



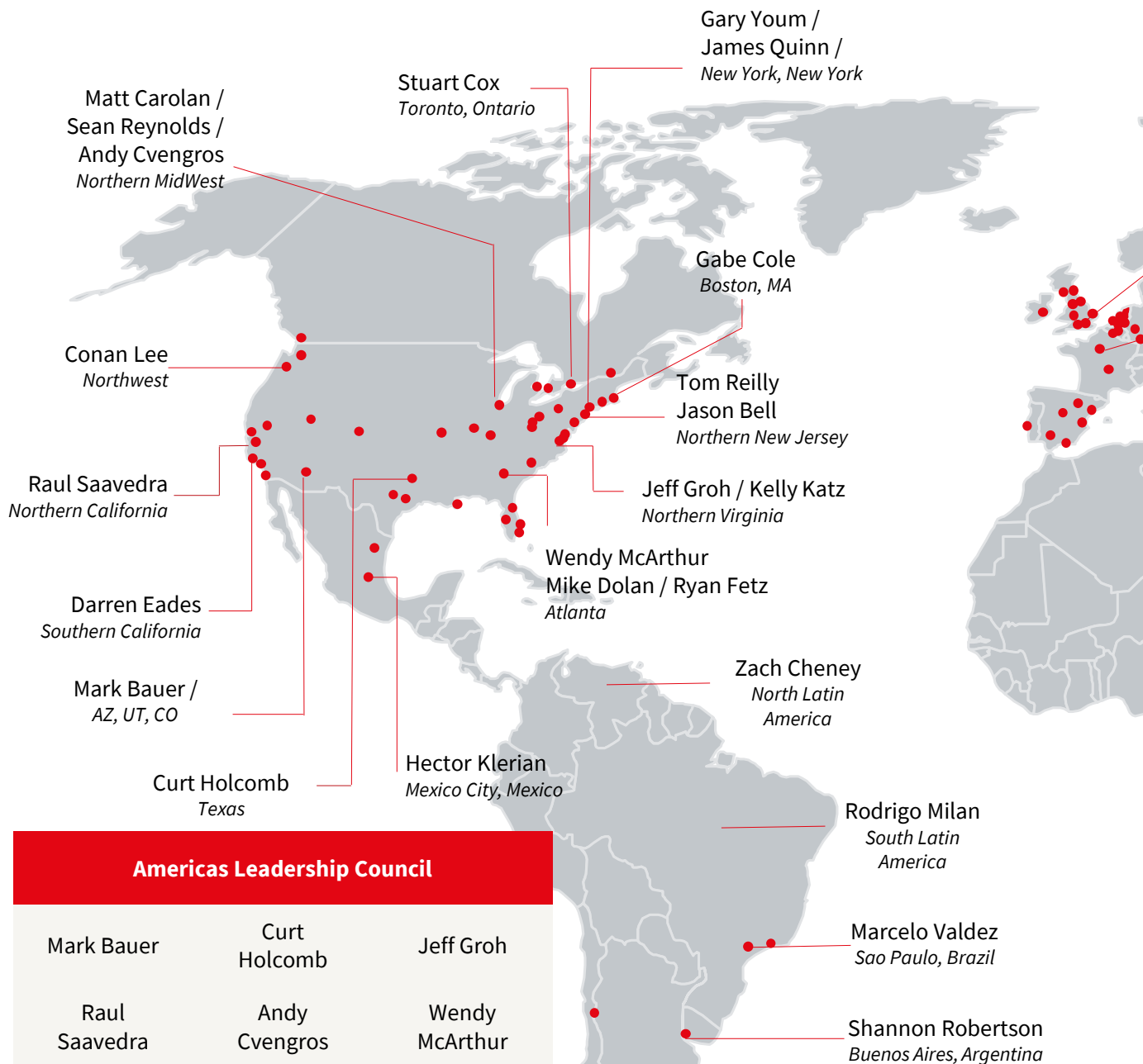
Global | Year-End 2020

Research

2020 Year-End Data Center Outlook

A review of the industry's latest trends
and what to expect in 2021

Data Center Global Team

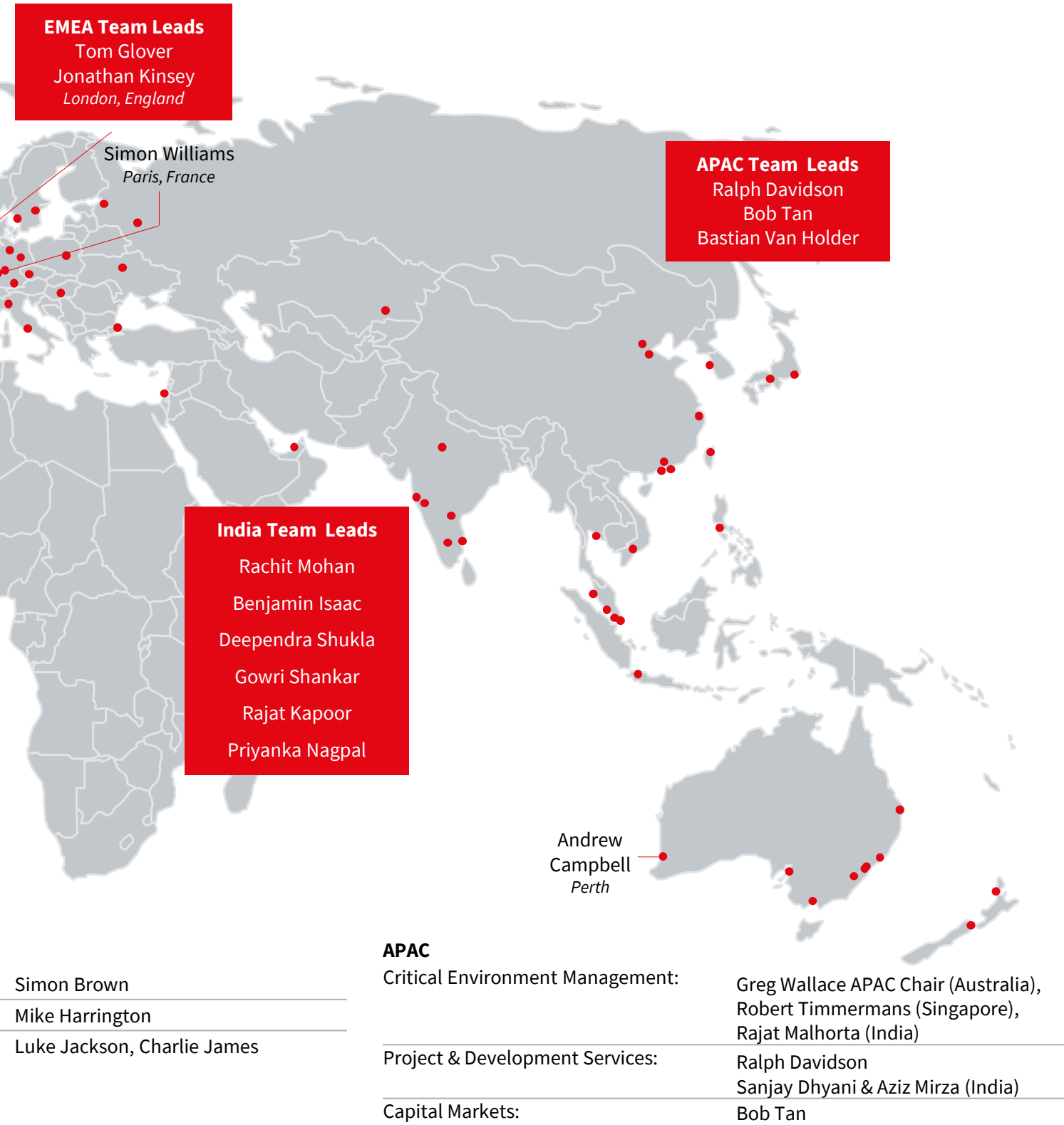


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Welcome

Insatiable demand for data centers surged in 2020. Absorption reached 619.3 MW in the United States and 201.2 MW in Europe. Despite initial slowing and leasing backlogs amid the pandemic, enterprise colocation demand picked up in the second half of the year.

The construction pipeline reached near-record levels in 2020, with 611.3 MW under construction in the United States. Northern Virginia has 326.0 MW under construction, an increase of over 400 percent since 2019. In Europe, 83.0 MW of new supply was added to Frankfurt inventory in 2020. The market currently leads the region with 117.8 MW under construction.

M&A activity and operator investment remain robust. Global M&A activity in the data center sector surpassed \$30 billion as of November 2020, including Digital Realty's record-setting \$8.4 billion deal with Interxion. The top data center REITs continued to outperform other sectors throughout 2020 amid the pandemic.

David Barnett,
Director,
Americas Research



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1. key trends

Insatiable cloud demand across the globe

In **North America**, cloud dominated demand in 2020 and will continue to expand in primary markets in 2021. Atlanta, Phoenix, and Chicago recorded large land purchases where new facilities will meet cloud demand. Cloud makes up 80 percent of all data center demand in Northern California. One cloud player is active with two build-to-suits in Santa Clara and Hayward. On the East Coast, expansions show little sign of slowing for cloud players in Northern Virginia, particularly south of Dulles Airport. Here, one provider is planning to add a potential 2.5 million square feet of data center space to its portfolio.

Cloud demand is also burgeoning in **South America** and fueling data center growth. The industry is projected to grow 7 percent by 2025 in Brazil, which now has over 120 data centers across the country.¹ A major hyperscaler announced plans to invest \$236 million into its Sao Paulo presence in February 2020.

Emerging markets pick up the slack in **Asia Pacific**. China, India, and Indonesia, with large domestic markets, are seeing the highest level of interest. Big technology companies, cloud providers, and social media providers are driving demand in every location. Chinese groups are actively working to expand out of China. EdgeConnex and Equinix moved into India via Adani and GPX India, respectively. PDG's investment into XL will give it a good starting point in Indonesia. Following behind Keppel DC's new facility, Space DC recently launched its new 1.45 MW facility in Jakarta.

Robust expansion by global cloud players in established markets of Mumbai and Chennai continues as required infrastructure is in place. Hyderabad is attracting players with state support for infrastructure and incentives.

Like other regions, data center demand in **Europe, Middle East & Africa** is largely driven by hyperscalers and technology players. One example is the recent purchase of 33 acres of land from a hyperscaler in London. Additionally, TikTok will build a US\$500 million facility in Ireland.

2.

Despite initial slowing and leasing backlogs amid the pandemic, enterprise colocation demand picked up in the second half of 2020

While cloud demand thrived in 2020, enterprise level demand slowed as overall IT spend declined globally. According to Gartner, overall IT spend declined by 5.4 percent due to the pandemic's impact on organizations' budgets.² However, re-entry and vaccination rollouts could lead to a strong rebound in 2021 as cloud migration keeps momentum. For example, in **North America**, enterprise-driven absorption increased in the second half of 2020 in major markets, including Dallas and Northern Virginia.

Colocation demand in **Europe** had a record year, with a substantial 22 percent increase in take-up from 2019. London and Frankfurt drove much of the demand, with London recording a 72 percent increase year-over-year. Increased appetite for colocation demand is projected for 2021.

Mature markets are taking a pause in **Asia Pacific**. Singapore's moratorium on new data center approvals will likely be in place in early 2021. Efforts to explore renewable energy and reduction in carbon footprint are under way. Success of such efforts will drive clarity on the moratorium. Hong Kong is experiencing uncertainties with the introduction of security laws. The supply pipeline across Australia is putting downward pressure on rates. Strong interest is growing in Tokyo and increasingly Osaka, given the size of the market, but stakeholders are grappling with power supply lags.

¹ ReportLinker, "Brazil Data Center Market - Growth, Trends, and Forecasts (2020 - 2025)"

² Gartner, "Gartner Says Worldwide IT Spending to Grow 4% in 2021"

3.

M&A activity and operator investment remain robust

Investment activity has grown on several fronts. It has increased on a speculative basis where cloud demand has been strongest, secondary markets where cloud demand has increased, and new international markets.

Global M&A activity in the data center sector surpassed \$30 billion as of November 2020, according to Synergy Research. This year recorded massive multibillion-dollar deals, including Digital Realty's acquisition of Interxion at \$8.4 billion. The top data center REITs continued to outperform other sectors throughout 2020 amid the pandemic.

In **North America**, Vantage Data Centers expanded into Montreal with its acquisition of Hypertec's two facilities and a planned third site. DataBank invested \$30 million into EdgePresence and its modular data centers to enhance connectivity across U.S. markets.

On the capital markets front, enterprise-owned data centers continue to sell as users accelerated their migration to the cloud in favor of the flexible and scalable consumption model. Institutional equity interest is at a peak as existing players continue to roll out funds as new entrants seek an entry into the space.

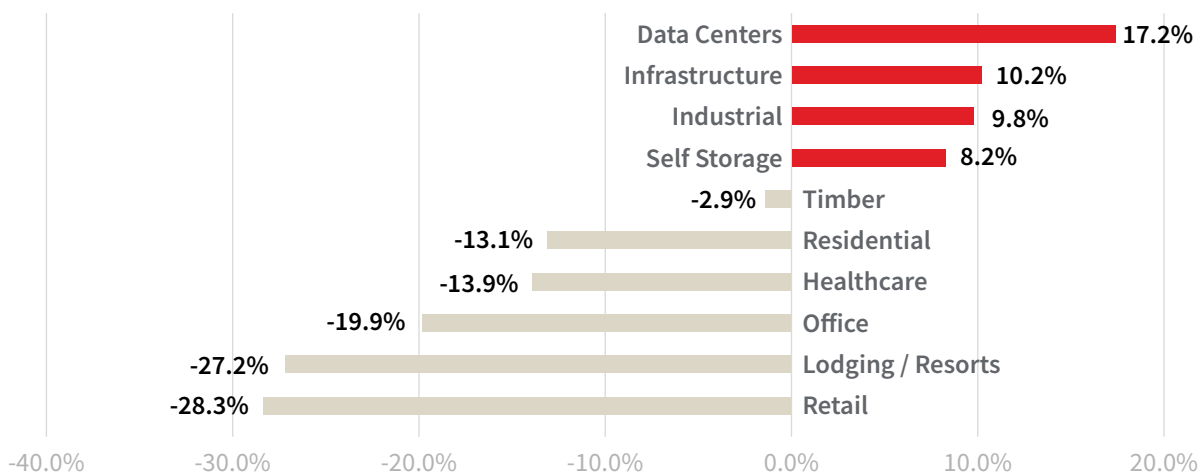
In **South America**, Ascenty continues with its expansion plans. It delivered a 70 MW location in Vinhedo in Sao Paulo and has five data locations under construction throughout South America.

Investor interest is strong in **Asia Pacific**. Following the success of Airtrunk's transaction with MacQuarie Infrastructure and Real Asset, Chindata and PDG have both completed their private placements and IPO activities. Other operators such as Equinix and xScale continue to enjoy a high degree of investor interest in their capital-raising exercises. Listed entities, such as NextDC, have also enjoyed strong support from their investors. Equinix entered the India market with its US\$161 million acquisition of GPX India, due to close in Q1 2021. The deal will add two data centers in Mumbai to its portfolio.

Operators are increasing their footprint in **Europe** through M&A activity. Digital Realty's \$8.4 billion acquisition of Interxion exemplifies the M&A strategy in EMEA. The operator also acquired Altus IT in the third quarter of 2020. The Croatia-based provider will help Digital Realty enhance its connectivity in southeastern Europe. Secondary markets are also gaining traction. Digital Realty just purchased land in Madrid for a 34 MW data center, as well as a parcel near its Vienna campus.

In 2021, we expect to see traditionally non-data-center investors and developers actively explore opportunities in the sector, either to back startups with good management teams, or in some form of M&As and partnerships. Most investors tend to focus more on the hyperscale segment, given its scalability.

Total YTD Returns by Sector, as of November 30, 2020



Sources: JLL Research, Nareit, FTSE

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

4.

5G demand expected to burgeon in 2021

Communications service providers are prioritizing spending on 5G capabilities. While Gartner projected that overall infrastructure spending would decline by over 4 percent in 2020, 5G was projected to nearly double.

5G expansion will lead to edge locations near cell towers, data campuses, and more. In **North America**, DataBank's recent \$30 million investment in EdgePresence illustrates the demand for these modular sites amid a shift in infrastructure spend.

Various markets are in different stages of rolling out the new 5G infrastructure in **Asia Pacific**. China is leading the pack and will provide clues on how data centers may evolve to support 5G in future. This may require a network of smaller edge facilities to be built, either by telecommunications players, or by a new class of specialist providers.

In India, retail and edge colocation players are differentiating with city-centric colocations (5-20 MW IT load), network-driven business strategies, 5G-backed deep country expansions, cable landing collaborations, and adoption of hybrid colocation in hyperscale campuses.

5.

Sustainability not slowing down

Customers continue to demand green solutions from operators to help achieve their goals of 100 percent renewable energy. Equinix has used a variety of approaches to progress on its green initiatives and meet growing demand, including green rooftops, fuel cell adoption, and innovative cooling systems. In **North America** for example, the operator uses Smardt Chillers at its Toronto location for maximum cooling efficiency and energy reduction.

Substantial sustainability projects are under way in **Europe**. In Galway, Ireland, one hyperscaler will complete a third wind farm of over 100 MW to power its data centers. That same user is primarily using external air for cooling rather than the more conventional use of water.

In Amsterdam, CyrusOne partnered with the Municipality of Haarlem and PolanenPark to research reuse of residual heat, which could potentially "heat 15,000 homes in the municipality," according to Data Center Dynamics.

\$44.9 billion

The global green data center market is expected to grow by nearly \$45 billion from 2020 to 2024.

Source: Technavio



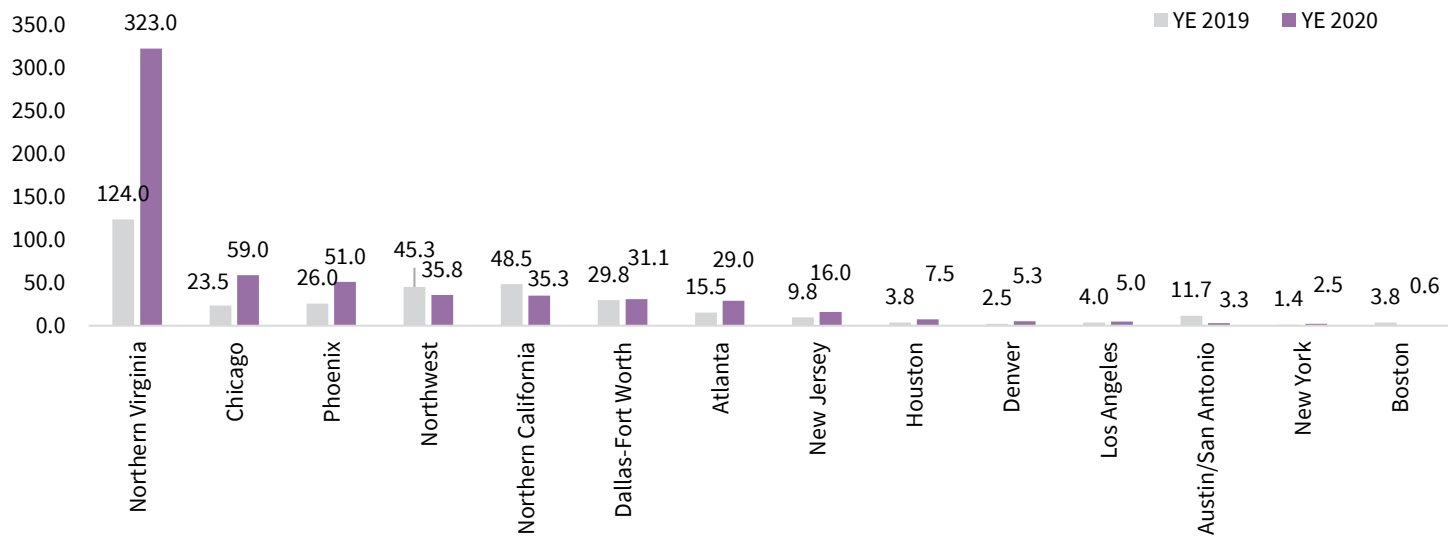
State of the industry

Demand | Record year for data center demand

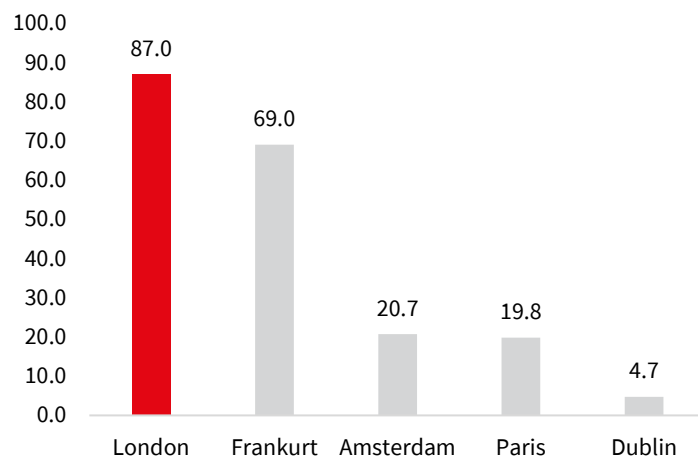
Demand increased by a staggering 72.9 percent from year-end 2019 to year-end 2020 in 14 markets in the United States. This comparison excludes Salt Lake City since the market was not included in the analysis in 2019. Including the market in 2020 absorption figures, demand reached a total of 619.3 MW. Only four markets in the United States marked a decrease in demand from 2019. Northern Virginia continues to set records for demand,

with an impressive 323.0 MW of absorption for 2020. Demand also surged in Chicago, which recorded 59.0 MW in 2020, an increase of 151.1 percent year-over-year. Hyperscalers and social media companies accounted for the large uptick in demand across markets. In Northern Virginia, over half of absorption was attributed to social media companies.

Absorption (MW) by market, year-end 2020



Absorption (MW) by EMEA market, year-end 2020



Demand surged in **Europe**, with London recording a 72 percent increase in demand since 2019 as it continues to be the most established market in the region. Frankfurt also had a record year for absorption with 69.0 MW, which led to strong preleasing in new developments. While Paris recorded a modest 19.8 MW of absorption, a significant amount of deals are set for 2021. Dublin had a quieter year compared to the other markets in the region, with hyperscale driving the demand.

In **Asia Pacific**, cloud, financial institutions and e-commerce contributed to the 91 MW of absorption recorded in India. Cloud players continue to expand in the key markets of Mumbai and Chennai given their available infrastructure.

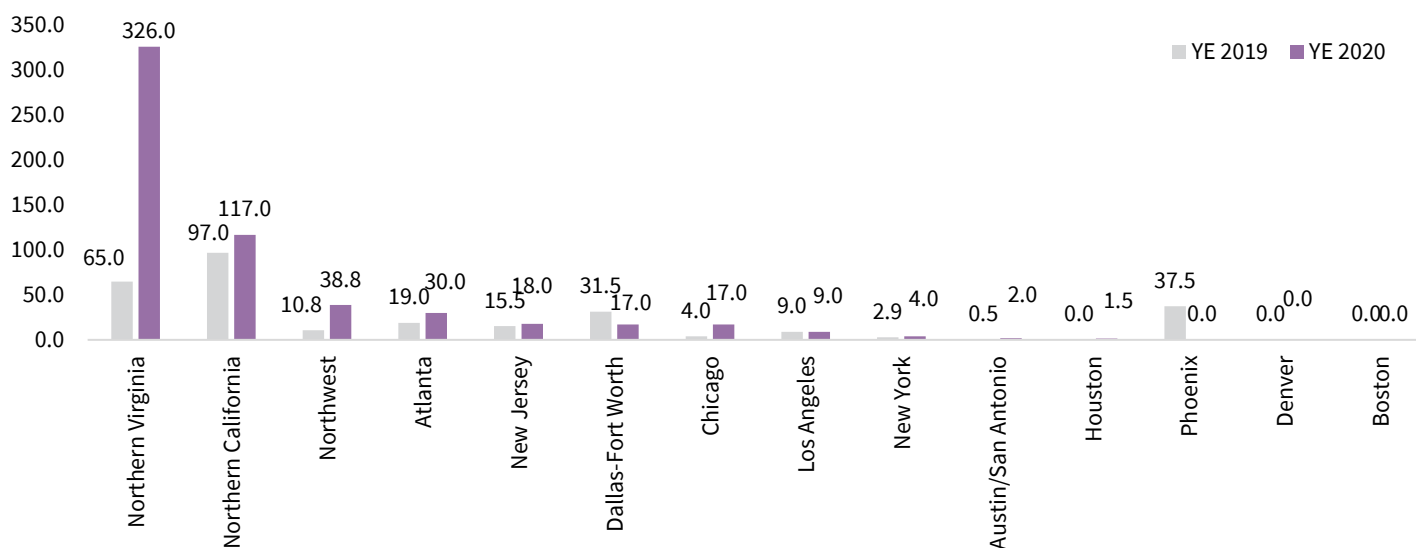
State of the industry

Supply | Construction pipeline reaches near-record levels

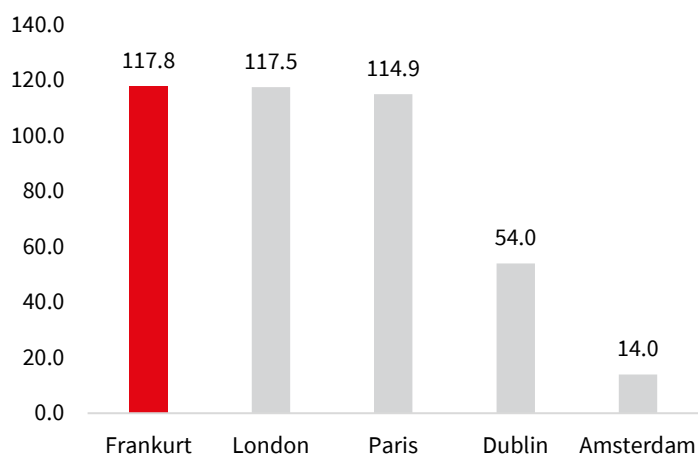
The construction pipeline is one of the largest on record, totaling 611.3 MW in 2020, including all 15 U.S. markets with Salt Lake City. This is over double the amount of supply under construction recorded in 2019, which stood at 292.7 MW. Northern Virginia continues to lead with 326.0 MW under construction, an increase

of over 400 percent since 2019. Northern California, Chicago and the Northwest markets recorded significant increases in the supply pipeline in year-end 2020. Expect supply to increase over the next year as competition shows little signs of slowing.

Under construction (MW) by U.S. market, year-end 2020



Under construction (MW) by EMEA market, year-end 2020



Markets in **Europe** recorded 418.2 MW under construction. Frankfurt had an active year, with 83.0 MW of new supply added to its inventory in 2020. The market currently leads the region with 117.8 MW under construction. The Paris market has grown by 72 percent over the last four years and now has 114.9 MW under construction. No new supply was added to the Amsterdam market in 2020, due to the restriction on data center development, which was lifted in July of 2020. London set a record number of planning applications in 2020. However, scarce land availability caused prices to reach record highs in the market.

In **Asia Pacific**, India has 196 MW under construction. While key markets, like Mumbai and Chennai, remain attractive for developers and operators with their infrastructure, many players now consider Hyderabad, due to the state government's support for infrastructure.

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.

U.S. market insights

Atlanta

Hyperscale activity ratchets up as cloud migration trend continues

Market overview

Supply

QTS makes good on its promise to expand its Metro Campus by delivering Phase I of the first building in July reporting record leasing. DataBank expands Atlanta presence through zColo acquisition; Equinix's expanded presence allows for wholesale leasing in Metro Atlanta.

Demand

Demand from enterprise users remained at a steady pace while hyperscale demand skyrocketed throughout H2 2020. Operators are reporting strong pipelines across the spectrum and expect increased leasing in 2021.

Market trends

Hyperscalers are descending on the Atlanta market driving colocation absorption and acquiring land competing with the hot industrial market. Facebook and Google announce campus expansions.

Outlook

for Users

- Enterprise uncertainties resulting in shorter-term commitments
- The need for scalability and flexibility continue to be significant drivers
- Carriers continue to invest and expand in their networks

for Providers

- Hyperscale industry continues to grow its presence in Atlanta
- Technology evolution putting pressure on legacy data centers
- Slower pandemic-related decision making may result in pent-up demand

Supply

	s.f.	MW
Total inventory:	2,257,574	270.0
Total vacant:	225,900	38.0
Under Construction:	224,000	30.0
Planned:	970,000	127.0

Demand

	MW
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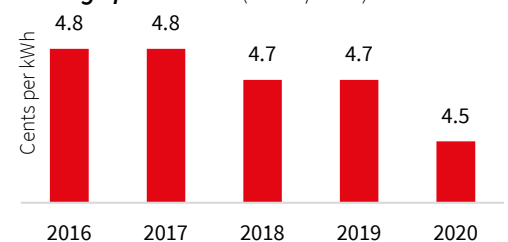
Net absorption:

	29.0
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Rental rates

	Low	High
(All-in) sub-250 kW	\$165	\$250
250 kW-1 MW	\$95	\$125
1-5 MW	-	-
5 MW plus	-	-

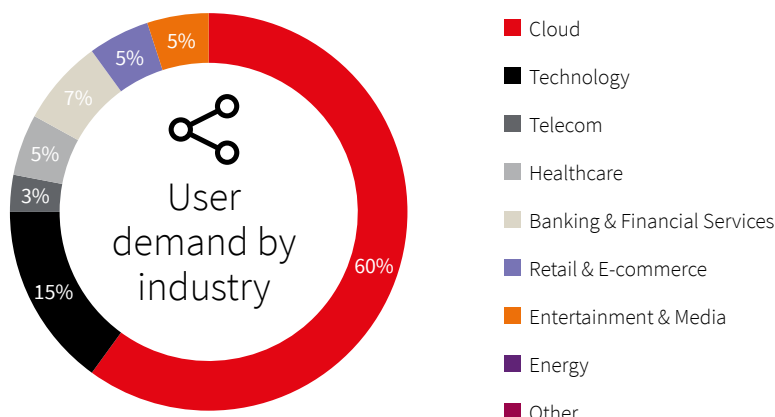
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Mike Dolan | Ryan Fetz | Leigh Martin | Wendy McArthur

See page 35 of this document for contact information.

Austin & San Antonio

Large anchor tenants drive new supply

Market overview

Supply

Supply in both Austin and San Antonio remains tight as providers have held off constructing new supply. Hyperscalers building data center capacity on their own behalf has made some providers think twice about adding supply in San Antonio. Several providers have V-Power availability from the utility in Austin, while the market has hindered some providers from adding supply.

Demand

A balance of technology companies and enterprise users drove demand in the first half of 2020. The second half recorded less activity than anticipated due to lack of colocation demand from the cloud users. Enterprise demand in both markets was light in the second half of the year.

Market trends

Providers have not stepped up construction to increase supply, so the market has limited options on the supply side. Demand decreased in 2020 as the cloud providers, who contributed to the majority of absorption in 2019, sat on the sidelines in 2020. Pricing remained steady due to lack of options and new construction.

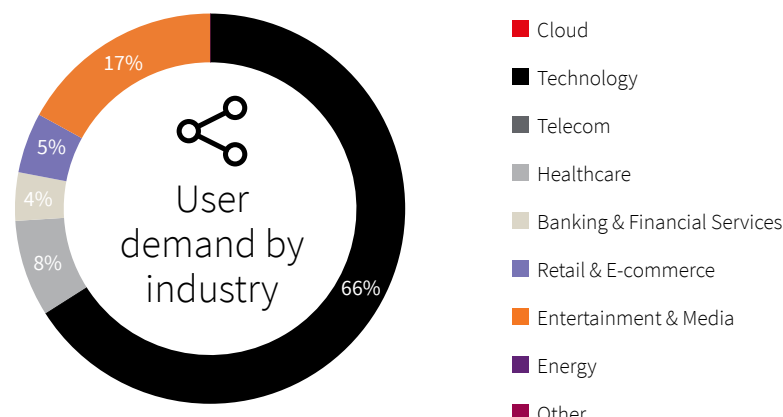
Outlook

for Users

- Lack of turnkey space requires longer-term capacity planning
- Rental rates have remained steady but could see an increase
- Limited options for users in Austin and San Antonio will affect demand

for Providers

- Lack of turnkey space would suggest an opportunity for a provider to build on spec
- Upfront utility planning is key to timely delivery of new supply
- Scalable space is critical to meeting current and future hyperscale demand



Supply

	s.f.	MW
Total inventory:	795,950	144.8
Total vacant:	42,765	5.1
Under Construction:	15,000	2.0
Planned:	102,122	15.0

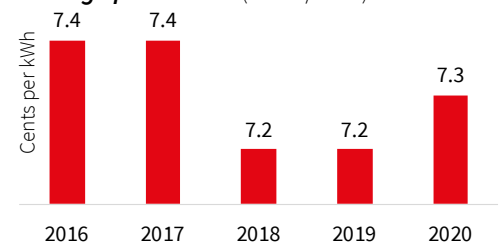
Demand

	MW
Net absorption:	3.25

Rental rates

	Low	High
(All-in) sub-250 kW	\$220	\$290
250 kW-1 MW	\$85	\$120
1-5 MW	\$85	\$105
5 MW plus	-	-

Average power rate (cents/kWh)



Data Center leverage

H2 2018	H1 2019	H2 2019	H1 2020	H2 2020

User-favorable market
Neutral market
Provider-favorable market

Authored by: Curt Holcomb

See page 35 of this document for contact information.

Boston

Slow growth continues across all sectors

Market overview

Supply

Market supply remains healthy across major submarkets in Boston, including downtown, 128, and 495.

Demand

Demand is limited but steady across the markets. One Summer and 70 Innerbelt continue to be the most requested locations for data center space.

Market trends

Demand remains strongest among life sciences and pharmaceutical companies that have experienced rapid growth in 2020, which is expected to continue for several years.

Outlook

for Users

- Pricing remains competitive for space and power
- Energy-efficiency projects are reducing overall costs
- High competition for full-service offerings, including DR

for Providers

- Pricing has been stable for the last year
- Energy-efficient and green offerings will be attractive to customers
- Facility closings over the last three years have stabilized the market

Supply

	s.f.	MW
Total inventory:	1,200,000	160.0
Total vacant:	255,000	29.0
Under Construction:	0.0	0.0
Planned:	60,000	10.0

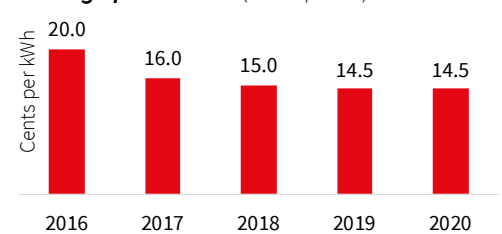
Demand

	MW
Net absorption:	0.6

Rental rates

	Low	High
(\$/kW+E) sub 250 kW	\$115	\$280
250 kW-1 MW	\$110	\$145
1-5 MW	\$95	\$130
5 MW plus	\$85	\$115

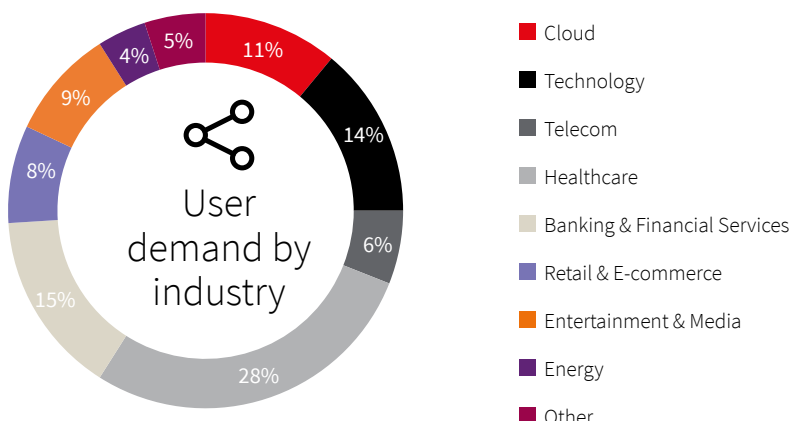
Average power rate (cents/kWh)



Data Center leverage

H2 2018	H1 2019	H2 2019	H1 2020	H2 2020

User-favorable market
Neutral market
Provider-favorable market



Authored by: Gabe Cole

See page 35 of this document for contact information.

Chicago

A feeding frenzy picked up in 2020

Market overview

Supply

Available supply increased in the second half of 2020 with newly commissioned capacity from Coresite (6 MW), RagingWire (6 MW), Digital CrossRoads (3 MW) and Evoque (3 MW). That said, there were several major leases that resulted in entire assets being leased by cloud companies. Several providers have or will run into campus capacity issues as a result of recent leasing.

Demand

The second half of 2020 recorded a substantial uptick in user demand. This has been driven primarily by large hyperscale transactions, who accounted for approximately 44 MW of the total absorption. Managed service providers are expanding, enterprise users are implementing post-COVID initiatives, and financial services are migrating from East Coast due to NJ tax initiatives.

Market trends

The market recorded a huge uptick in both demand and supply, which has been driven by the new state tax-abatement program. Cloud users are taking down massive capacity and eliminating entire data centers from the market. Enterprise users and managed service providers are expanding within market. We anticipate continued strong demand in 2021.

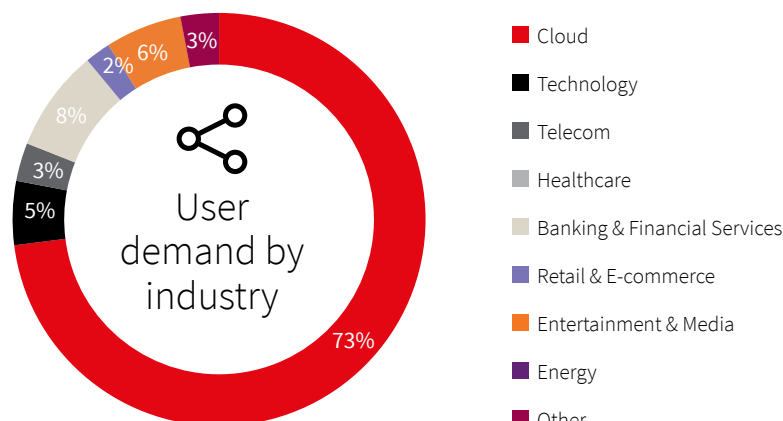
Outlook

for Users

- Stabilization in market rates and increased flexibility
- Few options due to historic cloud leasing
- Tax incentives make Chicago one of the cheapest markets nationally

for Providers

- Increased demand from all user types
- Reduced market availability in Elk Grove for H1 2021
- Increased out-of-town interest in the market



Supply

	s.f.	MW
Total inventory:	5,032,500	621.0
Total vacant:	333,500	55.0
Under Construction:	266,000	17.0
Planned:	820,000	31.0

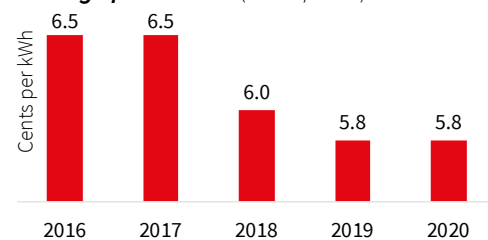
Demand

	MW
Net absorption:	59.0

Rental rates

	Low	High
(\$/kW+E) 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

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market

Authored by: Matt Carolan | Andy Cvengros | Sean Reynolds

See page 35 of this document for contact information.

Dallas/Fort Worth

Steady demand as users take advantage of lower pricing

Market overview

Supply

Supply in Dallas/Fort Worth ("DFW") continues to increase, but at a much slower pace than in recent years. Many of the providers have plans to increase their supply, but are waiting for additional absorption before kicking off new builds. New builds in 2020 include Stream in Garland and Equinix at INFOMART, completed in the first half of 2020.

Demand

DFW demand continues to be all about the enterprise user as in years past. Demand is coming from a diverse group of industries including financial, technology, and healthcare companies. The hyperscalers and cloud companies are limited to smaller requirements versus the large multi-megawatt deals completed in other markets.

Market trends

Pricing in DFW continues to be very soft as competition among the providers has led to aggressive pricing and incentives. Most of the major providers have a presence in the DFW market, and diverse options coupled with aggressive pricing means DFW will continue to see enterprise users evaluating the market.

Outlook

for Users

- Renegotiations and renewals will provide increased value to users
- Users locking in lower rates and more flexible terms
- Flexible terms and low rates for credit-worthy logos

for Providers

- Organic growth from existing customers feeling expansion
- Users are valuing higher-density infrastructure
- Cloud access and services are key differentiators

Supply

	s.f.	MW
Total inventory:	395,430	595.6
Total vacant:	640,621	84.3
Under Construction:	85,000	17.0
Planned:	1,420,000	235.0

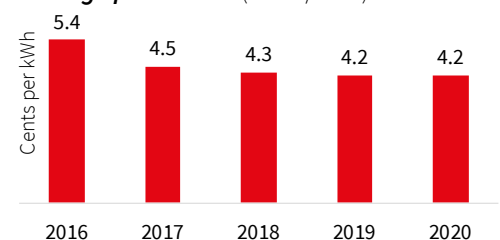
Demand

	MW
Net absorption:	31.1

Rental rates

	Low	High
(All-in) sub-250 kW	\$170	\$250
250 kW-1 MW	\$80	\$110
1-5 MW	\$75	\$95
5 MW plus	-	-

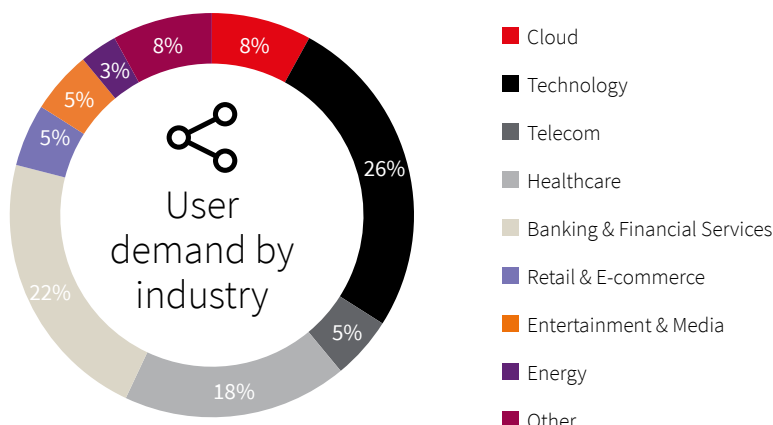
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Curt Holcomb

See page 35 of this document for contact information.

Denver

Denver maintains steady growth through managed services, software, and cloud colocation requirements

Market overview

Supply

H5 Data Centers continues to have growth capabilities, with as little as 1 MW readily available and up to 10 MW with further expansion. Flexential, Iron Mountain, and Cyxtera have a few MW of available space, as well.

Demand

Smaller retail colocation still remains the main source of demand and absorption for Denver. Although many deals have recently been put on hold due to the pandemic, there are still conversations taking place with Fortune 500 companies to acquire space within the market. Denver shows great promise for continued growth by technology and finance institutions.

Market trends

The market still seems to be trending in a positive direction for both retail colocation and disaster recovery for Fortune 500 companies. As Denver continues to invest more into its renewable energy resources and finds ways to reduce TCO, it'll be a valuable market for all types of colocation requirements.

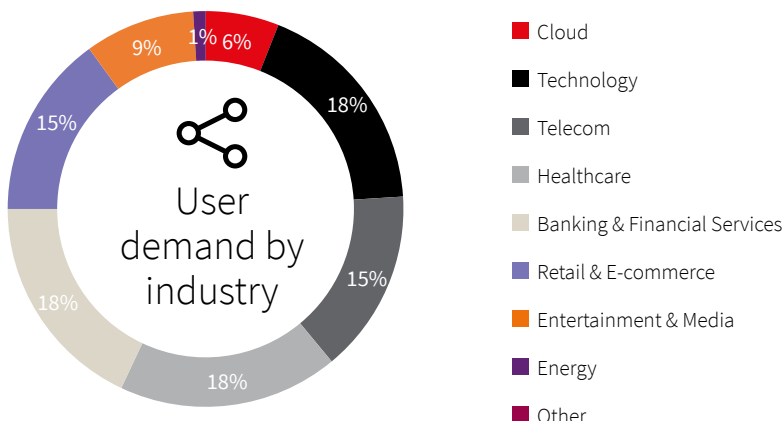
Outlook

for Users

- Continued cloud strategy pressures from the C-suite
- Flexibility going forward will be of even higher importance
- Be on the lookout for more colocation providers to enter the market

for Providers

- Be able to deliver contiguous space to end users
- Continue to emphasize pandemic protocols within the facilities
- Compliance still of high importance for end users



Supply

	s.f.	MW
Total inventory:	902,180	101.6
Total vacant:	224,804	17.3
Under Construction:	0.0	0.0
Planned:	176,301	32.8

Demand

	MW
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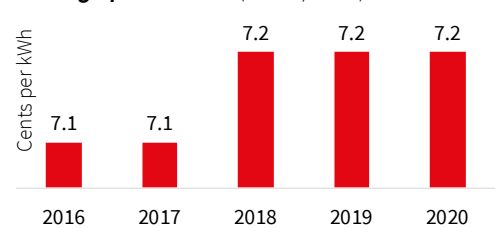
Net absorption:

	5.3
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Rental rates

	Low	High
(All-in) sub-250 kW	\$200	\$300
250 kW-1 MW	\$105	\$125
1-5 MW	-	-
5 MW plus	-	-

Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market

Authored by: Mark Bauer

See page 35 of this document for contact information.

Houston

One large transaction is highlight of 2020

Market overview

Supply

Supply modestly increased as providers have stayed on the sideline with little new supply on the horizon. Speculative development of capacity will hinge on improvement in the oil and gas sector. Providers have, for the most part, declined to build speculatively so far in 2020.

Demand

Demand is tepid at best as the region has experienced the oil bust and COVID-19 simultaneously. The energy industry historically has driven data center demand in Houston and that has not changed. Once the energy industry comes out of its current slump, the forecast for the Houston market will improve.

Market trends

Supply is not the issue in Houston. Lack of demand is currently driving the market as providers have lowered pricing in an attempt to compete for the users. Providers with the ability to quickly add to supply may benefit as the market recovers.

Outlook

for Users

- Lack of new supply will soften price compression
- Quality space available at competitive pricing
- Users leveraging market to renegotiate terms

for Providers

- Providers connecting Houston facilities with their other markets
- Access to cloud providers and services key
- Providers focusing on retaining tenants

Supply

	s.f.	MW
Total inventory:	1,118,000	142
Total vacant:	140,000	15
Under Construction:	10,000	1.5
Planned:	550,000	80

Demand

	MW
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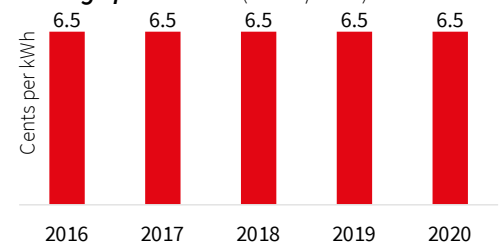
Net absorption:

	7.5
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Rental rates

	Low	High
(All-in) sub-250 kW	\$170	\$250
250 kW-1 MW	\$80	\$110
1-5 MW	\$75	\$95
5 MW plus	-	-

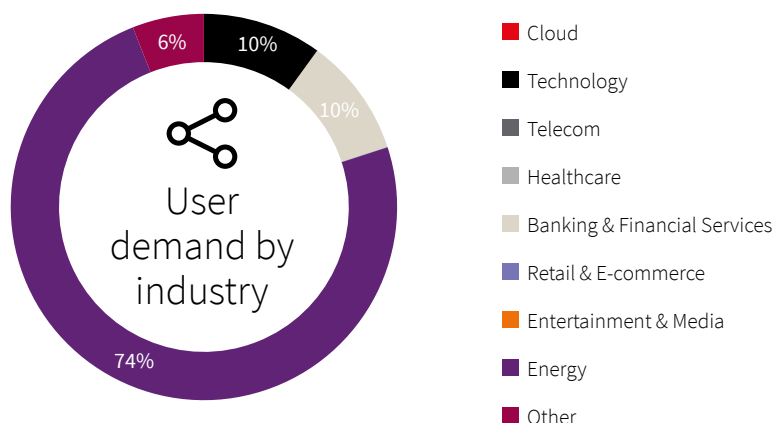
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Curt Holcomb

See page 35 of this document for contact information.

Los Angeles

Los Angeles market slows as users delay decisions due to COVID-19 restrictions

Market overview

Supply

The large hyperscalers slowed their Southern California growth as they focus on other markets. Coresite and GI Partners' addition of power will tremendously increase available options, thus, increasing competition.

Demand

Work-from-home and the demand for fast and reliable content will continue to drive market demand.

Market trends

Smaller expansions and sub-25 kW deals are the focus of the market.

Outlook

for Users

- New inventory hitting the market
- Continued rate compression and consolidation among providers
- More options in the market to further reduce rates and increase competition

for Providers

- Providers need to update infrastructure and deliver turnkey environments
- Expect more-efficient environments to combat high energy rates
- Higher return from investments in critical infrastructure from higher-level clients

Supply

	s.f.	MW
Total inventory:	2,300,000	230.0
Total vacant:	320,000	12.0
Under Construction:	160,000	9.0
Planned:	0.0	0.0

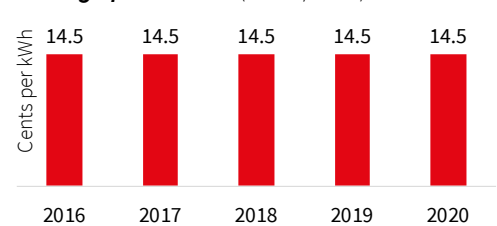
Demand

	MW
Net absorption:	5.0

Rental rates

	Low	High
(\$/kW+E) sub 250 kW	\$125	\$135
250 kW-1 MW	\$115	\$125
1-5 MW	\$105	\$120
5 MW plus	\$90	\$110

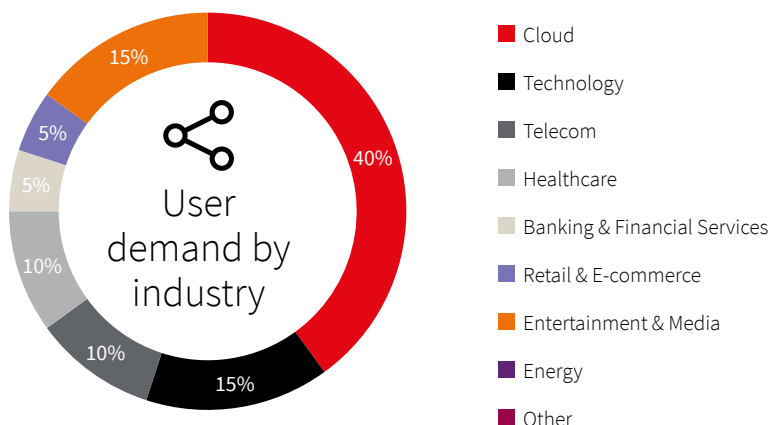
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Darren Eades

See page 35 of this document for contact information.

New Jersey

New Jersey had a strong 2020, despite the COVID-19 setbacks

Market overview

Supply

Continued, strong financial services growth in early 2020 and a pandemic-paused pipeline, have resulted in capacity increases set for Q1 2021. Digital Realty is adding 3 MW in Clifton and has plans set for a second build-to-suit in Totowa. CyrusOne has brought a 6 MW, 30,000-square-foot suite online, QTS will enable 4.5 MW in Q1, and Coresite has 4 MW available.

Demand

Demand continues to increase in New Jersey among financial services, life sciences and technology sectors. Demand drivers supporting the local growth are network-related applications, proximity to financial liquidity markets, cloud on-ramps, IP content, and 5G gateway hubs.

Market trends

Potential of a financial transaction tax has financial markets, buy-and-sell side players, and trading firms on alert. Several operators are looking for anchor tenant opportunities to add this market to their portfolios. Operators and tenants will have a slight pause in Q1 2021 and expect a healthy recovery in the remainder of the year.

Outlook

for Users

- Sustainability and alternative cost-effective power options are emerging
- Investments are being made in IoT sensors for operational efficiency
- Improved virtual, AI, and wireless IoT services are aiding the remote operations

for Providers

- Sufficient utility-powered developments and powered shells well sought out
- Industrial developers contending for prime locations in Northern NJ
- Sale/leasebacks and subleases emerging in older facilities

Supply

	s.f.	MW
Total inventory:	3,850,000	410.0
Total vacant:	195,000	22.0
Under Construction:	155,000	18.0
Planned:	275,000	16.0

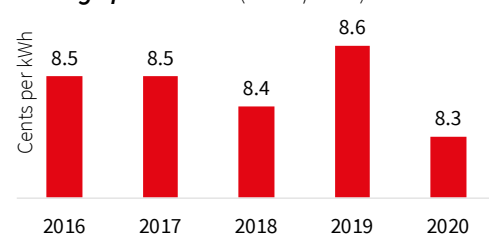
Demand

	MW
Net absorption:	16.0

Rental rates

	Low	High
(\$/kW+E) sub 250 kW	\$120	\$180
250 kW-1 MW	\$105	\$115
1-5 MW	\$95	\$105
5 MW plus	\$85	\$95

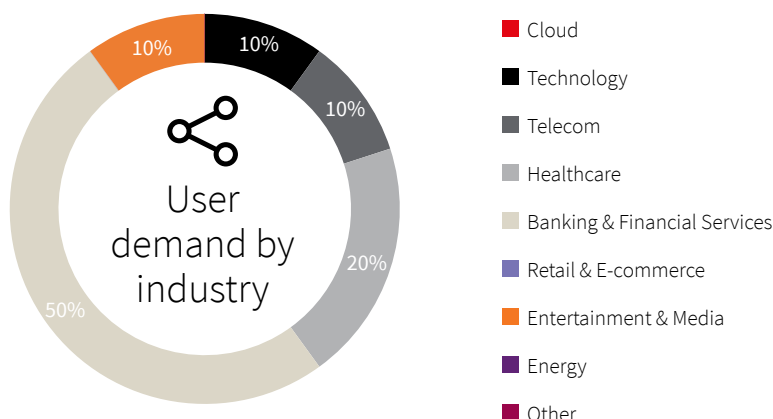
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Thomas Reilly | Jason Bell

See page 35 of this document for contact information.

New York

Carriers prepare for 5G as providers focus on smart building technologies to reduce operating expenses

Market overview

Supply

Sabey added supply in H2 as existing tenants expand. Digital Realty added capacity at 32 AoA to support overflow from its 111 Eighth Ave. consolidation. 1547 and Datagryd position shell conversion space. WebAir, Telehouse, Coresite, 325 Hudson and NYI continue to position remaining retail space.

Demand

NYC continues to see small edge deployments ranging from 25 to 100 kW supporting carrier hotel capacity, content providers, wireless radio networks and local NY government applications. Coresite and Digital Realty have retail success positioning multicloud access deployments of hybrid clouds at 32 Avenue of Americas.

Market trends

Operators and building owners are focusing on IoT, AI and smart building technologies with proven ROI to reduce operating costs to offset losses from the pandemic. Expect carriers to increase deployments in H2 2021 to stay in line with 5G market thresholds.

Outlook

for Users

- Network access to cloud on-ramps are vital to designing multicloud strategies
- Good offers from operators in close proximity to carrier hotels
- Multimarket tenants can receive promotions for network edge and cloud access

for Providers

- Virtual tours with space models and new operation standards are a must with COVID-19
- Investment opportunities in major interconnect locations will emerge
- Managed services are growing as enterprises are capital and resource constrained

Supply

	s.f.	MW
Total inventory:	1,020,000	152.0
Total vacant:	75,000	13.0
Under Construction:	25,000	4.0
Planned:	140,000	20.0

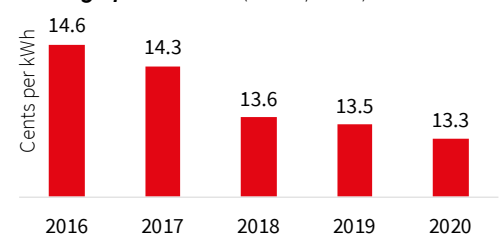
Demand

	MW
Net absorption:	2.5

Rental rates

	Low	High
(All-in) sub-250 kW	\$300	\$350
250 kW-1 MW	\$250	\$300
1-5 MW	\$150	\$250
5 MW plus	\$130	\$150

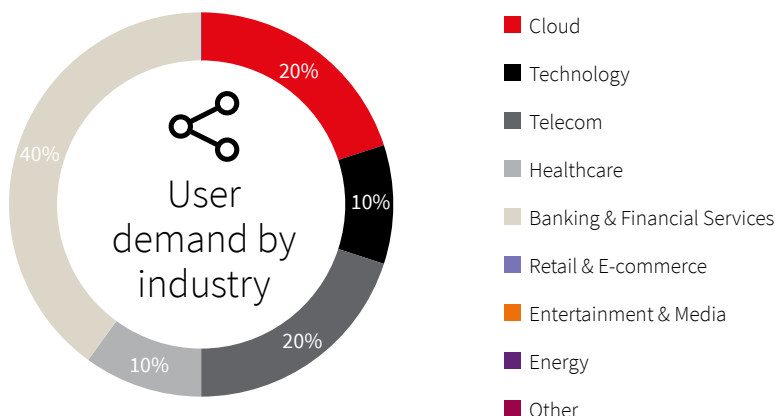
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Jason Bell | James Quinn | Gary Youm

See page 35 of this document for contact information.

Northern California

COVID-19 has not interrupted momentum in the market as fundamentals still among the strongest in the U.S.

Market overview

Supply

Vacancy has fallen to mid-single digits as end users continue to show strong demand. Bringing new supply online has been challenging as nearly all operators have experienced delays in construction as well as the entitlement and approvals process.

Demand

H2 net absorption was 15.9 MW. Operators continue to see strong demand for new product with 72 percent of new product delivering preleased. A small group of hyperscale users accounted for over 60 percent of absorption in 2020 via expansion in new product and build-to-suit projects near existing core deployments.

Market trends

Hyperscale cloud providers have proven to be vendor agnostic as they continue to drive this market. Vacancy rates have fallen from 6.5 percent to sub-5 percent year-over-year. Strong performance in comparison to other asset classes has driven heavy investment interest which has held cap rates steady.

Outlook

for Users

- Work-from-home technologies will increase need for bandwidth and computing
- Near-term supply will remain incredibly tight
- Expect pricing to remain stable or increase in the short term

for Providers

- Need to be mindful of competitive supply coming online
- Need to be realistic about entitlement and construction timelines
- Need to be mindful of development costs and construction delays

Supply

	s.f.	MW
Total inventory:	6,280,413	468.0
Total vacant:	374,140	55.0
Under Construction:	2,029,036	117.0
Planned:	2,546,621	400.0

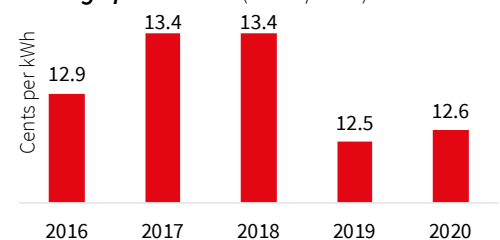
Demand

	MW
Net absorption:	35.3

Rental rates

	Low	High
sub 250 (all-in)	\$200	\$300
250 – 1 MW (+E)	\$140	\$160
1-5 MW (+E)	\$120	\$140
5+ MW (+E)	\$120	\$140

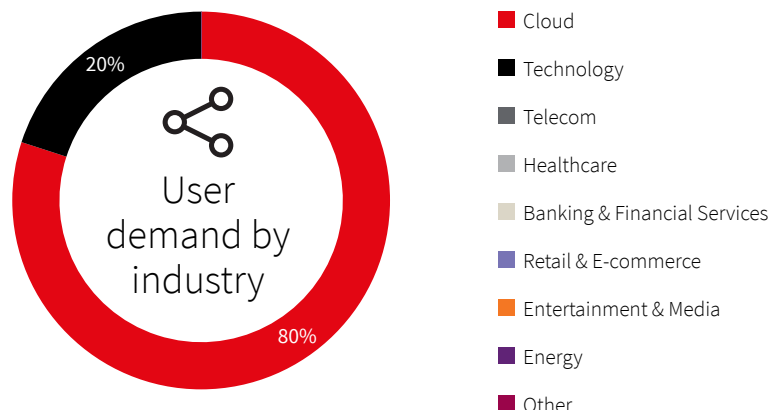
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Raul Saavedra | Patrick Murdock

See page 35 of this document for contact information. | *Northern California includes Silicon Valley/Santa Clara, San Jose, San Francisco, and Sacramento

Northern Virginia

Northern Virginia experienced a historic 323 MW of absorption in 2020

Market overview

Supply

There was a total of 380 MW of single-tenant inventory added, and 230 MW of multitenant inventory added in 2020.

Demand

Social media accounted for an unprecedented 176 MW of absorption in 2020, or 54 percent of the total transaction volume. Additionally, three companies accounted for 213 MW of absorption.

Market trends

Enterprise demand is continuing to grow. New demand is outpacing new power supply, causing longer lead times. The size of deployments continues to grow as enterprise demand gains momentum.

Outlook

for Users

- Historically low rates and additional concessions
- Many high-quality options to consider
- Competition will stay strong for the foreseeable future

for Providers

- Margins decreasing for providers due to aggressive new competitors
- Large hyperscale deployments are at historic highs
- Must be more flexible, offer more services and highlight "on-ramps"

Supply

	s.f.	MW
Total inventory:	17,783,196	2,105.0
Total vacant:	3,027,500	173.0
Under Construction:	5,705,000	326.0
Planned:	11,602,500	663.0

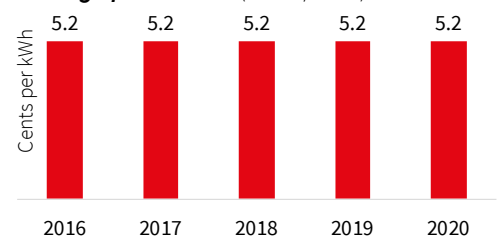
Demand

	MW
Net absorption:	323

Rental rates

	Low	High
(\$/kW+E) sub 250 kW	\$125	\$180
250 kW-1 MW	\$80	\$120
1-5 MW	\$75	\$100
5 MW plus	\$65	\$85

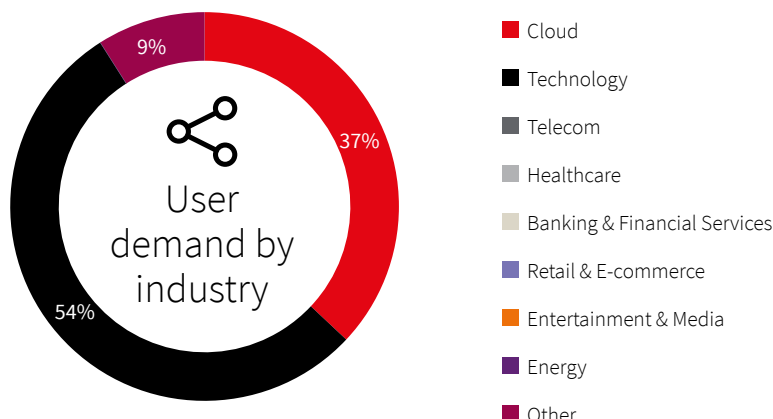
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Jeff Groh | Kelly Katz

See page 35 of this document for contact information.

Northwest

The Northwest continues to develop as a major market, with significant leasing from technology companies and ample construction under way, with few pandemic-related delays

Market overview

Supply

There are pockets of availability throughout all the core Northwest submarkets. However, the majority of new construction and supply delivery is centered around Hillsboro, with large-scale facilities in development by multiple colocation operators.

Demand

The major demand drivers have been via sizable transactions from West Coast technology corporations. In addition to the core markets, such as Central WA and Hillsboro, demand has increased in the metropolitan cores, such as Portland.

Market trends

The amount of colocation corporations with investments in Hillsboro have increased demand as more marketing resources are devoted to the region. Rental costs are stabilizing after multiple years of slow downward pressure. Corporations continue to see Central WA and Hillsboro as low-cost alternatives to markets clustered in and around California.

Outlook

for Users

- Users now have a variety of new construction options to choose from and leverage
- For multimarket transactions, there are large-scale national operators in place
- High operator competition will continue for the foreseeable future

for Providers

- Demand is shifting from powered shell to full ranges of colocation offerings
- Primary market competition for Hillsboro is Arizona and California
- Having options both in the NW and on the East Coast can be a competitive advantage

Supply

	s.f.	MW
Total inventory:	2,092,937	364.9
Total vacant:	127,667	25.2
Under Construction:	258,333	38.8
Planned:	720,000	108.0

Demand

	MW
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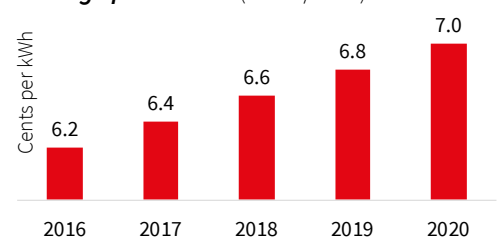
Net absorption:

	35.8
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Rental rates

	Low	High
(\$/kW+E) sub 250 kW	\$160	\$200
250 kW-1 MW	\$90	\$110
1-5 MW	\$85	\$100
5 MW plus	\$80	\$95

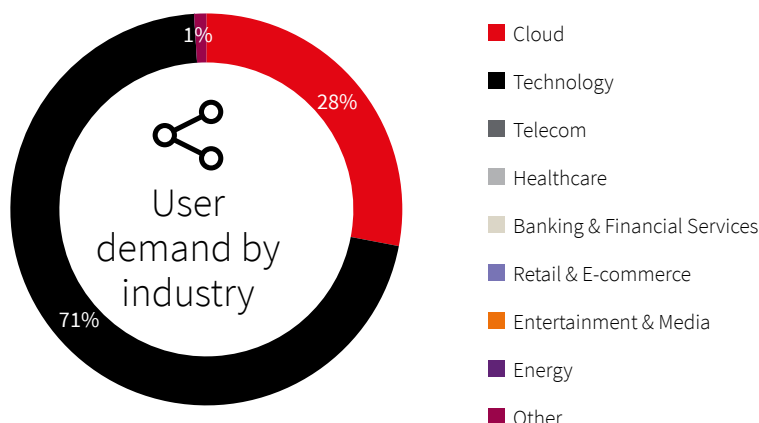
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Conan Lee

See page 35 of this document for contact information.

Phoenix

Cloud and technology drive colocation absorption for the Phoenix market

Market overview

Supply

Supply is not keeping up with demand. In the Goodyear market, Compass is ready with a 60,000 and 120,000 square-foot powered shell and Stream with 4.5 MW of commissioned space. QTS started substation construction on its Central Phoenix campus. NTT is completing its substation on its Mesa campus. Edgecore, CyrusOne, and Aligned are all positioned to commission shell space.

Demand

Demand by hyperscale cloud companies continued through the balance of 2020 with multimegawatt deals expanding these companies' existing colocation footprints in the Valley. Financial, healthcare, social media, and software companies are beginning to expand as well.

Market trends

Corporate-owned enterprise data centers will continue to be brought to market for sale-leaseback to rightsize and outsource operations to colocation companies. Greater Phoenix will continue to see existing Phoenix colocation operators expanding their footprints with secondary locations.

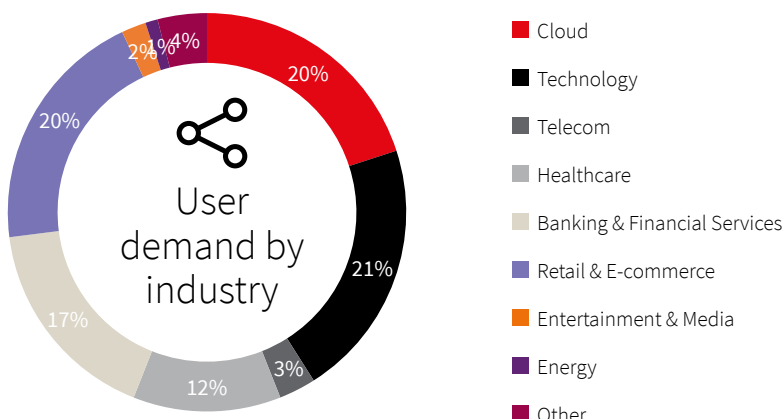
Outlook

for Users

- Negotiating for pandemic clauses in future contracts
- Flexibility going forward will be of even higher importance
- Continued cloud strategy pressures from the C-suite

for Providers

- Be able to deliver contiguous space to end users
- Continue to emphasize pandemic protocols within the facilities
- Compliance still of high importance for end users



Supply

	s.f.	MW
Total inventory:	2,184,076	326.7
Total vacant:	371,536	31.1
Under Construction:	-	0.0
Planned:	959,897	250.0

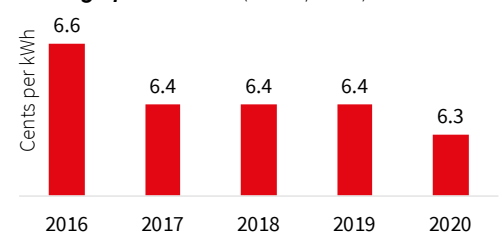
Demand

	MW
Net absorption:	51.0

Rental rates

	Low	High
(All-in) sub-250 kW	\$200	\$300
250 kW-1 MW	\$95	\$110
1-5 MW	\$85	\$95
5 MW plus	\$75	\$85

Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market

Authored by: Mark Bauer

See page 35 of this document for contact information.

Salt Lake City

Salt Lake City is becoming a true competitor in the West region

Market overview

Supply

Supply continues to be added in Salt Lake City. Aligned is continuing the buildout of its campus with a new second building, consisting of 48 MW of designed critical power. Newly announced Novva Data Centers started construction on its first of five buildings, which will support 24 MW. DataBank recently finished construction on SLC5, which added 13 MW to its campus.

Demand

The market's diverse fiber routes across the Pacific Northwest, the Southwest, and the Midwest, as well as its new data center tax-exemption program, has 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 1st, 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

- Continue cloud strategy pressures from the C-Suite
- Utilize new sales tax exemption for reduced TCO
- Continued growth of cloud providers

for Providers

- Stay competitive as more providers look to SLC
- Compliance still of high importance for end users
- Continue to emphasize pandemic protocols within the facilities

Supply

	s.f.	MW
Total inventory:	556,000	80.0
Total vacant:	63,000	10.0
Under Construction:	250,000	31.0
Planned:	1,490,000	160.0

Demand

	MW
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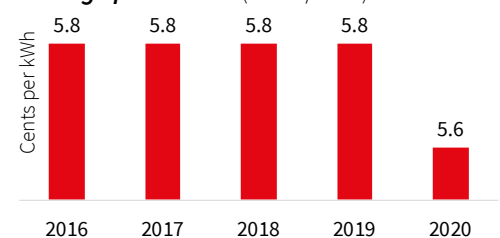
Net absorption:

	15.0
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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

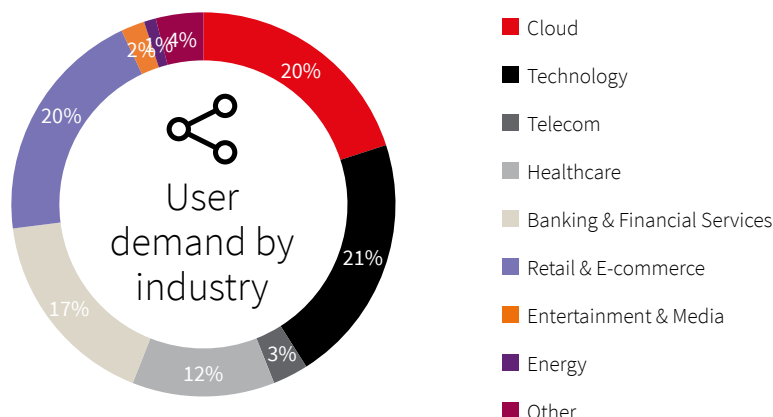
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Mark Bauer

See page 35 of this document for contact information.



Global insights

India

28 percent growth in capacity additions on back of high demand

Market overview

Supply

Global cloud players are expanding in established markets of Mumbai and Chennai owing to excellent infrastructure, while Hyderabad is emerging as a new hotspot backed by state government incentives. Emerging trends by hyperscalers of land banking, 3-site strategy and scalable modular design adoption along with self-perform ambitions led to robust ramp up in capacities.

Demand

The pandemic spurred additional demand for e-commerce, OTT, gaming platforms and work-from-home environment. However, cloud adoption, data localisation and the shift from captive to colocation continued to be secular growth drivers. Unexpected outages faced by the banking and financial services industry made it imperative to upgrade their IT infrastructure.

Market trends

Growing demand has driven capacity expansions and the need for more cable landing stations. An emerging trend of sourcing renewable power by operators gains pace, as large cloud occupiers aim at reducing carbon footprint. Government is enacting legislation to make India a 'Global data hub'. The 4G spectrum and rollout of 5G spectrum are expected to further drive data usage.

Outlook

for Users

- Quality supply in Mumbai, Chennai and Pune to drive high absorption
- Hyderabad and NCR-Delhi to emerge as upcoming cloud region
- Users with sustainability goals to influence operator actions

for Providers

- New entrants are expected to grow through M&A activities and local partnerships.
- Aggressive expansions in preferred locations to drive land values
- Edge data centers to gain importance with improved latency expectations

Supply

	s.f.	MW
Total inventory:	10,095,750	447.0
Total vacant:	1,513,233	67.0
Under Construction:	1,693,900	196.0
Planned:	3,647,633	364.0

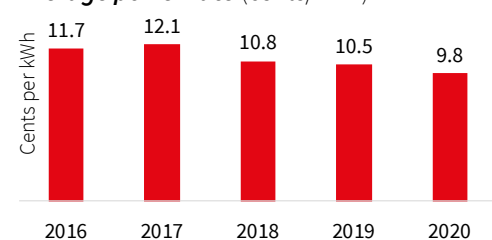
Demand

	MW
Net absorption:	91.0

Rental rates

	Low	High
sub 250 kW	\$120	\$150
250 kW-1 MW	\$90	\$125
1-5 MW	\$80	\$105
5 MW plus	\$75	\$100

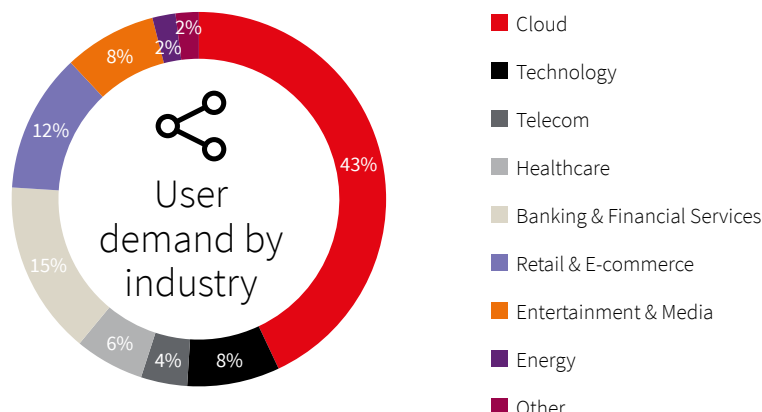
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Rachit Mohan | Jitesh Karlekar

See page 35 of this document for contact information.

London

Demand up 72 percent year-over-year

Market overview

Supply

London colocation market supply stands at 768 MW IT load, the largest market in Europe with over 37 percent of the market share. In 2020, we have seen 72 MW of new supply added to the market.

Demand

We have seen record high levels of take-up in London in 2020, with 87 MW seen throughout the year. This is a 72 percent increase on take-up seen in 2019.

Market trends

2020 marked a record number of planning applications for data centers in London and Slough, as well as a number of land deals. Lack of power and land availability is driving high land values in the core markets such as Slough and West London.

Outlook

for Users

- Access to major financial and business hub
- Most-established data center market in EMEA
- Brexit uncertainty

for Providers

- Lack of available power in core submarkets
- Land prices at record highs
- Rise of self-build hyperscale campus

Supply

	s.f.	MW
Total inventory:	5,633,938	768.0
Total vacant:	375,994	-
Under Construction:	-	117.5
Planned:	-	74.0

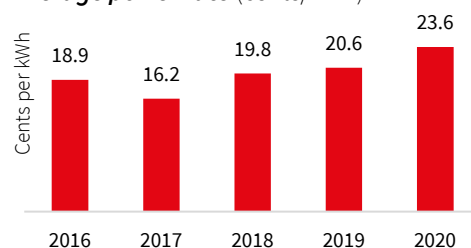
Demand

	MW
Net absorption:	87.0

Rental rates

	Low	High
sub 250 kW	\$242	\$267
250 kW-1 MW	\$133	\$170
1-5 MW	-	-
5 MW plus	-	-

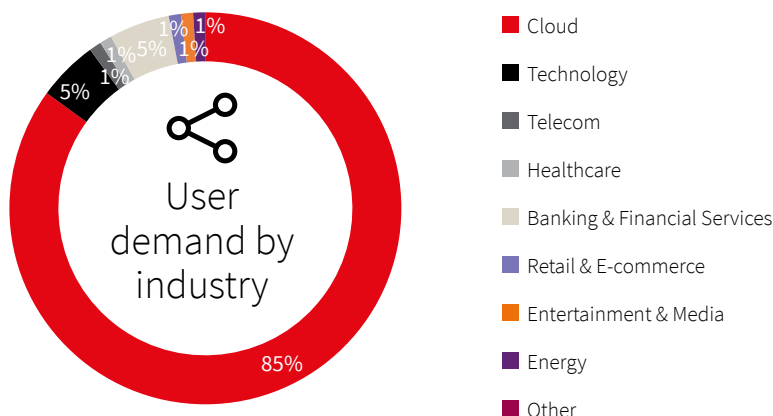
Average power rate (cents/kWh)



Data Center leverage

H1 2019	H2 2019	H1 2020	H2 2020	H1 2021

User-favorable market
Neutral market
Provider-favorable market



Authored by: Jonathan Kinsey | Daniel Thorpe

See page 35 of this document for contact information.

Significant growth in new supply places Frankfurt as the largest mainland colocation provider in Europe

See page 35 of this document for contact information.

Supply constraints place Amsterdam below Frankfurt

See page 35 of this document for contact information.

Smallest colocation market, but the largest self-build market in Europe

See page 35 of this document for contact information.

Canada & Asia Pacific

Canada

Deal velocity has slowed over the past 12 months with many large wholesale requirements being delayed primarily due to the pandemic and travel restrictions. Equinix's acquisition of 25 of Bell Canada's data center facilities in May 2020 continues to be a strong investment play with Bell exiting the data center space. The consolidation of some of the data center operators in Canada has reduced competition. However, the end-user has ultimately benefitted from an improved product with higher standards and more options.

Traditional telecommunications players have been exiting the data center space with only Rogers remaining. The result is a carrier neutral data center which provides improved competition for connectivity services to end customers.

At the local level, **Montreal** remains as Canada's top destination for data center business primarily given the Province of Quebec's low cost of power. Many cloud providers who have established operations in Montreal are now assessing **Toronto** despite higher power costs. **Calgary** has seen a reduction from oil and gas data center requirements.

Asia Pacific

Mainland China is a high growth data center market backed by diverse domestic demand and opportunities for scalability. However, the market is fragmented and generally dominated by local operators that typically have a pricing advantage over international operators.

High network densities in Shanghai and Beijing make these locations attractive to operators, despite power limitations. Some operators are migrating outwards to surrounding areas such as Nantong, Wuxi and Nanjing (from Shanghai) as well as Tianjin (from Beijing) to access power. In the near term, operators may start adopting the use of renewable energy instead, due to the country's commitment to achieving carbon neutrality before 2060.

India is an underserved market. It offers sizable opportunities due to its scale, reinforced by global operators actively seeking local partners. Delhi and Bengaluru are evolving, but Mumbai alone accounts for 45% of current capacity with its submarine landing stations and power capacity supporting growth. Almost 60% of total additional capacity over the next five years in India is likely to be in Mumbai and many hyperscale operators are likely to base operations in the city.

Indonesia is home to a huge young and tech savvy population and they have recently relaxed their position on data protection. Largely due to cost effectiveness, cloud providers and operators are increasingly demonstrating their desire to establish a

See page 35 of this document for contact information.

presence in Indonesia, with Greater Jakarta as a key market. Instead of trying to serve the market from Singapore, deployment of facilities locally would prove to be most cost effective.

Japan is a mature but growing market with international operators looking to increase their exposure, especially in the Greater Tokyo and Osaka areas. Power supply is also an issue in Japan, with long waiting lists even after a site has been acquired. A new focus on renewable energy is likely.

Australia is far from other Asia Pacific markets, so data centers deployed there typically cater to the local market and to a lesser extent, to New Zealand. It is a competitive market with well-established groups, although new-to-market operators are also sourcing local partners. Sydney and Melbourne are the key Australian markets and more and more operators are ramping up development there, raising concerns that there may be short-term over-supply.

South Korea is traditionally a localised market dominated by the major Korean conglomerates but significant interest is now coming from international groups as well as boutique investment houses. International groups typically focus on the immediate area around Seoul; although land availability is more favourable further afield, delivery of power and fiber sometimes becomes an issue. International groups also need to navigate complex ownership structures and difficulty sourcing suitable land due to both geographical challenges and a supply/demand imbalance.

In terms of demand, however, the market remains extremely strong. Private data consumption, as in other APAC markets, is driven by video streaming, online gaming and e-commerce while video conferencing and cloud storage also boost business requirements.

Hong Kong - Greater China is a mature market and there is strong interest from mainland Chinese data center operators, to enter the market as a base for their operations further afield in Asia Pacific and the rest of the world. Location is paramount in Hong Kong and the Tsuen Wan, Kwai Chung and Tseung Kwan O areas of the city are the most popular. However, their new national security law has created some uncertainty pertaining to privacy laws for technology companies.

Singapore is a mature market with a depth of local and global operators, and a recognized status as one of the most global data center hubs in Asia Pacific. Social media and cloud players have also established, or are in the process of developing large scale data center campuses. Currently, there is a moratorium on new data centers in Singapore through 2021 and this may extend into 2022 as the Singapore government actively reviews its economic priorities and pursues its climate change targets.

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