



Confederation of Indian Industry

India Data Centers

- Entering Quantum Growth Phase

India | October 2023

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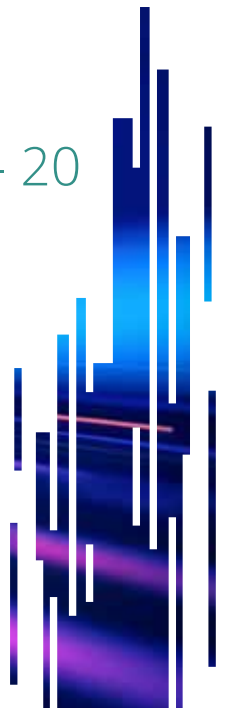
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The Indian Real Estate & Housing Sector occupies a pivotal role in propelling the nation's economic development. It is noteworthy that the infusion of additional investments into the housing and construction sector not only fosters economic growth but also spawns employment opportunities through a chain of backward and forward linkages, resulting in an estimated eightfold increase in employment. Furthermore, this sector stands as one of the primary beneficiaries of foreign direct investment (FDI), actively bolstering more than 350 industries across the country.

The Confederation of Indian Industry (CII), via its National Committee on Real Estate & Housing, has diligently collaborated with all stakeholders, including the Union and State Governments, in spearheading numerous reforms. These efforts are aimed at fostering growth, promoting transparency, and enhancing governance within the sector. Noteworthy initiatives championed by CII, in conjunction with relevant stakeholders, encompass the Real Estate (Regulation and Development) Bill, the advocacy for Public Private Partnership (PPP) initiatives in the affordable housing segment, and the facilitation of Real Estate Investment Trusts (REITs), among other endeavors.

With robust fundamentals and unwavering government support, we hold a confident belief that the real estate and housing sector is poised to take center stage in reinvigorating India's growth narrative over the forthcoming decade.

Today, the Indian construction and real estate industry stands as a beacon of excellence, renowned for its exceptional ability to create some of the world's most distinguished buildings and projects. These achievements bear witness to India's visionary leadership and unparalleled expertise in the realm of real estate. Moreover, the unwavering support and progressive policies implemented by the Government have propelled this sector to new heights, both in scale and sustainability.

This environment has also cultivated significant growth opportunities for stakeholders, fostering vibrant partnerships at both the national and international levels. The relentless pace of urbanization sweeping across the nation has ignited a surge in demand for residential, commercial spaces, and infrastructure projects. The emphasis on developing smart and sustainable cities has

challenged the sector to innovate and create ecologically superior and economically viable models.

CII Indian Green Building Council (CII - IGBC) has been spearheading the green building movement across the country for over 2 decades and has achieved the milestone of 10.27 billion sq. ft. of registered green building footprint with over 11,050 projects adopting IGBC Green & Net Zero Rating Systems. This has enabled India to emerge as the 2nd country in the world in terms of largest green building footprint.

The promising trends indicate a bright future for the real estate sector, with immense untapped growth potential. As we look ahead, with 70 to 80% of India's underdeveloped land yet to be developed, the Indian construction sector is poised for prosperous times. It is imperative that we prioritize designing all forthcoming projects with a green-by-design ethos. Collaborative efforts among stakeholders will continue to drive this momentum, opening doors to new growth trajectories.

We are excited to bring to you this report in collaboration with Colliers which focuses on the growth and future of Data Centres in India. In the last three years, the global data center industry has shown remarkable growth due to high demand driven by expanding hyperscale operations. Operators have seized opportunities in emerging markets with ample resources and infrastructure. India stands out as a hotspot with substantial capacity growth, driven by increased data use, accelerated cloud adoption, and regulatory improvements. Data center stock has more than doubled since 2020 and is projected to double again by 2026, fueled by factors like expanded internet access, government digital initiatives, and rapid adoption of technologies like cloud computing, IoT, and 5G. Major operators are focusing on decarbonization, aiming for net-zero emissions by 2050, with room for further sustainability efforts. The industry, including India, is on track for transformative growth driven by technology and sustainability.

Dr K Nandakumar

Chairman, CII Maharashtra State Council & Chairman and Managing Director Chemtrols Industries

In the face of economic uncertainties, geopolitical tensions, and global supply chain constraints, data centers have continued their steadfast expansion worldwide over the last three years. This remarkable growth is fueled by an ever-increasing demand for data center services, driven predominantly by hyperscale giants rapidly expanding their footprints across the globe.

While 2019-22 can be broadly identified as Phase-1 of DC growth story in India, Phase 2 (2023-26) promises quantum acceleration in the growth trajectory. Simultaneously, with global players venturing into emerging markets, particularly those priding in superior power availability, cost-effective land parcels, and robust infrastructure capabilities, markets like India are primed for quantum growth in data center development. Although still at a nascent stage, India's DC market, spread across 11.0 million sq ft of real estate space in top 7 cities of the country, stands out prominently with 819 MW of capacity as of August 2023.

India's internet economy, expected to register a six-fold growth, reaching USD1 trillion by 2030, will be fundamental to the quantum acceleration envisaged across data centre clusters within the country. As India continues its digital revolution, the demand for data storage, processing, and management is expected to witness an unprecedented surge in next 2-3 years, leading to a doubling of its existing capacity in a relatively shorter span. Moreover, the continued growth of data centers in India will drive innovation, economic development, and job creation within the country. Looking ahead, apart from steady penetration in Tier II cities, upcoming data centers are likely to be meticulously designed with larger and faster data processing capabilities, robust data security measures, and energy-efficient features.

The data center sector in India has attracted substantial investments, amidst contributions from global data center operators, real estate developers, and private-equity funds keen on tapping into India's burgeoning market. The sector's resilience and promising returns have made it a preferred choice amongst investors, with foreign investments playing a dominant role. Moreover, India's improving data center regulatory framework, marked by recent grant of infrastructure status, is likely to enhance transparency and simplify credit access, further aiding growth and investments in the segment. With increased cloud adoption, major hyperscale players are expanding their presence in India, committing notable long-term investments in key markets. Meanwhile, sustainability is also taking center stage in the data center industry, with operators increasingly focusing on decarbonization efforts to achieve net-zero targets by 2050. These sustainability initiatives, apart from having a positive impact on the environment, are likely to enhance rentals, asset valuations, and operational efficiencies as well.

This report in collaboration with Confederation of Indian Industry (CII) provides a comprehensive analysis of India's dynamic data center market, exploring its high paced growth trajectory, key players, regulatory changes, and the transformative impact of emerging technologies. The report also evaluates the investment potential in the near-mid term. Given the criticality and promise of Data Center sector in India, the segment is on the cusp of being elevated from being an "Alternative" real Estate segment to a more "Defining" real estate vertical.

Badal Yagnik
Chief Executive Officer, Colliers India

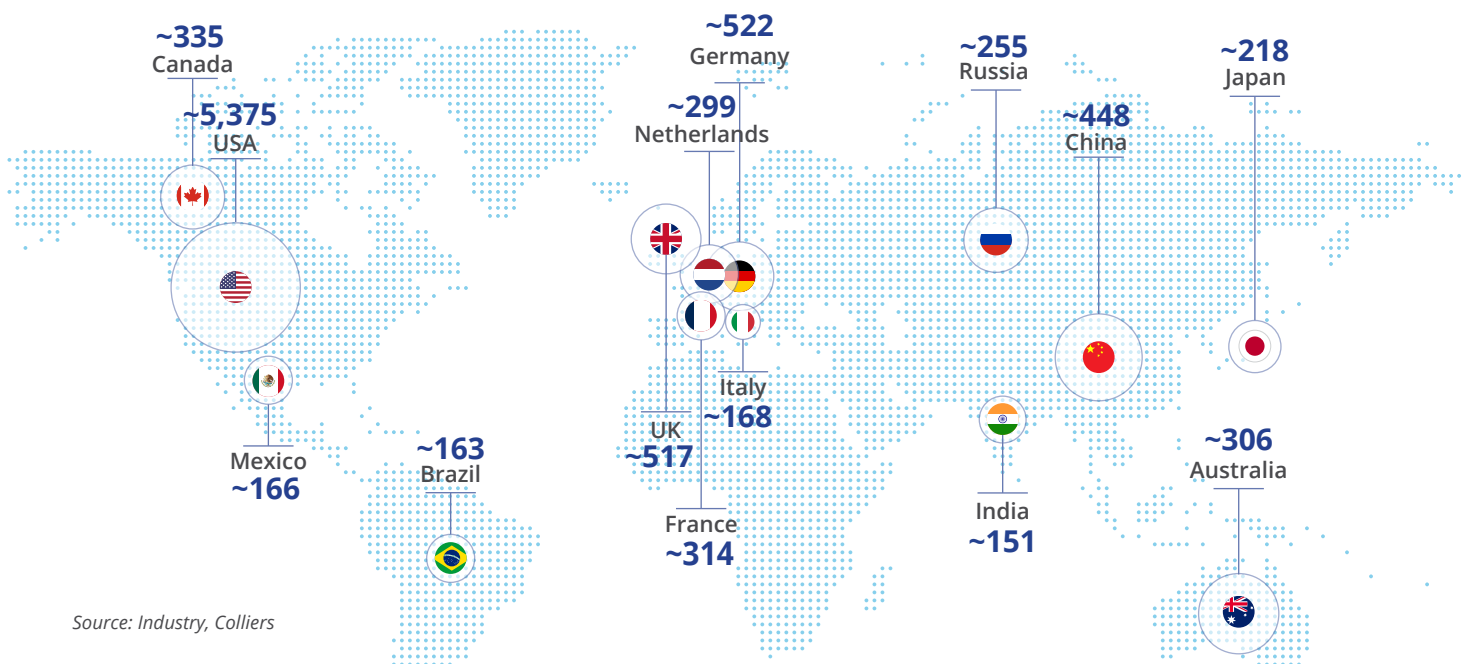


Data center market overview

Navigating the global data center landscape

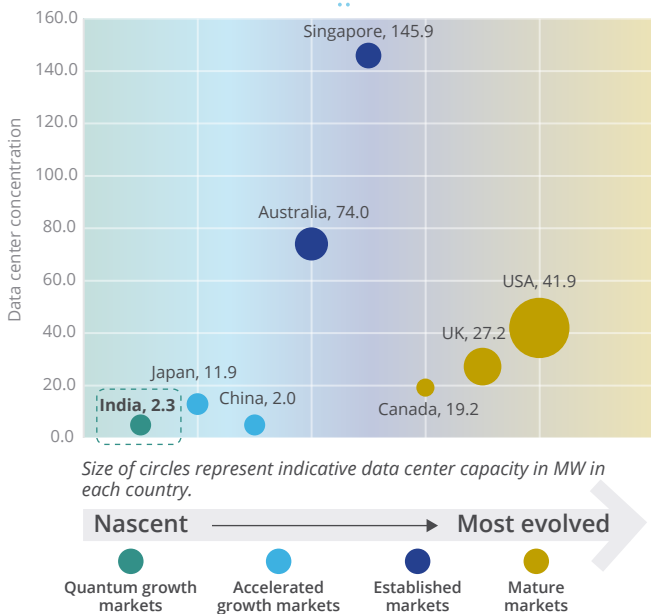
Data centers have continued their relentless expansion globally, despite economic headwinds, geopolitical woes and supply chain constraints across larger markets in the last 3 years. Demand for data centers continues to surge every year led by hyperscalers, who continue to scale up and expand their footprints across geographies. Following the suit, data center operators are increasingly foraying into emerging markets, especially those who score high on power availability, affordable land parcels and infrastructure capabilities for data center development. India specifically has seen remarkable growth in data center capacities in the last three years, driven by exponential increase in data consumption, coupled with improving regulatory framework and robust investments in the sector. India has become one of the top fastest growing data center markets in the APAC region, and ranks 14th globally in its data center inventory. Availability of land and power at affordable rates, attractive returns and robust demand from hyperscalers have made India one of the most sought after market in data center space.

Countries with highest number of data centers (2023)



Source: Industry, Colliers

Country-wise data center market maturity level



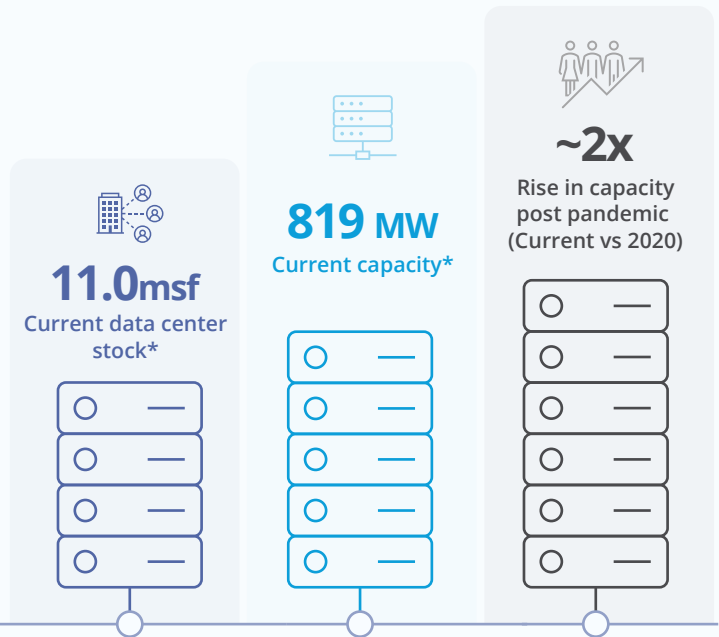
India has over 880 million internet users, almost twice than that of the USA and about 12X higher than that of UK. However, data center space per 1 million of internet users in India stands significantly low compared to the established markets. As data localization becomes a norm, India's data center market is likely to witness accelerated growth, opening enormous opportunities for developers and operators in the space in next 2-3 years. At the same time, abundant availability of space, established global connectivity through submarine cables, comparatively lower land & power costs, and burgeoning demand will further lead data center operators to explore India, resulting in fast paced growth of the sector.

Source: Industry, Colliers

Note: Data center concentration is represented by capacity in MW per 1 mn of internet using population. Data center capacity and internet penetration is taken as of 2022-2023 as per availability. | Graph not to scale.

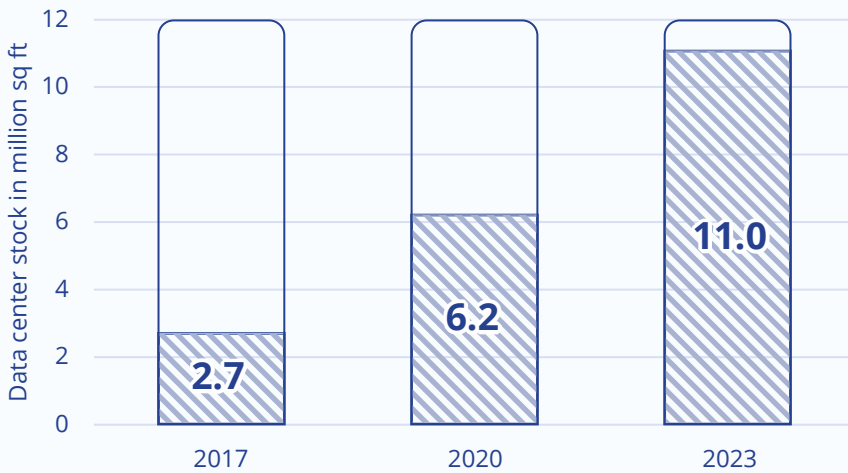
India data center market overview

Data centers in India have experienced significant growth and transformation in recent years, with its capacity rising two-fold post pandemic. As of August 2023, the data center capacity across the top 7 cities stands at 819 MW, spread across 11.0 million sq feet. As the country continues its digital revolution, the demand for data storage, processing, and management continues to rise. Furthermore, initiatives like "Digital India" have accelerated the adoption of cloud computing and data-driven technologies, further fuelling demand for state-of-the-art data centers in the country. Upcoming data centers are being designed with larger data storage capacities, robust data security measures, faster data processing and energy efficient features.



Source: Colliers

India's data center stock almost doubled in 3 years



Source: Colliers

Large players continue to ramp up

Being a CAPEX heavy industry, data center market remains largely consolidated with top 5 operators holding over 75% market share. While large players will continue to dominate the space, burgeoning demand for data centers will provide multiple opportunities for new players to foray India's fledgling data center industry



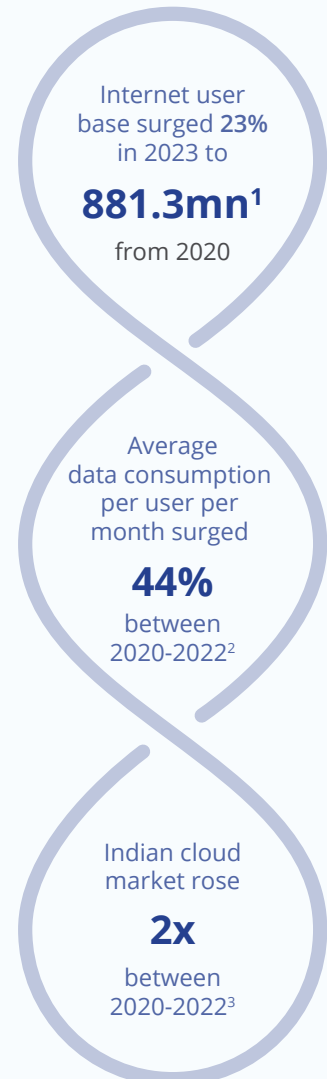
Source: Colliers

* Data pertains to Co-location data centers in top 7 cities - Bengaluru, Delhi-NCR, Mumbai, Pune, Hyderabad, Chennai & Kolkata only. Data center capacity represents total IT load capacity including occupied as well as unoccupied space. Data is as of August 2023.

¹ TRAI-Telecom Regulatory Authority of India, Mar 2023

² Industry

³ Public Cloud India-Statistica market forecast

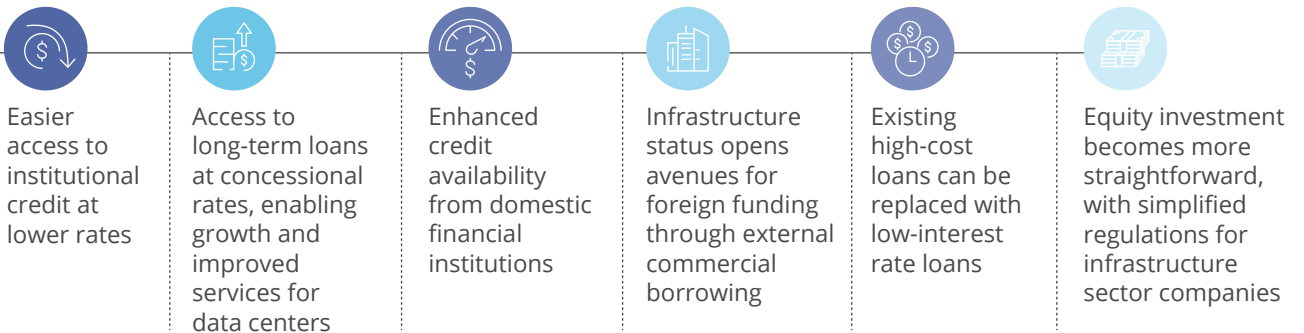


Regulatory push powering the acceleration

India's regulatory framework for data centers is constantly evolving with better transparency and structure, strengthening the data center ecosystem in India. In a significant development, data centers in India were granted infrastructure status by the government during the Union Budget FY2022-23. This move, applicable to data centers with over 5MW IT load in dedicated facilities, brings forth a host of advantages. It not only simplifies access to institutional credit at favourable rates but also opens doors to foreign investments. Infrastructure status facilitates easier equity investment, opportunities for loan refinancing, and improved credit availability. This pivotal change promises to bolster the data center industry, attracting both domestic and foreign investments, ultimately paving the way for enhanced services and growth in the sector.



Impact of granting infrastructure status to data centers



Source: Industry, Colliers

National Data center policy

The policy lays out a framework including various structural / regulatory interventions, investment promotion in the sector, possible Incentivization procedures along with the institutional mechanism required for the governance.

Policy Incentives

The draft policy offers incentives such as streamlined clearances, revised building guidelines, and a substantial INR12,000 crore scheme to attract investors and promote local equipment use

Providing Infrastructure Status to the Data Center Sector

Providing "Infrastructure status" for the Data Center sector, will bring in the benefits of availing long-term credit from domestic and international lenders at easier terms

Boosting Indigenous Innovation

The policy promotes indigenous IT and non-IT hardware, software, and offers fiscal incentives for domestic startups. It encourages global equipment manufacturers to establish units in India and strengthens the testing and certification framework

Inclusivity and Economic Zones

This policy extends benefits to both private and public sector Data Center parks, developers, and operators. It establishes specialized Data Center Economic Zones (DCEZs) to foster an ecosystem for data centers, attracting investments and industry growth

Facilitating Industry-Government Dialogue

The proposal introduces the Data Center Industry Council (DCIC) to bridge the gap between the sector and the Government, advocating for industry interests and engagement with MeitY* to fuel growth

Strengthening Power Infrastructure

Policy facilitates provisioning of quality power for uninterrupted supply

Source: Industry, Colliers | *Note: MeitY – Ministry of Electronics and Information technology

Data protection bill

In August 2023, India's Parliament approved the Digital Personal Data Protection Bill, which introduces clear rules advising organizations to handle people's personal information in the digital age. It covers data processing both within India and outside. Data collected online or offline, and later digitised in India, as well as foreign companies offering goods or services within India come under the ambit of this bill. To use personal data, organizations must have a valid reason and obtain consent from individuals, ensuring data accuracy, security, and deletion when its purpose is fulfilled. Along with data protection, the bill also limits cross-border data storage, encouraging local storage of country's data. This data localisation is likely to intensify the demand for data centers in India in the next 2-3 years.



Key features

Data localization

The Bill applies to digital personal data within India, collected online or offline and digitized. It also covers data processed outside India for goods or services in India

Processing personal data with consent

Personal data can only be processed with consent, which can be withdrawn at any time. Exceptions include voluntary data sharing and government benefits

Data transfer outside India

The Bill permits personal data transfers abroad, except to restricted countries. This provision is likely to create huge demand for data centers in India

Responsibilities of data fiduciaries

Data fiduciaries must ensure data accuracy, security, and erasure when not legally required. The government exempts certain activities like state security, research, archiving, and statistics processing



Source: Data protection Bill, Colliers

Data localisation to bolster data center growth

Data localisation, a crucial aspect of managing data today, involves keeping data within certain borders to follow specific rules. In India's context, localisation will make it mandatory for companies collecting critical consumer data to store and process it in data centers present within India and select trusted geographies. Need for Data Center infrastructure within the boundaries of the country is further necessitated by the data localization provisions of proposed Data Protection Act and for protection of the digital sovereignty of the country in an increasingly connected world. While data localization will primarily ensure protection of personal and financial information of country's citizens, it will also accelerate need for data center spaces for storing large volume of data, thus bolstering growth of Data center industry within the country.



Other digital initiatives



Rural Connectivity and 5G Expansion:

The BharatNet initiative, aiming to connect village panchayats with optical fiber by 2025, opens doors for smaller data centers in towns. The rollout of 5G services, Digital Banking Units (DBUs), and the National Digital Health Ecosystem further increases demand for data storage services in the rural areas of India

Source: Colliers

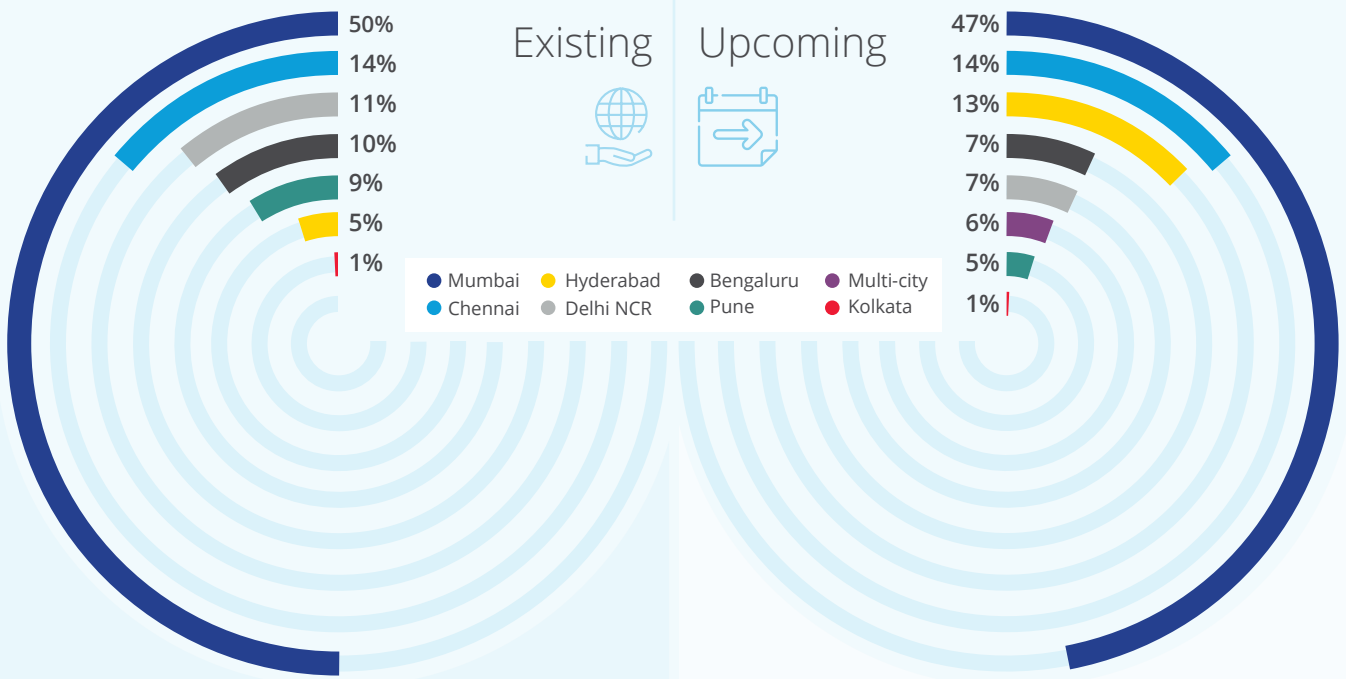


Optic fibre networks augmentation:

India, like the rest of the world, is witnessing substantial investments in data centers. Apart from policy incentives, continuous improvement in power and fibre networks is vital. While international marine cables enhance India's global connectivity, local, intra-city infrastructure enhancements are equally crucial for the success of upcoming projects

Delineating the growth trajectory

Data center capacity split



Source: Colliers

Data center capacity represents total IT load capacity including occupied as well as unoccupied space. Data as of August 2023

Source: Colliers

Data center capacity represents total IT load capacity likely to come into the market in the next 3-4 years

Upcoming supply is considered only for Tier I cities

Mumbai has the highest share of data center capacity in India at **50%** followed by **Chennai** at **14%**

61% of the new additions post pandemic were in **Mumbai**

Chennai saw highest growth in DC capacity at **3X** during the post-pandemic period

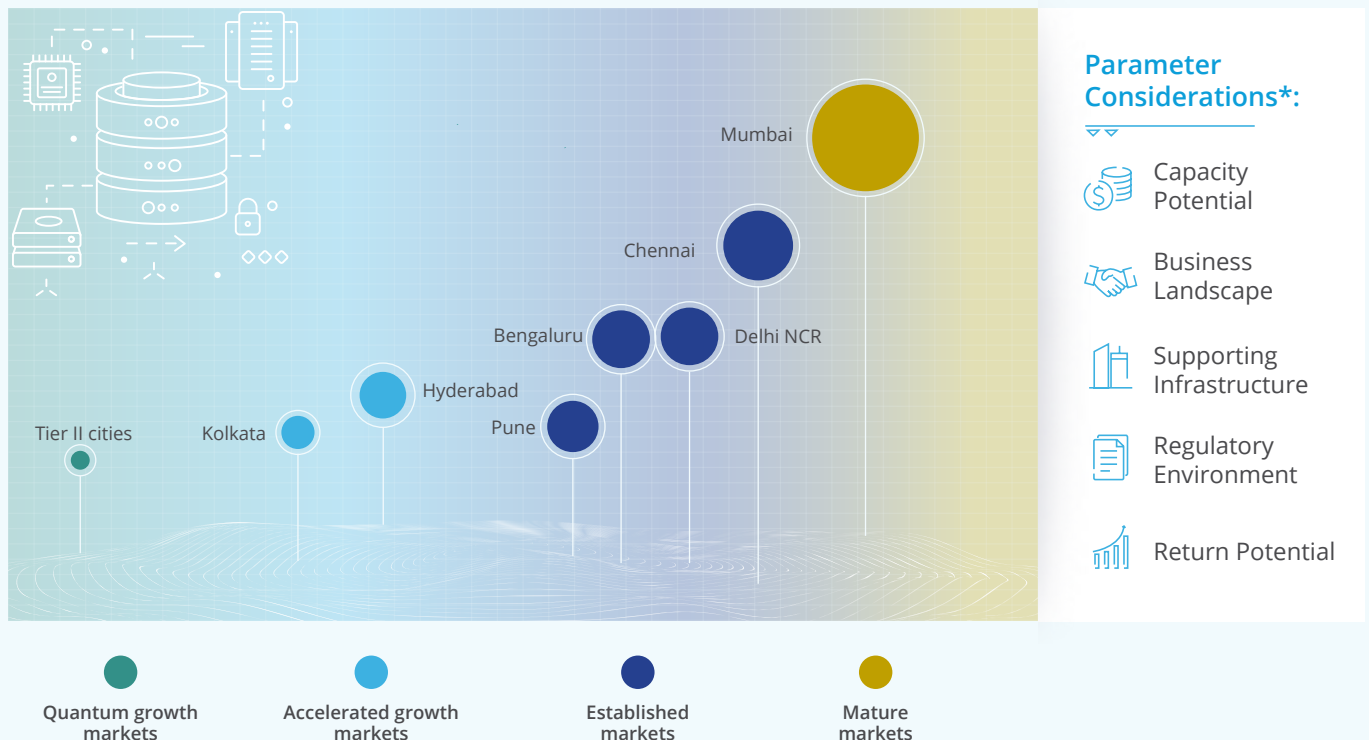
About half of the upcoming supply to be located in **Mumbai**

Chennai and **Hyderabad** are likely to see significant rise in data center supply in the next 3-4 years



Mapping the growth potential of select data center markets

Overall India Market: Nascent stage



Source: Colliers

*Cities are examined on a relative performance scale on each of the parameters (Scale is 1-5, 5 indicating highest relative performance)

Note: Size of the circles is basis the existing data center capacity in the respective cities

An exploration of the DC market potential across various cities of the country, necessitates a close scrutiny on various parameters including but not limited to analysis on existing capacity, planned capacity expansions and operator presence. Moreover, supporting infrastructure elements such as power cables, landing stations and fibre connectivity are critical in understanding the DC growth trajectory in respective cities. State level DC policies and relative affordability of land prices are equally pivotal considerations.

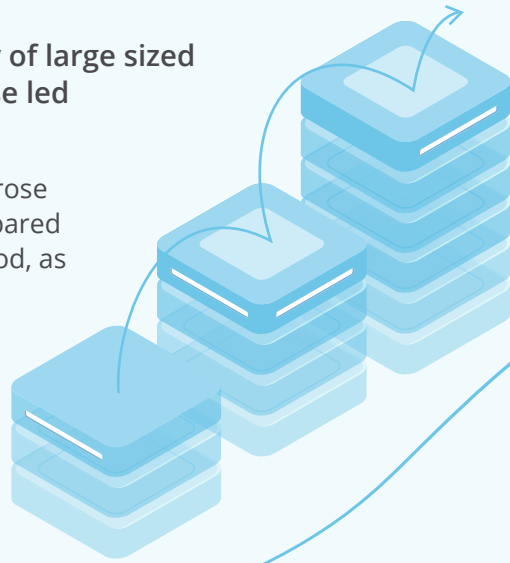
Mumbai continues to remain the most evolved data center hub, hosting half of the data center capacity of the country. Mumbai also features in the top 5 APAC region markets, along with Beijing, Shanghai, Tokyo and Sydney. While Chennai, Bengaluru and Delhi-NCR are already relatively established markets, it is important to note Kolkata's potential of being a zonal data center hub for East India. Infact, Delhi-NCR's rise in the DC landscape of the country, is in a way correlated with data storage requirements of the entire North zone. Although Hyderabad and Pune currently correspond to a 5-10% share of the total data center capacity in India, they are likely to witness robust growth in the next 3-4 years owing to supporting infrastructure and encouraging regulatory framework. Meanwhile, promising returns on investment and growing demand for data centers in close proximity of data consumption centers will eventually result in quantum growth of the DC market in the tier II cities of the country.



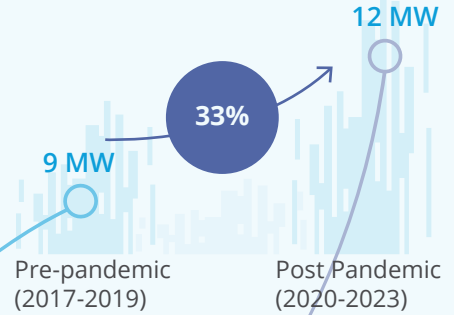
Symbiotic coexistence of hyperscalers and edge centers

Post pandemic, supply of large sized data centers on the rise led by Hyperscalers

Average data center size rose 33% post pandemic compared to the pre-pandemic period, as large hyperscale data centers gained more traction



Average data center size

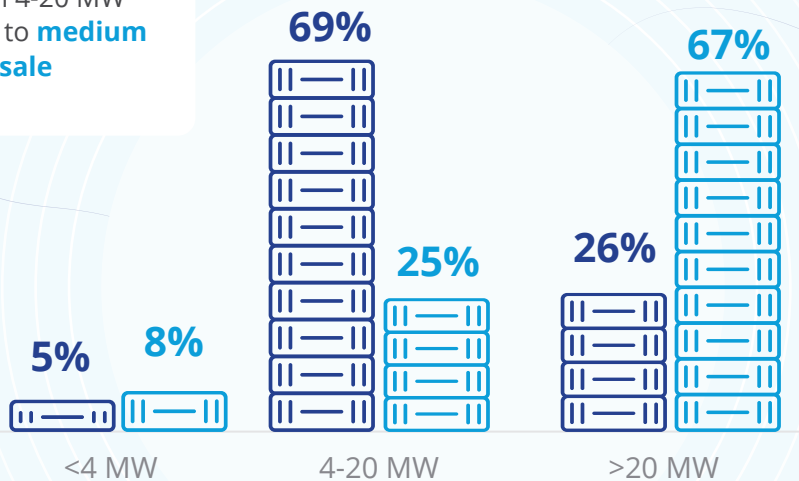


Source: Colliers

Size wise split of data centers (%)

About **70%** of the data center supply during pre-pandemic time was between 4-20 MW capacity, catering to **medium retail and wholesale occupiers**

Share of large size data centers (>20 MW) has increased from **26%** during pre-pandemic times to **67%** post-pandemic amidst rise in demand from Hyperscalers



Average data center size in **Mumbai** and **Chennai** is **50-60% higher** than average sizes in other cities with development of large data center parks

Penetration of small sized data centers (<4MW) currently remains low, but is likely to **increase in next 3-4 years** with more edge deployments

Source: Colliers

*Data pertains to Co-location data centers in top 7 cities - Bengaluru, Delhi-NCR, Mumbai, Pune, Hyderabad, Chennai & Kolkata only. Data center capacity represents total IT load capacity including occupied as well as unoccupied space. Data as of August 2023

Tier II cities to witness steady growth amidst rapid edge deployments

Unlocking Tier-II Cities' data center potential in India

With only 4% of India's data center capacity in Tier-II cities, the potential for growth is significant as businesses opt for smaller towns

As consumer-centric businesses like banks and OTT* companies seek proximity to their customers, data center demand in Tier II cities is likely to accelerate

Tier II cities such as Ahmedabad, Jaipur, Kochi, Nashik, Vijayawada, etc. are steadily witnessing growth due to their strategic location and infrastructure (including power, fibre and cable connectivity) upgrades

Tier II cities offer valuable disaster recovery advantages, ensuring secure backup for critical operations

Edge data centers soon to gain traction

Rising demand for edge data centers is driven by IoT, big data, AI, cloud, OTT streaming, and 5G technologies as they provide reduced latency, real-time analysis, enhanced app performance, and business agility

Leading operators are establishing edge data centers not only in Tier I cities but also in Tier II cities

India is expected to add additional 400-500 edge data centers in the next five years across multiple cities

Edge data centers will support the sustainable transition of data centers through smaller footprint, and lower energy consumption

*OTT - Over the top





Data center investments landscape



Investments to replicate growth potential

India's data center market has experienced remarkable growth post pandemic, attracting about USD7.0 billion of total investments since 2020. These investments are from global data center operators, real estate developers, and private-equity funds looking to expand into India. Global institutional investors and developers have been increasingly partnering with data center operators to entail operational expertise and market experience in data center development. Global hyperscalers too are viewing India as a prime market for expansion and developing their own Built to Suit (BTS) data center facilities specially customized as per their requirements. Developers are pursuing "land banking" strategies, by acquiring land for future projects in markets where development sites are scarce. About 11% of the total investments in data centers since 2020 were in land, and the quantum should rise further in near future, as DC players continue to scale up their operations across geographies.

Note: The total investments include investments deployed during 2020-2023 period for development of data centers by PE players, DC operators and real estate developers.



Total investments since 2020

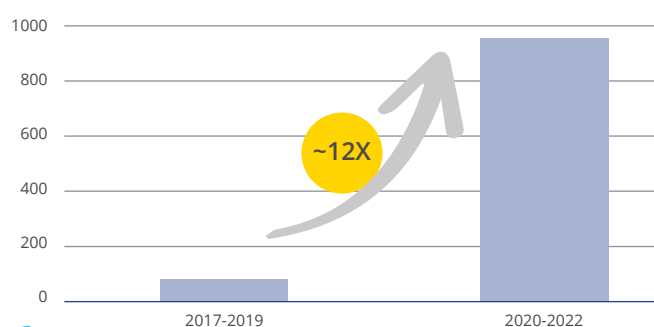
USD
~7bn

Source: Colliers

Institutional investments in data centers rise multifold

Data centers have remained a preferred choice among investors and have received about USD1.1 bn private equity investments since 2020, owing to their strong growth fundamentals and attractive returns. During 2020-September 2023, data centers accounted for about 54% of total private equity investments in alternatives. Foreign investors specifically played a dominant role, contributing over 90% of investments in the sector during the period as they sought asset diversification and enhanced risk adjusted returns amidst volatile market conditions. Foreign investments have helped data center operators to achieve the desired scale, foray into new markets and achieve development and operational expertise by providing access to capital. As the data center market grows bigger, the sector will likely witness allocation of more foreign capital, as global investors will look to have a stake in quality assets for long-term returns.

Institutional inflows in Data centers (USD million)



About **54%** of the total investment inflows in alternatives post pandemic (2020 onwards) were from data centers

Institutional investments in Data centers surged **~12X** post pandemic (2020-22) compared to pre-pandemic time (2017-19)

Foreign investors accounted for over **93%** of the total inflows in data centers post pandemic (2020 onwards)

Source: Colliers

Note: The institutional flow of funds includes investments by family offices, foreign corporate groups, foreign banks, proprietary books, pension funds, private equity, real estate fund-cum-developers and sovereign wealth funds. The data has been compiled as information in the public domain

Why are investors attracted to India's data center market ?

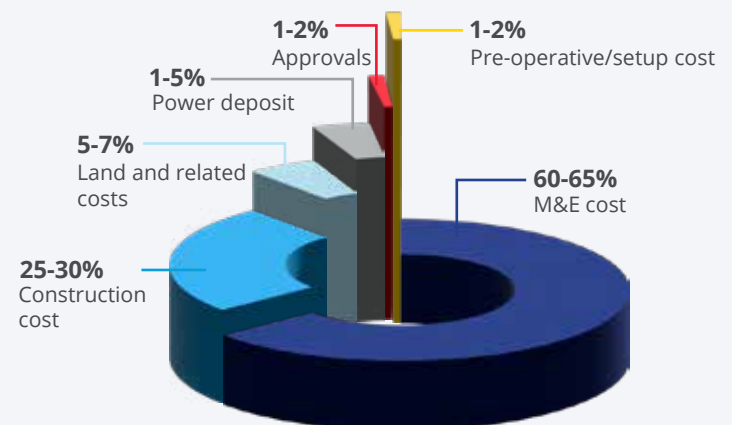
- Strong growth prospects owing to increased cloud adoption, digital penetration and generative AI
- Robust demand from Hyperscalers and Tech, BFSI occupiers
- Relatively low land, labour and construction costs compared to other markets
- Indian data center operators are increasingly focusing on sustainability through energy-efficient technologies to reduce energy consumption.
- Regulatory reforms supporting data center growth, boosting investor confidence
- Attractive yields of 16-17% compared to 7-10% in retail, office and warehousing sector
- Demand for core assets remains volatile amidst externalities

Source: Colliers

Large players, larger pie

Development of data centers requires significant investments of about USD7-7.5 million per MW IT load capacity. Real estate and construction costs constitute 30-40% of the total data center development cost. Owing to the high volume of investments required, large investors such as Blackstone, Brookfield, Capitaland and Kotak have been primarily infusing funds in data center space in India. Also, given the capital-intensive and high-specification nature of data centers, investors are increasingly partnering with local operators to develop state of the art data centers across India. Global hyperscale cloud providers are also eyeing India for expansion, and are increasingly opting for 'own and operate' model, while they remain core occupiers of existing colocation space.

Data center development cost split



Source: Colliers

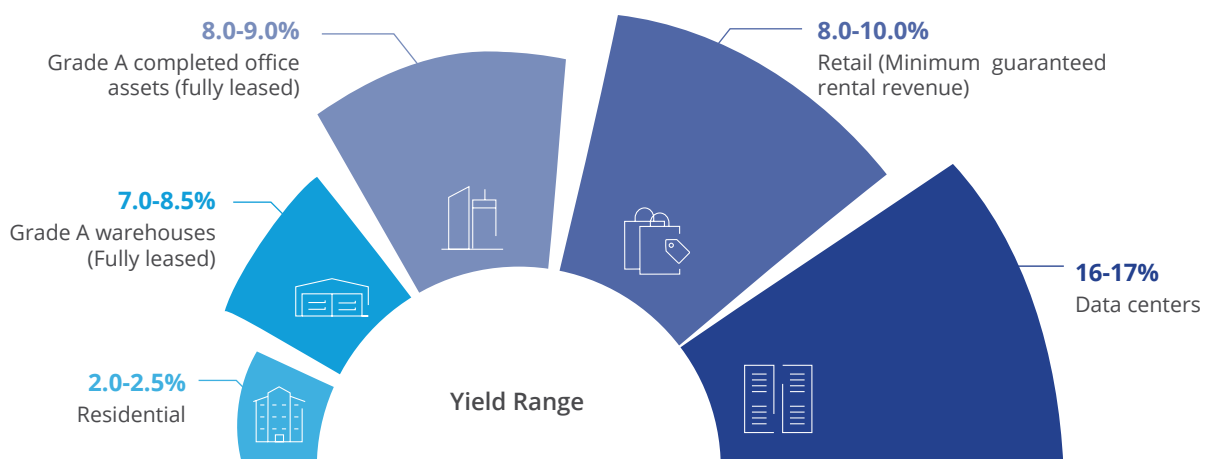
Note: Construction costs include both hard costs (labor, materials, utilities) and soft costs (design fees, legal fees, taxes)

M&E is Mechanical & Electrical cost

Hyperscalers go for own and operate model

Mass adoption of cloud computing and artificial intelligence is driving exponential growth for data center space in the country. Top Hyperscalers in the space are also ramping up their expansions across top locations in the country as they look to capitalize on the increasing demand from cloud usage. 2023 saw some landmark pre-commitments from top hyperscalers in major markets. In the beginning of 2023, Tech giant Google signed a 28-year land lease agreement for its new data center in Navi Mumbai aimed at expanding its cloud infrastructure in India. As a cost optimisation and revenue – boosting strategy, hyperscalers are looking to build their own Built to Suit (BTS) data center facilities in India. We are likely to witness more investments from hyperscalers in the next 3-4 years, who are looking at large scale expansions in India, focusing on long term growth.

Gross Yields across real estate sectors



Source: Colliers

Note: Pre-tax yield ranges are indicative only

Data centers offer robust steady risk adjusted yields of approximately 16-17%, outperforming core office assets at 8-9%.

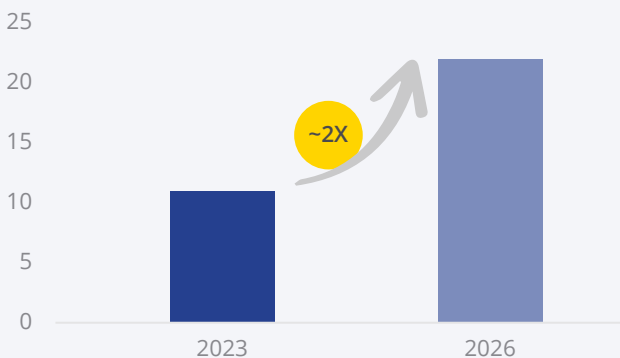
Stock & investments to double up faster



Data center stock to cross **23 msf** by 2026

India's rapid digital transformation will continue to drive substantial growth in the data center industry going ahead which will further drive its real estate demand. Data center stock is expected to cross 23 msf by 2026, catering a total data center capacity of ~1800 MW

Institutional inflows in Data centers (USD million)



Source: Colliers

Data centers hold investment potential of **USD 10 Bn** in next 3 years

Data centers are likely to attract investments over USD 10 billion, in the next three years driven by increased internet access, government digitalization initiatives, and the adoption of cloud computing, IoT, and 5G. Investors are capitalizing on the data center revolution sparked by data localization efforts in the country, drawn by the prospect of stable income and better yields



USD 10 mn

overall investments in 2023 - 2026

40% higher than 2020-22 period

Note: The investment potential is estimated by assuming the capacity additions during the period and for next 3-4 years and the resultant investment in a staggered manner.

Demand from **hyperscalers** to remain strong; BTS developments to gain prominence

Hyperscalers are expanding in India's top locations to meet the rising cloud demand by developing and operating their own data centers. Hyperscalers are likely to pour more capital in the next 3-4 years for development of data centers in India as they aim for long-term growth, further establishing their dominance in India's data center market

Edge data centers to see rise in investments

As lower-latency processing demand grows, edge data centers present a promising investment opportunity. Major data center players are planning to establish several edge centers in India, driven by the imminent 5G adoption surge across the country. This is likely to elevate edge data centers as prime investment options, which in themselves will steadily penetrate in Tier II cities as well

Developers to opt for **land banking strategies**

As the demand for data centers across top locations remains strong, developers are likely to pursue land banking strategy. This will enable them to acquire land for future projects at strategic locations

Core cities will continue to dominate; **Tier II cities** to witness steady growth

Mumbai and Chennai are likely to house 60% of the new additions in next 3 years. Tier II cities will also see steady growth, with enterprises and startups establishing their bases in these cities

Indispensability of sustainable data centers



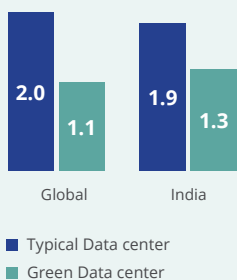
Indispensability of sustainable data centers

Demand for digital services has grown rapidly over the past few years. Global internet users have more than doubled since 2010 levels as per International Energy Agency (IEA) leading to a 20-fold rise in global internet traffic. According to IEA, data centers and data transmission networks account for 1-1.5% of the global electricity use. They also account for about 1% of energy-related greenhouse gas (GHG) emissions significantly contributing to temperature rises and climate changes. As data center footprint in India is expected to double by 2026, its share in carbon footprint is likely to surge significantly. Hence, upcoming data centers are required to be future-ready as they will have a long - lasting impact on the environment and climate for the next few decades.

Data center performance and efficiency metrics

The contribution of data centers towards sustainability can be determined by its three primary components - **Power Usage Effectiveness (PUE)**, **Water Usage Effectiveness (WUE)** and, **Carbon Usage Effectiveness (CUE)**

Average PUE of data centers



CUE

If CUE is close to 0, then that DC is more carbon efficient

Ratio of total CO₂ emissions by data centers by total IT energy consumed

Source: Industry, Colliers

PUE

If PUE is near to 1, it tends to a sustainable data center as all the power is used for computing and less power is lost for transmission/ lighting / system cooling

Ratio of total power used by a data center and its consumed power (power delivered to computing equipment)

WUE

If WUE is lower, the data center is more water efficient, hence sustainable

Ratio of annual water usage in data center (cooling, humidification, etc. and the energy consumption of the IT equipment)

Data center operators look to step up the sustainability ladder

Top data center operators are increasingly prioritising decarbonisation of their data center portfolios, committing towards achieving their net zero targets by 2050. Decarbonisation offers significant benefits to operators, in terms of enhanced rental premiums, asset valuation, brand recognition and reduced operational costs. While some of the leading operators have already reduced their carbon emissions by 10-20% by adopting sustainable strategies, a lot more is to be done to achieve the net zero goals.

What has been done so far?

- **17-20%** reduction in electricity consumption using renewable energy sources from 2020 levels
- **20-25%** renewable energy penetration
- **23-25%** reduction in operational emissions from 5 year old levels
- **24-28%** reduction in overall carbon footprint and **20-40%** reduction in overall energy cost over the last 2-3 years
- **5-7%** improvement in PUE and **18%** improvement in WUE since 2020 levels.
- Sourcing **green energy** through public and private partnerships in major data centers across Karnataka, Tamil Nadu, Maharashtra and Delhi NCR

Short-term goals

- To source more than 50% of energy needs from renewable energy by 2026
- 40% reduction in emission intensity within data center operations by 2026
- Commit to optimizing overall power use by operating its data centers within wider temperature parameters

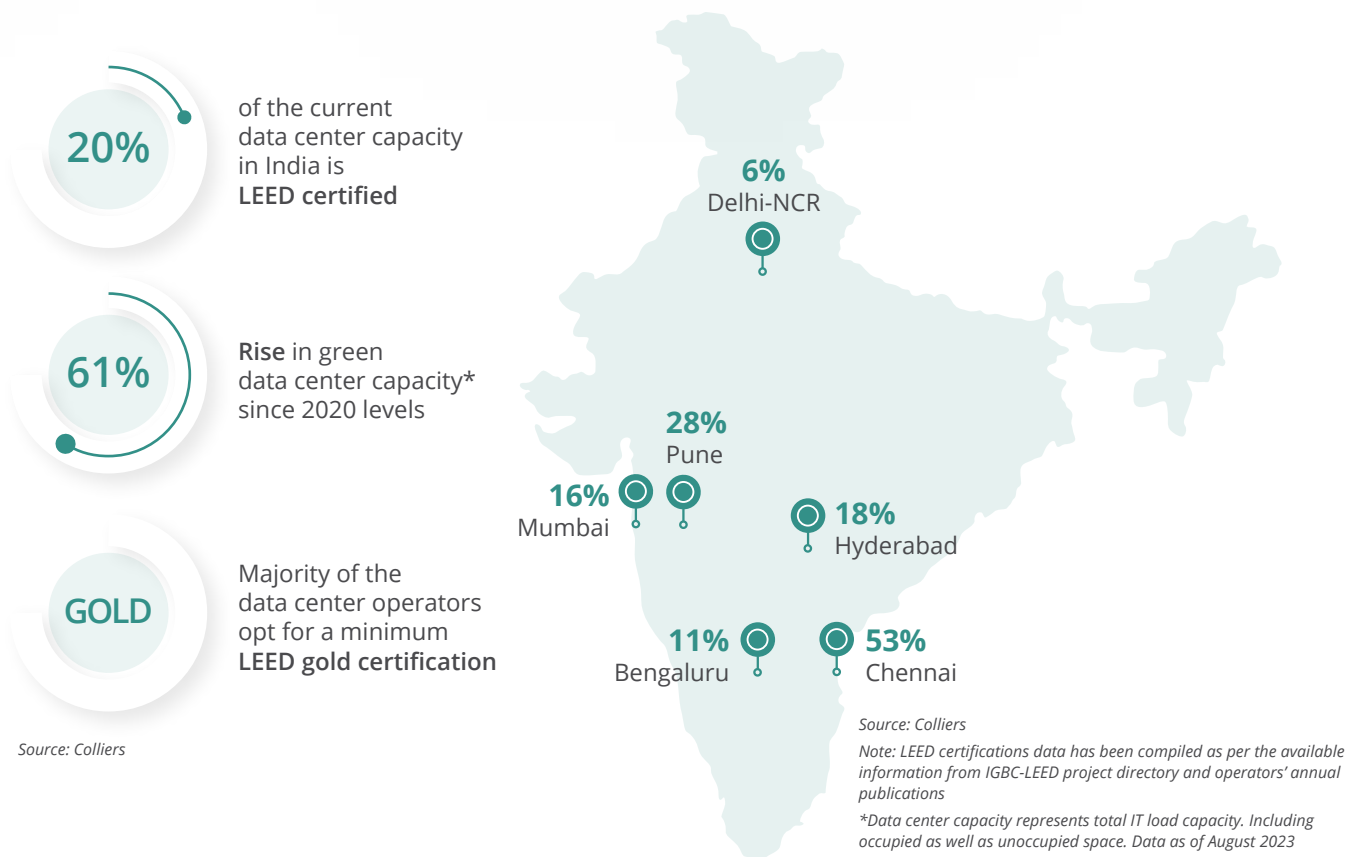
Long-term goals

- Achieve carbon-neutral data center operations by 2030
- 100% wastewater recycling at data centers by 2030
- New data centers design with green building strategies and 'zero discharge' spaces
- Significant commitment to dedicated renewable investments - solar and wind

Source: Industry, Colliers

Data center green penetration on the rise

Green penetration in Data center stock of 6 top cities in India



Guidelines for sustainable data centers

- Reducing the consumption through **design optimization** and adoption of technologies, materials and practices to minimize emissions. **Edge data centers** will drive more sustainable data center ecosystems through smaller footprints
- Green power provisioning has always been of paramount importance in Data Center domain but off late its significance has seen exponential growth specially with growing environmental awareness. It is mandatory for data centers to have **35% green power availability**. Hence, Top data center operators in India are planning to expand their green power by 3-5 times the current usage
- Provision of **a dedicated waste segregation facility** for wet waste, dry waste and E-waste
- Provision of **solar PV** to cater to 3 to 5% of total building consumption for Non-IT Load
- Efficient cooling systems- **Liquid cooling** reduces temperature in a targeted manner and requires less energy to cool down than air-based cooling
- Installation of **treated fresh air units** to provide fresh air as per ASHRAE 62.1 -2010 requirements
- Provision of **rainwater harvesting pit** to harvest rainwater. Reduction from the baseline water requirement is achieved by the use of treated wastewater from the Sewage Treatment Plant for landscape irrigation
- Adhering to **Indian Green Building Council (IGBC) Green Data Center** norms
- Balancing residual emissions with offsets such as producing equivalent renewable energy
- Leverage technology to create intelligent, automated systems designed to increase efficiencies

Source: Colliers



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As India strategizes for the next 25 years to India@100, Indian industry must scale the competitiveness ladder to drive growth. It must also internalize the tenets of sustainability and climate action and accelerate its globalisation journey for leadership in a changing world. The role played by Indian industry will be central to the country's progress and success as a nation. CII, with the Theme for 2023-24 as 'Towards a Competitive and Sustainable India@100: Growth, Inclusiveness, Globalisation, Building Trust' has prioritized 6 action themes that will catalyze the journey of the country towards the vision of India@100.

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