-end 2020 to 274.5 MW at year-end 2021. Frankfurt leads the way in construction, despite its pipeline decreasing to 82.5 MW. However, the market is still expanding, with over 95 MW in planned space. In London, nearly 110 MW of space was added to the market. There is currently 49.9 MW of space under construction with an additional 219.8 MW planned. While the prospective product is strong, land availability remains scarce.

#### Under construction (MW) by EMEA market, YE 2021



Source: JLL Research

In **India**, Mumbai leads the way in development with 188 MW under construction, mostly driven by large hyperscale activity. Hyperscaler expansions are driving construction activity in the rapidly growing market of Chennai as well, where 42 MW are under construction. India's planned activity is also significant as hyperscalers inked large land acquisitions in 2021. There are nearly 500 MW of planned data center space throughout India.





# State of the industry

#### Demand Demand reaches yet another record in 2021.

In the United States, absorption reached a mammoth total of 885.7 MW across 14 domestic markets, due to an impressive second half of 2021 led by large cloud and technology company expansions. This absorption figure is a 44.3 percent increase yearover-year. To fully appreciate this growth, it is necessary to reflect on 2020, which was a record year itself. Year-end 2020 recorded 614 MW absorbed among the same domestic markets, which was an increase of over 70 percent from 2019. The Northwest more than tripled its demand in 2021, due to technology company activity and increases in the average deal size. Expanding hyperscale footprints in Phoenix and Dallas also drove significant gains in absorption, reaching 142 MW and 85 MW, respectively. Social media and technology companies drove consistent demand in Northern Virginia and Chicago.



#### Absorption (MW) by U.S. market, YE 2021

Source: JLL Research

The United States was not alone in recording insatiable demand. The core markets in **Europe** met earlier projections and recorded 219.3 MW in absorption, an increase of 9 percent year-over-year. Preleasing activity has picked up across Frankfurt and Paris. In these two markets, total leasing activity for the year stands at 126 MW and 89 MW, respectively. Paris recorded 43 MW in absorption, more than doubling its amount from 2020, largely driven by cloud companies.

#### Absorption (MW) by EMEA market, YE 2021



Source: JLL Research

Demand picked up in the second half in key markets in **India**, including Mumbai. In fact, total absorption in the second half of the year increased by 49 percent from the first half in all of India. In Mumbai alone, demand increased by a strong 71 percent in the second half of 2021 and reached 62 MW for the year. This demand was led primarily by cloud companies and banking and financial service companies expanding their footprints.





### Looking forward in 2022

Available landsites in key data center markets have been limited due to competing industrial demand, power deployment constraints and supply chain issues for critical infrastructure. This has resulted in hyperscale users competing for data center space that can accommodate large-scale growth that was previously unheard of (i.e., 36+ MW requirements). There are now more 20+ MW requirements than there are 1 MW requirements.

Despite strong demand and healthy fundamentals, the data center sector is not immune from global supply chain issues. From semiconductors to construction times, the state of the supply chain ecosystem will continue to disrupt data center operations and development in 2022. Equipment and material shortages, combined with construction pricing and insatiable demand for land, will likely lead to an increase in rents. There are several strategies operators are implementing to handle these issues. We expect data center developers and operators to increase their supplier pool to mitigate shortcomings. Other operators have been more proactive, including Switch, which started to design its own equipment to avoid competition for limited supply from other larger operators. Recent data center consolidations will also help increase purchasing power for smaller operators and limit the impact of current supply chain challenges.

Despite record megadeals, strong absorption and increased investor appetite, there are some headwinds for the data center industry:

- Rental rates continue to compress, notably in key markets like Northern Virginia, where development pipelines remain at record levels. However, supply chain challenges may shift costs to users.
- Land is increasingly expensive as development pipelines expand. Northern Virginia and London have experienced record-level price increases throughout the pandemic.

### **Definitions:**

*Inventory* of multitenant data center square footage and power that's either leased (absorption), shell space planned for future development (planned), turnkey/conditioned available today (vacant) or currently being developed into turnkey/ conditioned (under construction) all under one roof.

**Planned** represents development that has been announced, in process of entitlements and design.

*Total vacant space* represents turnkey/fully conditioned data center space available for lease.

**Under construction** represents data center space that has broken ground and has entitlements.

Absorption (Net) represents the amount of new multitenant data center square footage and power leased less the total amount of square footage and power no longer occupied between the current and last measurement periods.

*Hyperscale data centers* represent data centers with the ability to scale out from hundreds to thousands of servers owned and operated by one entity.

*Multitenant data centers* comprise facilities where an owner sells space and power to multiple tenants.

North America market insights

# Atlanta

### Enterprise users keep Atlanta's absorption on pace

#### Market overview

#### Supply

Colocation operators continue to invest in the Atlanta market: DataBank announces a 4.5 MW expansion, H5 is expanding its downtown operations by 3 MW, Digital Realty Trust is to expand its operations at 250 Williams Street and Switch is under construction for its second data center building.

#### Demand

Absorption of colocation space remained at a steady pace for the second half of 2021 as enterprise users led demand, edging out the hyperscalers for the first time in several quarters. Technology, media and financial sectors were very active.

#### Market trends

Atlanta continues to attract large-scale data center users, operators and hyperscalers, while engaging utility providers to find solutions for cleaner, renewable energy.

#### Outlook

#### for **Users**

- · Leveraging competition to (re)negotiate favorable terms
- Quality colocation product options available
- Expect new power and space to deliver in 12-18 months

#### for Providers

- Competition for land is fierce, driving up costs to all-time highs
- Economic incentives are very competitive
- Look for continued growth in technology and cybersecurity sectors



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Supply	s.f.	MW
Total inventory:	2,360,000	297.0
Total vacant:	282,000	42.0
Under construction:	208,000	23.0
Planned:	930,000	121.0
Demand		MW
Net absorption:		12.1
Rental rates	Low	High
(All-in) sub-250 kW	\$130	\$170
250 kW-1 MW	\$95	\$125
1-5 MW	\$95	\$110
5 MW plus	-	-



H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U	lser-favora Neu	<b>ble</b> market tral market
		Provi	der-favora	<b>ble</b> market

## Austin & San Antonio

### San Antonio vies to become the cloud hub in Texas

#### Market overview

#### Supply

Construction of new data halls takes hold, although overall supply is constrained. Availability is limited to sub-150 kW pockets within existing data centers until construction is completed by various operators. Additional hyperscale providers have entered the San Antonio market and are actively seeking land to construct 50+ MW facilities.

#### Demand

Demand is increasing from cloud providers and hyperscalers. Additional hyperscale developers have entered the San Antonio market to evaluate potential new builds to facilitate the insatiable demand for multimegawatt cloud footprints by cloud providers and federal contracts. Enterprise users spurred a rebound of activity in Austin.

#### Market trends

While construction is underway in Austin, due to various outside factors, progress is slow and does not meet the current demand for these markets. San Antonio continues to grow its presence as the hyperscale cloud/ government hub in Texas with a limited number of providers but large-scale deployments and noteworthy tenants.

#### Outlook

- for **Users**
- · Lack of turn-key space requires longer term capacity planning
- Rental rates remain flat compared to 2020
- New construction is underway in Austin, but will not be complete for some time

#### for Providers

- Lack of turnkey space suggests an opportunity for a provider to build on spec
- Supply is tight and pricing is stable to increasing
- Scalable space is critical to meeting current and future hyperscale demand



Supply	s.t.	MW
Total inventory:	1,365,415	138.5
Total vacant:	29,950	1.8
Under construction:	40,000	4.5
Planned:	6,500	0.8
Demand		MW
Net absorption:		2.9
Rental rates	Low	High
(All-in) sub-250 kW	\$205	\$255
250 kW-1 MW	\$85	\$120
1-5 MW	\$85	\$120
5 MW plus	-	-



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

User-favorable market Neutral market Provider-favorable market

#### Authored by: Curt Holcomb

# Boston

### Power rates have spiked again, making the Northeast the most expensive data center market in the U.S.

Market overview	Supply	s.f.	MW
Supply			
Space is available in all markets, including Downtown, 128 and 495. Absorption is slow, but with no new	Total inventory:	1,200,000	160.0
space coming to market, providers are maintaining pricing.	Total vacant:	235,000	25.0
	Under construction:	0.0	0.0
Demand	Planned:	-	0.0
Supply remains modest at 0.5 - 1 MW per month, with net new absorption comprising mostly smaller users. Users with larger needs are going to other markets such as Northern Virginia.	Derived		. 4) . 4
	Demana		IMINN
Market trends			
The recent spike in energy prices and lack of green alternatives has set the market back considerably.	Net absorption:		3.0
Outlook	Rental rates	Low	High
for lisers			
Pricing remains competitive	(\$/kW+E) sub 250 kW	\$115	\$280
Facilities offer flexibility to provide a broad range of services	250 kW-1 MW	\$110	\$145
<ul> <li>Service providers are willing to offset some or all move in costs</li> </ul>	1-5 MW	\$95	\$130
• Service providers are witting to onset some of all movem costs	5 MW plus	\$85	\$115
for <b>Providers</b>			
Customer pool is small	A	( + - /  -) A / - )	
<ul> <li>Trying to capture customers from other markets</li> </ul>	Average power rate	(cents/kwn)	
Continued interest in 5G/edge use cases	20.0		
	16.0 15.0	145 145	17.0



#### Data Center leverage

2017

2016

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

2019

2018

User-favorable market Neutral market Provider-favorable market

2020

2021

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# Chicago

### Chicago demand keeps strong pace

#### Market overview

#### Supply

Available supply increased in the first half of 2021 with newly commissioned capacity delivered from T5, NTT/ RagingWire and Digital Crossroads. Additional projects were announced by Aligned Energy, EdgeConnex, Stream CH2 and Skybox. Land and power are becoming increasingly hard to come by, due to industrial demand focused on the same submarkets.

#### Demand

The second half of the year recorded a substantial increase in demand with major hyperscale leases being completed. Tax incentives and readily available product have led to a significant increase in demand. Inconsistent cloud demand is expected to continue into 2022 for those who can accommodate large requirements.

#### Market trends

With recent leasing activity by major hyperscale users in 2021, 2022 is likely to see several data centers hit capacity constraints. This is likely to cause new developer entrants into the market who target hyperscale requirements. Success will be tied to the developers that have capacity on hand and line of sight to future expansion.

#### Outlook

for Users

- Large leases will cause supply constraints
- Pricing will stabilize and potentially increase for smaller users
- · Supply chain delays may cause issues for specific projects

#### for **Providers**

- Limited available land causing a leap in prices
- Power constraints will become an issue
- More 20+ MW deals than 1 MW deals in the market



Supply	s.f.	MW
Total inventory:	5,639,039	631.6
Total vacant:	401,000	62.2
Under construction:	102,702	19.0
Planned:	40,000	6.0
Demand		MW
Net absorption:		71.5
Rental rates	Low	High
(\$/kW+E) sub 250 kW	\$105	\$150
250 kW-1 MW	\$95	\$105
1-5 MW	\$85	\$98
5 MW plus	\$72	\$85



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U	lser-favora Neu	i <b>ble</b> market tral market

Provider-favorable market

# Dallas/Fort Worth

### A record year of absorption demonstrates the cyclical nature of the market

#### Market overview

#### Supply

Hyperscalers and multi-megawatt users have left only small pockets of contiguous space and power available across a majority of operators. New construction continues as demand increases from 2020 and midyear 2021. Development-ready land supply is critically depleted due to the explosion of industrial development in the market during 2021.

#### Demand

DFW is finally beginning to feel major demand from large hyperscale users, causing developers to seek land for 40+ MW facilities. However, this is proving to be a challenge as the majority of the viable sites are being developed as industrial facilities. Enterprise wholesale and retail demand continues to remain steady, evidenced by numerous smaller kW deals.

#### Market trends

Land in DFW, particularly south of the metroplex, is scarce due to both speculative and investment industrial development. Technology and cloud companies are leasing 7+ MW of power capacity within multiple facilities. While pricing remains firm, there have been a handful of transactions sub-\$75 per kW to capture new sources of revenue.

#### Outlook

#### for **Users**

- Vacant supply has decreased, leaving fewer options in market
- Pricing has stabilized and will potentially increase if demand remains strong
- · Electricity rates are rising and will raise total cost of occupancy

#### for Providers

- The entrance of hyperscalers and cloud users presents a new market opportunity
- · Providers with land for additional buildings will benefit from time-to-market advantage with new product
- More colocation facilities are providing cloud services to drive hybrid models



Supply	s.f.	MW
Total inventory:	4,242,817	632.0
Total vacant:	312,106	78.0
Under construction:	155,964.0	23.5
Planned:	628,932	199.0
Demand		MW
Net absorption:		85.0
Rental rates	Low	High
(All-in) sub-250 kW	\$110	\$175
250 kW-1 MW	\$85	\$185
1-5 MW	\$75	-
5 MW plus	\$75	-

#### Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
			lser-favora	hle market

User-favorable market Neutral market Provider-favorable market



#### Authored by: Curt Holcomb

## Houston

### Data centers change ownership as demand grows

#### Market overview

#### Supply

While vacancy exists within the market, a handful of large deals significantly reduced the overall supply from 2020. The limited number of providers in Houston continue planned expansions among their facilities.

#### Demand

Cloud and technology companies are picking Houston as an expansion market, thus driving demand for large, contiguous amounts of space and power. Oil and gas continue to account for steady demand.

#### Market trends

Movement between facilities and hybrid/colo/cloud strategies in the oil and gas industry facilitates dealmaking among Houston's providers. A new hyperscale user entering the market could spur new varieties of users to consider Houston as an option. One large hyperscale transaction accounts for the majority of absorption.

#### Outlook

#### for **Users**

- Vacant supply decreases, pushing upward pricing in 2022
- More options available by end of 2022
- Users will need to move quickly to secure larger capacity in near term

#### for **Providers**

- The entrance of hyperscale tech users provides a new source of revenue
- Rising energy prices revive enterprise colocation demand
- Select providers to add inventory in 2022



Supply	s.t.	MW
Total inventory:	1,853,240	158.55
Total vacant:	164,077	30.57
Under construction:	0.0	0.0
Planned:	1,652,504	31
Demand		MW
Net absorption:		29.3
Rental rates	Low	High
(All-in) sub-250 kW	\$170	\$250
250 kW-1 MW	\$80	\$110
1-5 MW	\$75	\$95



#### Data Center leverage

H2 2021	H1 2021	H2 2020	H1 2020	H2 2019		
User-favorable market						
Neutral market						
<b>Provider-favorable</b> marke						

#### Authored by: Curt Holcomb

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# Los Angeles

### Los Angeles heats up as demand increases and inventory shrinks

#### Market overview

#### Supply

The increased demand has limited the quality options in the market. Current users are looking to expand, while new operators are looking to make a big splash with more product.

#### Demand

Never has the Southern California market seen such demand for data center space, driven by customers' desire for faster, more reliable and secure content delivery.

#### Market trends

Developers are looking to acquire land to build state-of-the-art facilities to keep up with the increased demand.

#### Outlook

#### for **Users**

- Limited options
- Pricing increase due to lack of quality options
- Large hyperscalers continue to dominate the market

#### for **Providers**

- Demand for turnkey space
- Activity focused on built-out and ready-to-occupy options
- Upgrades to aging infrastructure

Supply	5.1.	1.1.4.4	
Total inventory:	2,500,000	265.0	
Total vacant:	500,000	18.0	
Under construction:	0.0	0.0	
Planned:	250,000.0	30.0	
Demand		MW	
Net absorption:		13.0	
Rental rates	Low	High	
(\$/kW+E) sub 250 kW	\$125	\$135	
250 kW-1 MW	\$115	\$120	
1-5 MW	\$105	\$115	
5 MW plus	\$90	\$115	

Supply

#### Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

User-favorable market Neutral market Provider-favorable market



#### Authored by: Darren Eades

# New Jersey

New Jersey had a strong 2021 as financial services, health care and hyperscalers signed for over 20 MW

Market overview	Supply	s.f.	MW
Supply			
Operators were diligent in adding capacity to support the pipeline and overflow from a strong 2020. Capacity	Total inventory:	3,850,000	410.0
ncreases were varied in which CyrusOne added 12 MW, QTS opened 9 MW, Coresite expanded with 6 MW,	Total vacant:	165,000	18.0
Digital Realty built out 5 MW, Equinix extended 3.5 MW and 1547 planned 10 MW.	Under construction:	145,000	16.0
	Planned:	350,000	42.0
Demand			
Across industries, financial services leads with over 10 MW of planned expansions and new capacity. Health care added over 4 MW. Hyperscale added 2.5 MW, followed by technology's 2 MW and entertainment and	Demand		MW
etail taking the remainder.	Net absorption:		21.0
Market trends	Pontal rates		High
Clients are adding ESG renewable mandates as part of their requirements. ROFO requirements are becoming	Remainates	LOW	i ligii
commonly larger as compute forecasts continue to grow. QTS, Digital Realty, Equinix, Coresite, Evoque and 1547 have started master plans on their campuses	(\$/kW+E) sub 250 kW	\$150	\$400
	250 kW-1 MW	\$115	\$160
	1-5 MW	\$98	\$118
Outlook	5 MW plus	\$85	\$98
for <b>Users</b>			
Multi-cloud strategy a must, including private, to offset outages		(	
Renewable credits to satisfy ESG goals	Average power rate	(cents/kWh)	
Managed services to offset Cisco and Dell lead times		8.6	

#### for Providers

- Supply chain management will be critical for expansion deliverables
- · Compete with industrial for brownfield acquisitions, with no inventory
- Carbon-free options, including nuclear, are being considered





8.4

#### Data Center leverage

8.5

8.5

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
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*tavorable* market Neutral market Provider-favorable market

8.3

8.5

2021

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# New York

### The NYC data center market marks an active year in 2021

#### Market overview

#### Supply

1547 added 10 MW and Databank plans for 30 MW to compete with the strong NJ market. Sabey added capacity to support current customer growth. Coresite and Digital Realty compete on 32 AoA. Cordiant acquired Datagryd and DivcoWest as H5 acquired 325 Hudson to support edge market strategy.

#### Demand

NYC continues to be an edge market, with transactions averaging 50 kW and mostly network driven. Carriers ramping up 5G has slowed, but expect a pickup in the next 24 months. Orangeburg will see opportunities in the next 24 months as some NJ operators expand final campus footprints.

#### Market trends

Server infrastructure supply chain delays are driving growth in managed private cloud services. Cloud services out of 32 AoA continue to be in high demand. Expect network edge growth in 2022 with the new Google Grace Hopper Sea Cable. IoT and building technology innovation will drive more edge deployments.

#### Outlook

#### for Users

- · IT hyperautomation and preventative maintenance services reduce operation costs
- Building energy audits will help reduce costs and drive efficiencies
- Multi-cloud and cybersecurity investment prevent downtime and breaches

#### for **Providers**

- IoT growth will drive more edge capacity
- Google's Grace Hopper Sea Cable completion will drive network edge demand
- Demand for new facility management technologies will drive down expensive operations



Supply	s.†.	MW
Total inventory:	1,020,000	152.0
Total vacant:	75,000	15.0
Under construction:	12,000	5.0
Planned:	140,000	20.0
Demand		MW
Net absorption:		1.8
Rental rates	Low	High
(All-in) sub-250 kW	\$300	\$370
250 kW-1 MW	\$250	\$300
1-5 MW	\$150	\$250
5 MW plus	\$130	\$180

#### Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

# Northern California

### Strong fundamentals lead to massive investment interest

#### Market overview

#### Supply

Market vacancy is below 5 percent and falling. Expect low vacancy to persist due to strong preleasing in newly constructed product and supply chain challenges. Landlords continue to experience difficulties and delays in procuring power, which slows the delivery of new supply. These delays will prevent the near-term alleviation of the supply-demand imbalance.

#### Demand

Interest from CSPs and large tech users continues to drive this market. One hyperscaler continues to be a leader, leasing 44.5 MW from IPI/STACK and purchasing the adjacent parcel to construct an additional 33+ MW facility. Strong demand has led investors (USAA, GI Partners, Harrison Street, etc.) to purchase development sites.

#### Market trends

Barriers to entry are high, but interest from sophisticated, well-capitalized investors remains strong due to low vacancy rates and stable pricing. Pricing for development sites has risen to \$6.0+ million per acre, excluding in-place income. Power density and green power are becoming increasingly important to end users.

#### Outlook

#### for **Users**

- Low vacancy and rising construction costs will result in operators pushing pricing
- Scarcity of new product is driving competition between users
- Near-term supply will remain incredibly tight

#### for **Providers**

- Need to be mindful of competitive supply coming online
- Need to be realistic about timeline for procuring power
- Need to be mindful of development costs and construction delays



#### Supply s.f. MW Total inventory: 553.0 6,384,438 Total vacant: 302,779 40.0 Under construction: 2,523,968 205.0 Planned: 2,895,634 447.0 Demand MW Net absorption: 29.7 Rental rates Low High sub 250 (all-in) \$200 \$300 250 - 1 MW (+E) \$140 \$160 1-5 MW (+E) \$120 \$150 5+ MW (+E) \$120 \$150





#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U Provi	lser-favora Neux der-favora	<b>ble</b> market tral market <b>ble</b> market

#### Authored by: Raul Saavedra | Patrick Murdock

# Northern Virginia

## Northern Virginia absorbs over 300 MW for the second consecutive year

Market overview	Supply	/			s.f.	MW
There are 97 MW currently available, consistent with year-end 2020 available	bility of 98 MW. <b>Total in</b> <b>Total va</b>	ventory: cant:		33,288 1,618	,534 ,750	3,046.0 92.5
<b>Demand</b> 338 MW were absorbed in 2021, a second consecutive record year for the r	Under c Plannec market. Cloud and technology	onstruction !:	:	3,500 61,757	,000 ,500	200.0 3,529.0
companies continue to drive strong demand.	Demai	าd				MW
Market trends Power constraints are beginning to impact the market. Hyperscalers' acqu supply chains. Land prices topped \$3.0 million per acre for the first time in	isitions strategy shifts to diversify <b>Net abs</b> I Loudoun County.	orption:				338
Outlook	Rental	rates		L	.OW	High
<ul> <li>for Users</li> <li>Options are plentiful for up to 5 MW</li> <li>Power constraints will begin limiting hyperscalers' alternatives in the fu</li> <li>Prices remained stable in 2021</li> </ul>	(\$/kW+E 250 kW- 1-5 MW	) sub 250 kl 1 MW	V	¢,	120 \$85 \$80	\$180 \$120 \$95
for <b>Providers</b> <ul> <li>Lead times to power sites have become a dominant issue</li> </ul>	5 MW pl	JS	. /	. //	\$70	\$80
Providers with a good "power story" are well positioned	Averag	je power i	rate (d	cents/l	۲۷۷h)	ΕD
Successifier providers with need to secure a pipeline for future developm	2016	2017	2018	2019	2020	2021
	2016 Data (	2011	2010 <b>araa</b> a	2019	2020	2021
9% Cloud			eruge		,	
	H1 201	9 H2 2019	) H12	020 H	2 2020	H1 2021



## Northwest

Hillsboro surpasses expectations, catapulting beyond forecasted numbers, with even higher absorption numbers to follow in 2022

#### Market overview

#### Supply

Supply of available colocation product is diminishing rapidly as large users continue to enter Hillsboro or expand their existing Hillsboro operations. The majority of the product under construction is preleased.

#### Demand

Demand in Hillsboro is at an all-time high. In 2021, annual absorption in the Pacific Northwest more than tripled 2020 absorption. The average transaction size continues to increase quickly, with the majority of the recorded absorption coming from fewer than 15 users. Central Washington has accounted for little absorption due to lack of available product.

#### Market trends

Hillsboro accounted for the vast majority of the total Northwest demand. Absorption numbers in 2022 will surpass 2021, likely by a significant margin.

#### Outlook

#### for **Users**

- There is very little commissioned supply left
- Tough negotiations for smaller users given the amount of large users
- Low vacancy/high build costs have not led to significantly higher rent

#### for Providers

- There are very few development opportunities left in core markets
- Power procurement is challenging due to high demand
- Look to other markets for developable large-scale power sites



Supply	s.f.	MW
Total inventory:	2,757,304.0	426.0
Total vacant:	165,769.0	29.0
Under construction:	769,333.0	112.0
Planned:	2,016,125.0	318.7
Demand		MW
Net absorption:		108.4
Rental rates	Low	High
(\$/kW+E) sub 250 kW	\$155	\$175
250 kW-1 MW	\$905	\$110
1-5 MW	\$90	\$100
5 MW plus	\$78	\$95



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

# Phoenix

## Cloud, social media and technology companies drive colocation absorption for the Phoenix market

#### Market overview

#### Supply

Supply continues to not keep up with demand. As of Q4 2021: Compass leased out its 225,000-square-foot building, CyrusOne leased out its last 36 MW in building 9 as well as 24 MW in building 10, Stream leased 4.5 MW, Iron Mountain has preleased committments for 24 MW and EdgeCore has 100 percent leased out building 1.

#### Demand

Demand by hyperscale cloud, technology and social media companies continued through the balance of 2021 with multi-megawatt deals, expanding these companies' existing footprints throughout the Valley, one being a 60 MW committment in the East Valley. Financial services, healthcare and software companies are actively pursuing additional options in the Valley.

#### Market trends

With continued large-scale multisite requirements, as referenced above, colocation developers and operators will continue to expand their footprints with secondary locations throughout Greater Phoenix. These development timelines are being accelerated due to the supply chain and labor shortages. We will continue to see speculative development to meet customer demand.

#### Outlook

- for **Users**
- Continued cloud strategy pressures from the C-suite
- · Deal execution will need to be swift with multiple users pursuing available inventory
- Long ramps will be more challenging to achieve

#### for Providers

- "If you build it, they will come"
- Go big or go home
- Power, power, power



Supply	s.f.	MW
Total inventory:	5,142,120	472.2
Total vacant:	2,513,493	43.7
Under construction:	561,000	86.0
Planned:	5,773,522	883.0
Demand		MW
Net absorption:		142.0
Rental rates	Low	High
(All-in) sub-250 kW	\$175	\$275
250 kW-1 MW	\$95	\$110
1-5 MW	\$85	\$95
5 MW plus	\$75	\$85

### *Average power rate* (cents/kWh) 6.6



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U	lser-favora Neu	<i>ble</i> market

Provider-favorable market

# Salt Lake City

Salt Lake City is becoming a true competitor in the Western region, led by cloud and financial services companies

#### Market overview

#### Supply

Supply continues to be added in Salt Lake City. Aligned continued the build-out of its campus with a new second building, consisting of 48 MW of designed critical power. Novva Data Centers completed construction on its first of five buildings, which is 24 MW and was all preleased. DataBank recently finished construction on SLC5, which added 13 MW to its campus.

#### Demand

The market's diverse fiber routes across the Pacific Northwest, Southwest and Midwest, as well as its new data center tax exemption program, have made it a very attractive market for many technology and financial institutions. With low power rates, numerous renewable energy options and a supportive tech sector, Salt Lake City has become a more attractive market.

#### Market trends

Utah recently passed legislation that allows sales-tax-free equipment purchases for data center clients, which became effective July 1, 2020. Utah has made leaps and bounds in becoming one of the most competitively priced data center markets in the country, which has been proven with the constant expansion of new space coming to the market.

#### Outlook

for **Users** 

- Continued cloud strategy pressures from the C-suite
- Utilize new sales tax exemption for reduced TCO
- Flexibility going forward will be of even higher importance

#### for Providers

- Stay competitive as more providers look to SLC
- Compliance still of high importance for end users
- Deliver speculative space to the market



Supply	s.f.	MW	
Total inventory:	1,061,456	144.5	
Total vacant:	83,100	12.2	
Under construction:	200,000	33.0	
Planned:	1,440,000.0	149.0	
Demand		MW	
Net absorption:		28.0	
Rental rates	Low	High	
(All-in) sub-250 kW	\$225	\$275	
250 kW-1 MW	\$95	\$110	
1-5 MW	\$85	\$95	
5 MW plus	\$78	\$85	

#### Average power rate (cents/kWh)



H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U	lser-favora Neu	<b>ible</b> market tral market
		Provi	der-favora	<b>ble</b> market

Authored by: Mark Bauer

# Greater Toronto

Demand for large development opportunities exceeds market availabilities, as multistory developments are on the near-term horizon

#### Market overview

#### Supply

New projects increased in 2021 with significant new capacity from Stack Infrastructure (10 MW) and a large technology company (two sites: 28 acres and 13 acres). Land availability for deployments requiring greater than 10 acres has become incredibly scarce as competition for land from industrial and e-commerce developments has increased land prices significantly in the GTA.

#### Demand

Increased interest from international providers will improve market opportunities for users. However, the significant amount of planned developments may impact future pricing as new developments go live.

#### Market trends

Cloud users continue to drive the majority of market demand. Extended construction timelines, coupled with limited centrally located development sites within the GTA, may impact pricing. We anticipate increased demand leading into 2022.

#### Outlook

for Users

- · Stabilization in market rates and increased flexibility
- Limited options due to historic cloud leasing
- Improved selection of providers in the future with market expansion

#### for **Providers**

- Ongoing demand from cloud providers
- Increasing market availability in H2 2021
- Increased out-of-town interest in the market



Supply	s.f.	MW
Total inventory:	2,000,000	426.0
Total vacant:	225,000	40.0
Under construction:	425,000	52.0
Planned:	1,300,000	240.0
Demand		MW
Net absorption:		14
Rental rates	Low	High
sub 250 kW	\$115	\$150
250 kW-1 MW	\$105	\$120
1-5 MW	\$95	\$110
5 MW plus	\$80	\$95

#### Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

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# Globalinsights

# London

### Supply hits nearly tripledigit growth for the first time in 2021

#### Market overview

#### Supply

London colocation market supply stands at 839 MW IT load, the largest market in Europe with nearly 38 percent of the market share. In 2021, we have seen nearly 110 MW of new supply added to the market.

#### Demand

The market recorded 83 MW of take-up throughout the year, slightly short of the record 87 MW we had seen in 2020. We forecasted 90 MW of take-up throughout the year, but a number of deals will come online in 2022.

#### Market trends

Supply continues to grow for Europe's largest colocation market despite concerns of land and power availability. We saw 98 MW of new supply added to the market in 2021 with further 50 MW under construction due to complete in 2022 and 220 MW in the planning stages.

#### Outlook

#### for Users

- Most established data center market in Europe
- Access to one of the world's leading financial centers
- New developments offering quality space

#### for Providers

- Competition for land is high
- Energy prices rising at a considerable rate in the UK
- Rise of self-build hyperscale campus



#### 2021 Average power rate (cents/kWh)



H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U Provi	lser-favora Neur der-favora	i <b>ble</b> market tral market i <b>ble</b> market



# Frankfurt

## Frankfurt continues to expand, with even more supply due in 2022

#### Market overview

#### Supply

Supply in Frankfurt is currently now at 503 MW IT load. The market has recorded significant growth in 2021, with 52 MW of new supply added throughout the year, a 12 percent increase in total supply.

#### Demand

Take-up for the year hit 62.5 MW, slightly down from the 69 MW seen in 2020. However, if we take into consideration all signings made throughout the year, including space not currently available, the market has seen 126 MW take-up throughout the year.

#### Market trends

Frankfurt is the fastest growing of the core European markets, with a 12 percent increase in total supply in 2021. This will continue in 2022 with 83 MW under construction and a further 96 MW in planning.

#### Outlook

#### for **Users**

- Supply continues to grow, with more new developments due in 2022
- Brand-new state-of-the-art developments offering quality space
- Vacancy rates compressed by the speed of take-up, which could result in rising prices

#### for **Providers**

- Frankfurt is the largest financial hub in continental Europe and home to the European Central Bank
- Demand for new supply has led to data centers preleased before being developed
- Frankfurt is home to the DE-CIX, the single largest exchange point worldwide in terms of traffic



Supply	s.t.	MW
Total inventory:	-	502.9
Total vacant:	-	70.9
Under construction:	-	82.5
Planned:	-	95.7
Demand		MW
Net absorption:		62.5
Rental rates	Low	High
sub 250 kW	-	-
250 kW-1 MW	\$146	\$179
1-5 MW	\$112	\$134
5 MW plus	\$95	\$118

#### 2021 Average power rate (cents/kWh)



H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U Provi	lser-favora Neu der-favora	i <b>ble</b> market tral market I <mark>ble</mark> market

# Amsterdam

## 2022 will see the first large-scale developments since the moratorium was lifted in July 2020

#### Market overview

#### Supply

Restrictions on data center developments were lifted in July 2020. As a result, we have seen a small amount of supply added to the market since 2020. In 2021, supply increased by 11 MW to 443 MW, remaining the third-largest colocation market in Europe.

#### Demand

Demand outstripped new supply as we saw 18.8 MW of take-up throughout the year. Take-up was marginally down on the 21.0 MW seen in 2020.

#### Market trends

We will see the first large-scale developments since the moratorium on new data center developments was lifted in July 2020, with 40 MW currently under construction, due to go live in 2022.

#### Outlook

#### for Users

- Continued lack of new supply coming to the market in 2021
- Still a major European business and tech hub
- Pricing remains fairly stable since the moratorium

#### for **Providers**

- New developments must adhere to sustainability criteria
- No large-scale developments in 2021, but we anticipate significant growth in 2022
- Limitations on both land and power available



Supply	s.f.	MW
Total inventory:	-	442.6
Total vacant:	-	107.3
Under construction:	-	40.0
Planned:	-	15.4
Demand		MW
Net absorption:		18.8
Rental rates	Low	High
sub 250 kW	-	-
250 kW-1 MW	\$134	\$168
1-5 MW	\$118	\$140
5 MW plus	\$101	\$106

#### 2021 Average power rate (cents/kWh)



H2 2021	H1 2021	H2 2020	H1 2020	H2 2019
<i>ble</i> marke	ser-favora	U		
ral marke	Neur			
<b>ble</b> marke	der-favora	Provi		

## Paris

### Level of demand more than doubled from the previous year

#### Market overview

#### Supply

The market recorded 31 MW of new supply added in 2021, a significant increase in the new supply added in 2020. However, supply is still below the level of demand recorded.

#### Demand

Take-up in Paris hit 43 MW, more than double that recorded in 2020. If we take into consideration all signings made throughout the year, including space not currently available, the market saw 89 MW take-up throughout the year.

#### Market trends

Demand has outstripped supply for the last couple of years in the Paris market. Despite land availability issues, Paris has a healthy development pipeline, with 24 MW under construction due to complete in 2022 and a further 96 MW in the planning stages.

#### Outlook

#### for Users

- Demand for space has led to new supply being preleased before completion
- · Despite new supply coming to the market in 2021, demand continues to outstrip supply
- Access to the Paris-Saclay Innovation Hub, one of the World's top technology clusters

#### for Providers

- Lack of available land means competition is high
- Tax incentive from French government on energy usage for data centers



#### 2021 Average power rate (cents/kWh)



#### Data Center leverage

H2 2	019	H1 2020	H2 2020	H1 2021	H2 2021
			L Provi	lser-favora Neu der-favora	i <b>ble</b> market tral market I <mark>ble</mark> market



*Authored by:* Jonathan Kinsey | Daniel Thorpe See page 42 of this document for contact information.

# Dublin

### Largest hyperscale market in Europe

#### Market overview

#### Supply

New supply increased by 9 MW in 2021, taking it to 141 MW in total. The unique nature of Dublin means it is simultaneously both the smallest and largest of the core European markets. "Self-build" data center facilities currently total 670 MW, taking the total market size to 811 MW.

#### Demand

Demand hit 11.9 MW in 2021, over double the total recorded in 2020. If we take into consideration all signings made throughout the year, including space not currently available, the market has seen 89 MW take up throughout the year.

#### Market trends

Dublin has a significant amount of new supply currently in the pipeline. There is 78 MW currently under construction due to complete in 2022 and a further 115 MW in the planning stages.

#### Outlook

#### for Users

- Colocation supply remains fairly small
- Pricing remains higher than the other core European markets
- Strong connectivity and access to major subsea cables connecting Ireland to the U.S.

#### for **Providers**

- · Competition for land from hyperscalers
- · Power constraints in the Dublin market
- European headquarters for a large number of global tech companies

Supply	s.f.	MW
Total inventory:	-	140.9
Total vacant:	-	13.5
Under construction:	-	68.3
Planned:	-	114.6
Demand		MW
Net absorption:		11.9
Rental rates	Low	High
sub 250 kW	-	-
250 kW-1 MW	\$162	\$196
1-5 MW	\$129	\$162
5 MW plus	\$90	\$112

#### 2021 Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U Provi	lser-favora Neur der-favora	<b>ble</b> market tral market ble market



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# Stockholm

### Access to green energy continues to drive data center demand in Sweden

Market overview	Supply
Supply	
Supply in the Stockholm market is estimated at 90 MW, with several ongoing developments expected to add capacity in 2022. AtNorth is expecting to add a further 6 MW when its data centre in Kista opens in 2022. Interxion opened the first phase of "ST06" in 2020. When fully completed, ST06 is expected to comprise a total area of 3,300 sqm and estimated load of 6 MW.	Total inventory: Total vacant: Under construction Planned:
<b>Demand</b> Deployment of 5G and IoT are particular drivers in the growth of data traffic. With sustainability becoming an ingrassingly relevant factor. Sweden's recovered and a strategies adventage in	Demand
the growth of the data center market.	Net absorption:
Market trends	Rental rates
Colocation providers are returning waste heat to the district heating network, with facilities having the	
potential to deliver 65-80 degree hot water back to the municipality and heat nearby buildings. We expect to see an increase in operators offering data centers running on 100 percent renewable energy going forward.	sub 250 kW

Outlook

- for Users
- New supply coming on to the market
- · Leading data center market in Scandinavia
- Hyperscalers expanding their presence in Stockholm

#### for Providers

- Government support for data center development through allocation of land area
- · Low energy prices and availability of renewable energy sources
- Since 2019 Sweden offers tax rebates on data center energy usage



Other	

Supply	s.f.	MW
Total inventory:	-	90.0
Total vacant:	-	-
Under construction:	-	12.2
Planned:	-	21.0
Demand		MW
Net absorption:		-
Rental rates	Low	High
sub 250 kW	-	-
250 kW-1 MW	\$220	\$280
1-5 MW	-	-
5 MW plus	\$110	\$150

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#### 2021 Average power rate (cents/kWh)



H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U Provi	lser-favora Neu der-favora	i <b>ble</b> marke tral marke i <mark>ble</mark> marke

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# Madrid

### Hyperscalers continue to expand their presence in the market, driving demand

#### Market overview

#### Supply

Madrid is a major European city and is well placed to deliver data center services to other areas of Southern Europe as well as Barcelona, which, in recent years, has been attracting technology companies to the city as a major tech hub.

#### Demand

Big operators such as Equinix, Interxion, Data 4, Nabiax and Global Switch already have a great share of the total stock. However, tech companies have a strong pipeline (MW) for the Spanish market in the upcoming years.

#### Market trends

Hyperscale cloud requirements will drive growth in the Barcelona market in the coming years and in Madrid this is already evident. The last 12 months have seen the emergence of hyperscale requirements, and we expect this demand to continue over the next two to three years as the large players look to expand their footprints in this location.

#### Outlook

- for Users
- · Operators and investment funds have shown appetite to invest in the market
- Access to excellent fiber optic connectivity
- Launch of Next Tech, a fund that will look to invest €4 billion in cloud services, big data, AI and new technologies

#### for **Providers**

- · Operators based in Madrid are looking to expand their presence in the market
- Madrid is well placed to deliver data center services to Southern Europe



Supply	5.1.	1.1.4.4
Total inventory:	-	80.0
Total vacant:	-	11.2
Under construction:	-	98.0
Planned:	-	238.0
Demand		MW
Net absorption:		-
Rental rates	Low	High
sub 250 kW	-	-
250 kW-1 MW	\$123	\$145
1-5 MW	\$95	\$117

Supply

#### 2021 Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
		U	lser-favora Neu	<b>ble</b> market
		Provi	der-favora	<b>ble</b> market

Authored by: Jordi Sinfreu | Ines Araguas | Monica Gracia

# Mumbai

## 71 percent sequential growth in absorption during H2 2021 over H1 2021

		5.1.	14144
Supply			
DC operators inked large land deals to build hyperscale facilities. Operators are exploring locations clc	oser to Total inventory:	4,235,920	252.0
anding stations to reduce latency. Players are reducing time to market by using retrofit options. Increa	asing Total vacant:	33,245	2.0
adoption of sustainable energy options by operators is visible.	Under construction:	2,475,000	188.0
	Planned:	3,700,000	270.0
Demand			
Proximity to client location continues to drive demand from enterprises. The hybrid model continues to colocation and cloud absorption. Financial regulations related to data storage has led to higher dema	to drive <b>Demand</b>		MW
panking and financial services. Lower availability options has led to firm lease rentals.	Net absorption:		62.0
Market trends	Rental rates	Low	High
High land acquisition deals have led to hardening of prices at select DC hubs. New joint ventures and		2011	
platforms funds have announced expansion plans in the city. The upcoming cable landing station is ex to drive high accuracy additional	xpected	\$120	\$150
to drive nigher supply additions.	250 kW-1 MW	\$90	\$125
Outlook	1-5 MW	\$80	\$105
for Users	5 MW plus	\$75	\$100
<ul> <li>Supply additions to provide multiple options</li> </ul>		<b>*</b> · •	+
Data localisation laws could impact some segments			
<ul> <li>5G trials in the city to augment network connectivity</li> </ul>	Average power rat	t <b>e</b> (cents/kWh)	
for Deputidaya		11.5	
Or <b>Providers</b>	11.4	.4	
Land cost are expected to firm up in select locations	11.4		
<ul> <li>Demand</li> <li>Proximity to client location continues to drive demand from enterprises. The hybrid model continues to colocation and cloud absorption. Financial regulations related to data storage has led to higher demaid banking and financial services. Lower availability options has led to firm lease rentals.</li> <li>Market trends</li> <li>High land acquisition deals have led to hardening of prices at select DC hubs. New joint ventures and blatforms funds have announced expansion plans in the city. The upcoming cable landing station is exited rive higher supply additions.</li> <li>Outlook</li> <li>Supply additions to provide multiple options</li> <li>Data localisation laws could impact some segments</li> <li>5G trials in the city to augment network connectivity</li> <li>for Providers</li> <li>Land cost are expected to firm up in select locations</li> <li>Hyperscale self build to impact colocation demand</li> </ul>	to drive nd from xpected xpecte	Low \$120 \$90 \$80 \$75 ce (cents/kWh) 11.5 4	10 27 M 6 Hi, \$1 \$1 \$1 \$1 \$1 \$1

- Hyperscale self build to impact colocation demand
- High quality builds to command premium rentals



#### Data Center leverage

2017

2016

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
112 2019	111 2020	112 2020	111 2021	112 2021

2019

2018

*User-favorable* market *Neutral* market *Provider-favorable* market

11.2

2020

11.2

2021

## Pune

### Cloud players accounted for major share of demand in H2 2021

Market overview	Supply	s.f.	MW
New supply is driven by pre-commitments from hyperscalers. Proximity to the key data center hub, Mumbai, has led to the growth of hyperscale commitment in the region.	Total inventory: Total vacant: Under construction: Planned:	1,035,000 39,478 75,000	80.0 3.0 6.0
<b>Demand</b> Established hyperscaler continued to increase commitment creating new availability zones. The BFSI segment has increased their space take-up as the preferred disaster recovery center.	Demand		MW
	Net absorption:		24.0
Market trends The region is maturing with the growth of availability zones for hyperscalers. Proximity to the key hub of	Rental rates	Low	High
Mumbal is leading to spillover of demand to the city.	sub 250 kW	\$140	\$150
Outlook	250 KW-1 MW 1-5 MW	\$110 092	\$125 \$95
for Users  • Availability of quality data center builds	5 MW plus	\$75	\$80
Option for new hyperscalers to expand footprint     Preferred disaster recovery location	Average power rat	<b>e</b> (cents/kWh)	
	5 1	11.5	
<ul> <li>for Providers</li> <li>Competitive alternative colocation for hyperscalers</li> <li>Proximity to green power sources for new data center builds</li> </ul>	11. 11.4 11.3	4	
Enterprises from manufacturing segment to provide potential demand		11.2	11.2
	2016 2017 201	.8 2019 2020	2021
Cloud	Data Center levera	ıge	
Technology	H2 2019 H1 2020 F	H2 2020 H1 2021	H2 2021



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# Chennai

### Chennai emerges as a fast-evolving data center hub in APAC

#### Market overview

#### Supply

Hyperscalers are expanding operations due to the market's strategic location as an alternative data center hub. State data center regulations have attracted new players to expand operations. The city enjoys lower latency due to cable connectivity with APAC hubs.

#### Demand

Demand from e-commerce, IT firms, and manufacturing sectors led to robust absorption during H1 2021. As the city is a leading hub for software-as-a-service firms, demand for cloud is likely to grow at higher pace.

#### Market trends

The city has witnessed land acquisition deals by existing and new data center players driven by demand from hyperscalers. The state policy to provide financial incentives and concessions in electricity duties is likely to attract operators.

#### Outlook

for **Users** 

- Availability of quality builds to increase
- Hyperscalers to increase footprint
- E-commerce and media segment to increase space take-up

#### for **Providers**

- Alternate availability zones to emerge
- Implementation of state policies to play key role
- Operators to scout for locations closer to cable landings



Supply	S.T.	IVI VV
Total inventory:	1,297,800	66.0
Total vacant:	80,375	4.0
Under construction:	695,000	42.0
Planned:	1,335,000	114
Demand		MW
Net absorption:		17.4
Rental rates	Low	High
sub 250 kW	\$145	\$150
250 kW-1 MW	\$110	\$130
1-5 MW	\$95	\$100
5 MW plus	\$80	\$85

#### Average power rate (cents/kWh)



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

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# NCR-Delhi

### Regulatory policies attract players to establish footprint

Ма	rket	overview

#### Supply

Operators and hyperscalers are creating a footprint in anticipation of expected demand from government digital initiatives. Regulatory policies and land allocation have led to several players commencing data center builds.

#### Demand

Enterprises, start-ups, and financial firms have been driving the absorption during H2 2021. The central government has launched various digital initiatives which would create demand for data centers. Hyperscalers are expanding in the region.

#### Market trends

The region is emerging as a location for government data center demand. Regulatory incentives are expected to accelerate capacity build-up. The city is expected to be a nodal point for serving densely populated region in the vicinity.

#### Outlook

for Users

- Hyperscalers to increase presence
- Government digital initiatives to see private sector participation
- 5G rollout trials to influence data usage

#### for **Providers**

- · Land allocation by state authorities to attract operators
- Network connectivity to become important variable
- Demand from government bodies to drive growth plans



Supply	s.t.	MVV
Total inventory:	1,080,850	46.6
Total vacant:	297,108	13.0
Under construction:	270,000	23.0
Planned:	400,000	74.0
Demand		MW
Net absorption:		3.8
Rental rates	Low	High
sub 250 kW	\$140	\$150
250 kW-1 MW	\$110	\$125
1-5 MW	\$90	\$95
5 MW plus	\$70	\$80



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021
112 2015	111 2020	112 2020	111 2021	112 2021

# Hyderabad

### Emerging location for hyperscale self-builds

#### Market overview

#### Supply

Hyperscalers "self-builds" continue to dominate with a global hyperscaler closing on a self-build option. Operators are located closer to the IT/ITeS segment to meet their needs.

#### Demand

Demand from IT/ITeS continued during H2 2021. State policies have led to growth of IT and life sciences, which is driving demand for data centers. Demand from start-ups is expected to pick up.

#### Market trends

Single window mechanism, power availability, lower land cost, and ease of doing business have led to the growth of self-build ambitions of hyperscalers in the region. Location with proximity to power stations is preferred for new data center builds.

#### Outlook

for **Users** 

- Regulatory incentives to lower operational cost
- Competitive pricing options
- Availability of multiple options

#### for **Providers**

- Regulatory incentives to reduce time to market
- Build to suit options beneficial
- Government led demand to drive absorption



Supply	s.f.	MW
Total inventory:	882,122	39.0
Total vacant:	144,522	6.0
Under construction:	536,200	39.0
Planned:	-	-
Demand		MW
Net absorption:		3.8
Rental rates	Low	High
sub 250 kW	\$120	\$150
250 kW-1 MW	\$90	\$125
1-5 MW	\$80	\$95
5 MW plus	\$75	\$80



#### Data Center leverage

H2 2019	H1 2020	H2 2020	H1 2021	H2 2021

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