

# Cap/taLand Investment

# APAC Data Centre Investment Strategies in the Age of Digitalisation

July 2024





# **Executive Summary**

From 5G mobile to Zoom conferencing, and from TikTok to video streaming, global consumption and processing of digital products continue to accelerate, leading to surging demand for new data centre (DC) capacity for data to be stored and processed.

While cloud computing is today the primary driver for DC demand, the rise of artificial intelligence (AI) – both AI learning and applications – has become an additional demand driver. As operators prepare for an explosion in AI uptake, they have therefore embarked on a huge buildout of capital-intensive infrastructure to host the large number of specialised semiconductors the technology requires. In addition, there has been rapid expansion into peripheral locations able to offer both land and power resources required to accommodate escalating infrastructure needs.

The revolution in the scale at which data is being used and managed is fundamentally a global phenomenon, but nowhere is it unfolding as rapidly as in Asia Pacific (APAC) markets. Regional economies are not only growing faster and from a lower base, but they also have a cultural affinity for digitised business and technology adoption. In addition, the multitude of distinct regulatory jurisdictions across the region means data users must comply with a larger number of country-specific data protection policies compared to the West, driving a shift towards greater data localisation. Together, these factors are creating new opportunities for early-stage investment in what remains an emerging regional asset class.

Demand in the APAC region is equally strong for both dedicated and colocation DCs. **Singapore**, **Tokyo**, **Osaka**, **Seoul**, **and Sydney** are identified as key markets for new DCs, with the major Indian cities of **Mumbai**, **Bengaluru and Chennai** also showing promise due to growing digital services sectors, strong government support, and robust long-term economic prospects.



The revolution in the scale at which data is being used and managed is fundamentally a global phenomenon, but nowhere is it unfolding as rapidly as in APAC markets.

Insatiable appetite for data throughout the APAC region is fuelling growth of this new economy asset class.

# AN ESSENTIAL REAL ASSET: DCs IN A THRIVING DIGITAL ECONOMY

Soaring global demand for data storage and processing is making DC infrastructure a key component of the ongoing fifth industrial revolution<sup>1</sup>, driven primarily by surging AI requirements and the adoption of cloud services. As a result, network providers and technology multinationals are now churning out ever-larger new facilities to accommodate expanding data storage and processing infrastructure.

While industry growth is strong globally, this revolution is more apparent in APAC markets, where DCs have emerged as a critical asset class for institutional investors.

# 1. Navigating the trends driving DC demand

### SECULAR AND STRUCTURAL DRIVERS

Rapid growth in global data consumption and processing are the main demand drivers for new DC capacity and services. They are a product of several secular trends:

- Surging consumption of digital content, including videos, social media and music,
- Widespread adoption of digital communications platforms
   a trend expedited by the pandemic,
- Development of smart cities<sup>2</sup>,
- Ongoing expansion of the digital economy.

In addition, demand from global technology players, as well as growing digitalisation among businesses, are also boosting appetite for cloud adoption and digital services. Finally, cloud operators are expanding their range of software services to attract and retain customers, including via managed cloud, private cloud, and cybersecurity applications used for risk management.

### **CUSP OF AN AI-DRIVEN REVOLUTION**

Even as appetite for cloud-based digital services continues to grow<sup>3</sup>, however, the recent emergence of Al has now become the industry's truly disruptive force, with the explosion of Al-enabled services following the introduction of ChatGPT in late 2022 creating a new catalyst for higher bandwidth and cloud-hosting DC infrastructure.

The market for generative AI is projected to experience a remarkable 32-fold increase over the coming decade alone <sup>4</sup>, driven by the development and uptake of AI across the global economy. In particular, given the proficiency of generative AI in producing significant quantities of content, businesses focused on creating analytical or creative material are likely to be key consumers of these new services.

The large number of new graphics processing units (GPUs) required for training generative deep-learning AI models has increased the size and energy intensity of associated IT infrastructure, fuelling demand for a new generation of high-capacity, cutting-edge DC facilities. The snowballing size of new DC facilities and campuses, with the majority constructed with capacities in the 20 megawatts (MW) to 50MW range and

Figure 1: APAC DC Growth is Driven by Five Key Secular & Structural Trends



# Digital Transformation

Organisations in APAC expected to generate **c.43% of revenue** from digital products, services and customer experiences by 2027 (2022: 27%).



# Emerging Technologies

Data-heavy technologies, including **AI, 5G technology and IoT**, will become more mainstream and ubiquitous across platforms.



# Increased Connectivity

Faster and more efficient data exchange and communication will be delivered by hyperconnected DCs with direct access to cloud providers.



# Data Protection & Cybersecurity

Tighter data protection policies encourage onshoring and localisation of data, especially given rising geopolitical tension in some APAC markets.

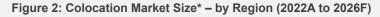


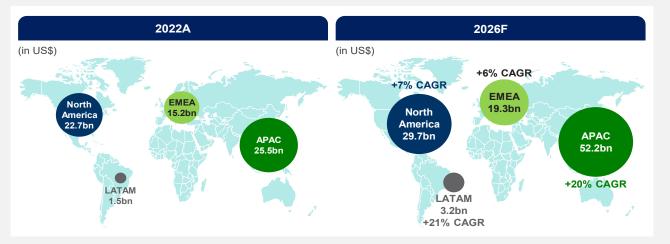
### Sustainability

DCs with embedded green solutions will generate fewer carbon emissions and potentially reduce operating costs.

Source: Lenovo & AMD – "CIO Technology Playbook 2023", JLL, CLI PERA Research, June 2024

- 1 The fifth industrial revolution, also known as "Industry 5.0", is an emerging phase of industrialisation with emphasis on key elements including automation, robotics, machine learning, Internet of Things (IoT), additive manufacturing, and quantum computing.
- 2 Refer to CLI PERA Research Topical Paper Finding Opportunity in Volatility within Asia Pacific: Reprioritising Fundamentals in Challenging Times, June 2023.
- 3 More than 75% of 803 global companies surveyed will integrate big data, cloud computing, digitalisation, and AI technologies by 2027. Source: World Economic Forum, Future of Jobs Survey 2023.
- 4 Projections indicate a 42% CAGR increase from US\$40 billion in 2022 to US\$1.3 trillion by 2032. Source: Bloomberg Intelligence Al's business impact to extend far beyond Nvidia, August 2023.





Note: (\*) Colocation market size includes carrier-neutral colocation DCs and built-to-suit DCs where capacity is made available to customers. Figures exclude self-build DCs which are purpose-built for sole user and not available to customers.

Source: CBRE, CLI PERA Research, June 2024

some exceeding 100MW, is significantly greater than the 10MW to 20MW DCs commonly seen in previous development cycles. Such notable increases in capacity are in turn encouraging innovation in the design, management, and fit-out of new DC facilities.

# 2. The Golden Opportunity in APAC

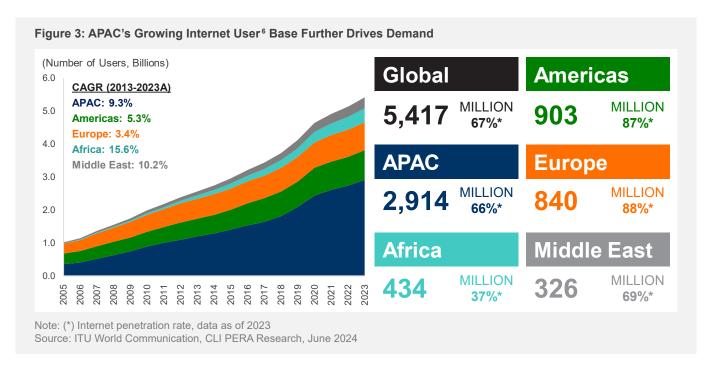
### **WORLD'S LARGEST COLOCATION MARKET**

Colocation DCs are fully-fitted facilities designed to host multiple customers, including cloud players and small and large enterprises. The APAC colocation market represents 39% of the global total and has an estimated value of US\$26 billion, making it by far the world's largest. It is expected to double

in size by 2026 (Figure 2), as APAC digital organisations continue to expand significantly faster than their peers in the Americas and EMEA. To achieve this, a significant volume of new investment will be needed in both dedicated and colocation DCs<sup>5</sup>.

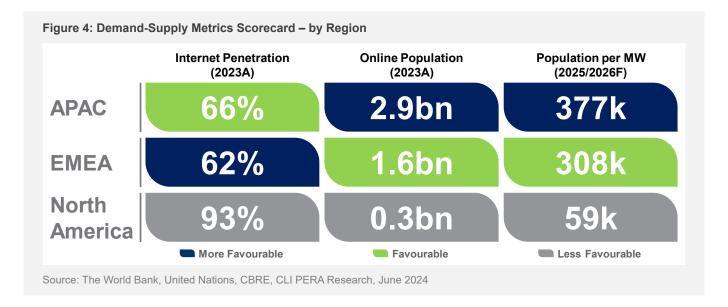
### **APAC'S DEMOGRAPHIC ADVANTAGE**

APAC's enormous population and swelling internet user base cement its status as a highly attractive destination for DC investment. Its user base has grown sevenfold since 2005, compared to the growth of 1.9x in the Americas and 1.8x in Europe over the same period. Going forward, APAC markets should continue to lead, underpinned by further increases in internet adoption given the lower penetration rates in the region (Figure 3).



<sup>5</sup> In a recent poll, 80% of APAC companies surveyed indicated plans to expand into new regions, countries, and cities in the next 12 months. Of these, 46% plan to build dedicated DCs, while 36% intended to take space in colocation DCs. Source: Equinix Global Tech Trends Survey 2023

<sup>6</sup> An internet user is defined as anyone who has accessed the internet using any technological device in the last three months.



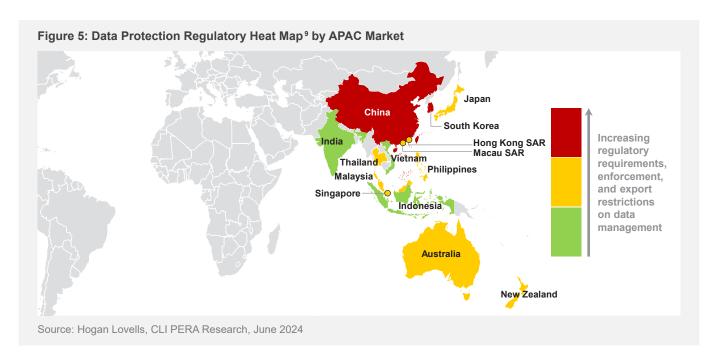
Currently, APAC's network infrastructure remains structurally undersupplied (Figure 4), particularly in more populous sub-regional hubs. APAC's market share of approximately 28% of worldwide bandwidth usage is therefore projected to more than double between 2023 and 2026<sup>7</sup>, meaning DCs that are focused on improving interconnection nodes across the region will be able to offer clients a competitive advantage when establishing digital core, integrating digital ecosystems, and deploying digital edge strategies.

# TIGHTER DATA PROTECTION FUELS ADDITIONAL GROWTH

New data protection policies and cybersecurity laws <sup>8</sup> introduced recently across individual APAC markets are another catalyst for DC demand because, in contrast to the more uniform regulatory environments in the US and Europe,

they encourage regional governments and corporations to view data as a strategic asset. The resulting shift towards data localisation, onshoring, and reshoring is therefore poised to boost demand for secure, onshore data storage systems (Figure 5).

However, the approach taken in Japan, Singapore, and Malaysia demonstrates that balancing data protection with pragmatic regulation can foster regionalisation. By catering to specific jurisdictional requirements, while also aligning with global standards, these markets have managed to capture significant regional DC demand by offering a decentralised, yet cohesive data infrastructure network across the APAC region. Regulatory predictability and alignment with international norms have made these locations appealing for long-term investments and also provide clear pathways for market entry and exit.



- 7 APAC interconnection bandwidth is forecast to reach 9,283 terabits per second (Tbps) by 2026 and reflects a CAGR of 34% between 2023 and 2026. Source: Equinix Global Interconnection Index 2024.
- 8 Recent regulations include Singapore's Personal Data Protection Act (PDPA), China's Data Security Law (DSL) and Personal Information Protection Law (PIPL), which took effect in 2021, and Indonesia's 2022 Personal Data Protection law (PDP law).
- 9 Data protection regulatory regimes are graded against four criteria: (i) data management requirements; (ii) data export controls; (iii) direct marketing regulations; and (iv) aggressiveness of the enforcement environment. Source: Hogan Lovells.

Figure 6: A Menu of DC Investment & Development Models\* SHELL & CORE **POWERED SHELL** FITTED DC **FULLY OPERATIONAL** Landlord owns or develops Landlord either owns or Landlord is a specialist Investor is (or partners Key the DC to "shell & core' develops the DC to "shell & investor or DC operator with) a DC operator which Characteristics status and leases the bare core" status and delivers who delivers the shell, power. delivers the shell, power M&E fit-out, and CapEx shell space to a DC access to power and fiber M&E fit-out, and CapEx operator connectivity The facility is leased to a DC is let to customers DC operator invests in Landlord leases the facility to single hyperscale customer including hyperscale, cloud power, mechanical & a DC operator for rent plus a or a DC operator which providers and small to large electrical (M&E) fit-out, and premium for power subleases to several large enterprises capital expenditure (CapEx) customers DC operator invests in M&E Investment requires fit-out, and CapEx Customers pay rent based specialist operational on committed power capability capacity; Electrical cost is passed through to customers Lease Triple net lease Triple net lease Triple net lease Service-level agreements Structure Service-level agreements Retail: ~3 years: Wholesale: 5-10 years: 15 Years 15 Years Wholesale: 5-10 years; Hyperscale: 10-15 years Lease Term Hyperscale: 10-15 years Increased requirement of DC operations, technical knowledge and expertise, and higher returns

Note: (\*) DC models can be applied to colocation, hyperscale and edge DCs, and are not mutually exclusive. Source: CBRE, CLI PERA Research, June 2024

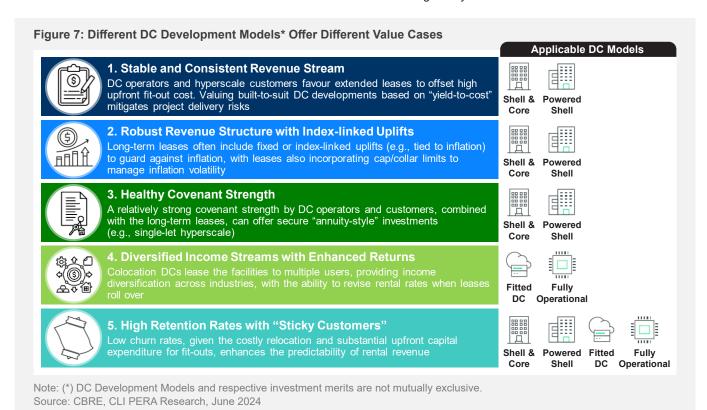
# 3. DCs Emerge as A New APAC Institutional Asset Class

### A PLATTER OF INVESTMENT OPTIONS

Given its unique and rapidly evolving nature, the DC industry offers a spectrum of options for both operators and investors, allowing it to cater to varying preferences and risk appetites (Figure 6).

This is one reason for the notable uptick of interest in the DC sector among institutional investors, as they look to:

- Pivot towards alternative asset classes that are more resilient to macroeconomic headwinds,
- Align with strong secular, new economy tailwinds,
- Add assets that offer inflation protection and are complementary to existing portfolio exposure,
- Go green with eco-friendly DCs that align with their Environmental, Social, and Governance (ESG) values and regulatory criteria.



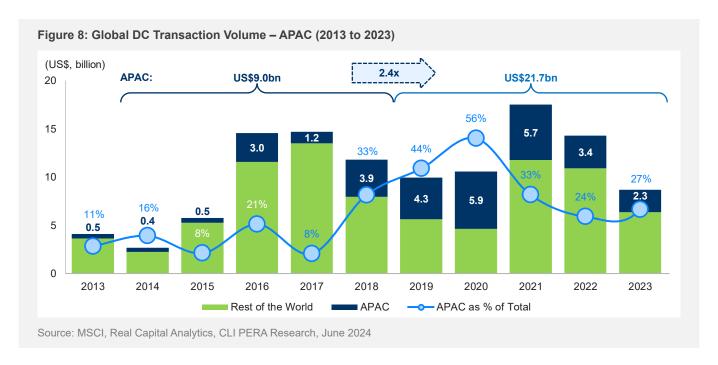
### DCs BECOMING INVESTMENT PORTFOLIO STAPLES

The shift in institutional investor interest towards DCs is especially evident in APAC markets. From 2019 to 2023, transactions involving APAC DCs rose to approximately US\$22 billion – or almost 2.4 times the level recorded over the preceding five years – even as markets in general stagnated during the COVID-19 pandemic (Figure 8).

Surging volumes are the result of rising interest among institutional investors drawn to the sector's resilience, long-

term growth prospects, and more recently an extensive array of exit opportunities, including to DC operators, private equity funds, publicly traded real estate investment trusts (REITs), infrastructure investment trusts (InvITs), and sovereign wealth funds, among others.

However, despite this heightened interest, the notable lack of stabilised DCs available for sale in the region means the most promising opportunities for investors lie in developing new DCs – a strategy that can both satisfy new demand and potentially yield higher returns.



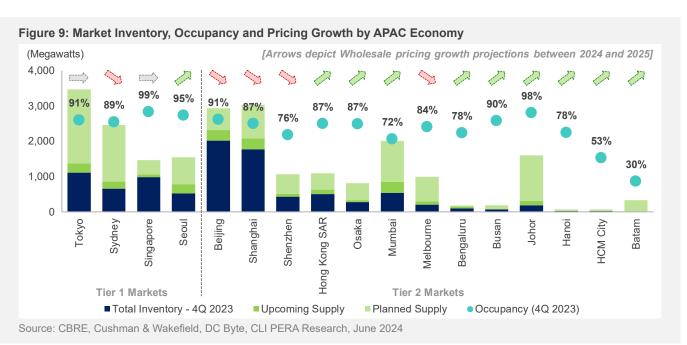
# 4. Charting The Course Through Fundamentals and Prospects

### **DEMAND-SUPPLY DYNAMICS REMAIN ROBUST**

Although the APAC region already boasts an outsized internet user base and the world's largest colocation market,

its DC industry remains less mature compared to other parts of the world. This suggests robust growth potential, even before considering rising user demand.

Several APAC markets are set to double their DC inventory by 2025, primarily driven by Tier 1 cities like Tokyo, Seoul and Sydney (Figure 9). These cities, once dominated by domestic telecom companies and conglomerates, are now



seeing an influx of international DC operators in partnership with capital providers and / or strategic investors.

In addition, expansion into selective secondary markets is also underway. Johor, Malaysia – for example – is benefitting from spillover demand in the region caused by constrained capacity due to government regulations in its neighbouring market, Singapore.

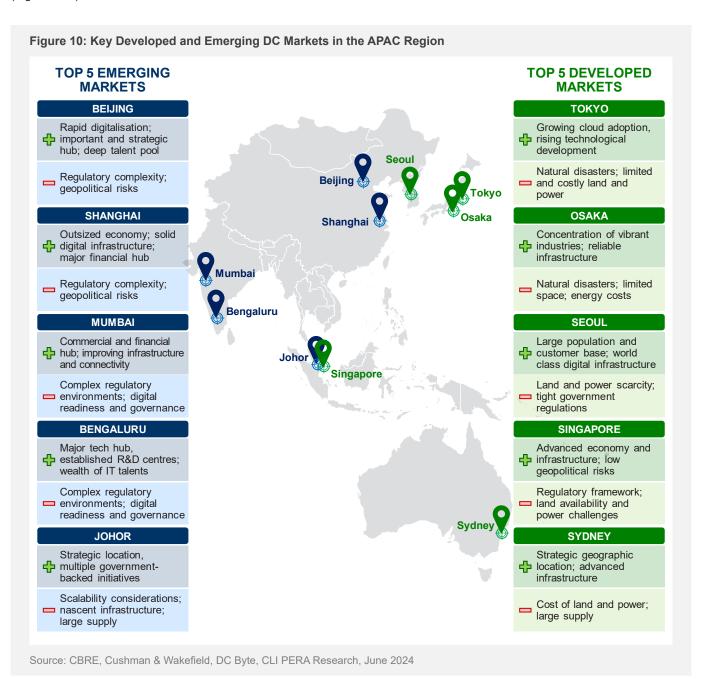
# MAJOR DEVELOPED MARKETS POISED FOR FUTURE GROWTH

A proprietary multi-criteria decision analysis <sup>10</sup> of 17 key markets in the APAC region identified Singapore, Tokyo, Osaka, Seoul and Sydney as the most promising destinations (Figure 10). Common characteristics include robust

macroeconomic and business environments, a high degree of digital literacy, availability of world-class infrastructure, and healthy demand-supply conditions for new DC capacity.

Otherwise, Hanoi and Ho Chi Minh City (Vietnam), along with Batam (Indonesia), rank lower, primarily because their status as emerging markets acts as a drag on short-term upside.

In India, however, while Mumbai and Bengaluru are also classified as emerging markets, they decisively outperform their regional peers in the above analysis for several reasons. For one, their economies have potential for enormous growth from a low base (in part due to growing capital migration from China); in addition, they are seeing rapid adoption of digital technologies by domestic businesses and consumers.



<sup>10</sup> Six criteria applied in the assessment included broad economic factors, inherent business frameworks and risks, state of existing and planned infrastructure, technological readiness, susceptibility to natural calamities, and prevailing conditions in the DC market. The derived rankings are calculated using a proprietary framework that includes the six broad parameters set out above. Each comprises multiple sub-parameters that are assigned a weighting and scored on a predefined scale.

# FEATURED: NAVIGATING THE PROSPECTS OF INDIA'S DC SECTOR

has recently emerged as a hotspot for DC investment as a result of robust uptake of digital technology and a rapidly growing base of internet users. With the world's second-highest number of mobile subscribers and one of its lowest internet penetration rates <sup>11</sup>, market dynamics suggest the local DC industry has a long runway for growth.

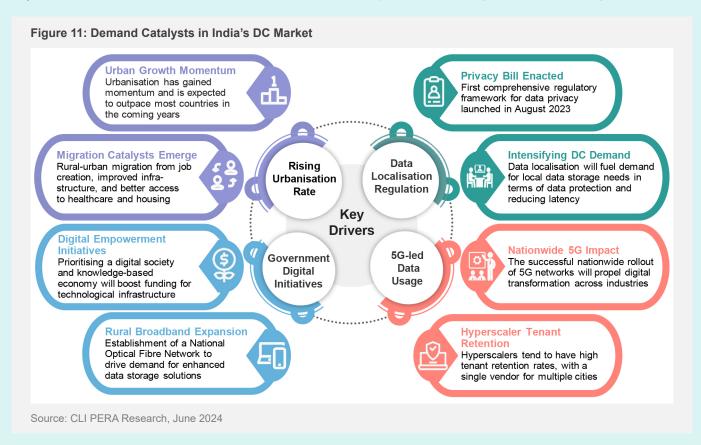
Anumber of other factors add to India's DC growth momentum:

- High urbanisation rates drive increased connectivity and digitalisation (Figure 11).
- Recent refinement of data localisation laws is boosting demand amid an unprecedented surge in online digital payments 12.
- Going forward, as businesses increasingly recognise the advantages of outsourced data management, the trend of captive (i.e. owner-occupied) to colocation migration will accelerate, fostering a dynamic and competitive DC market
- Availability of power India is a net exporter of electricity with a relatively modern grid that allows for renewable power distribution.

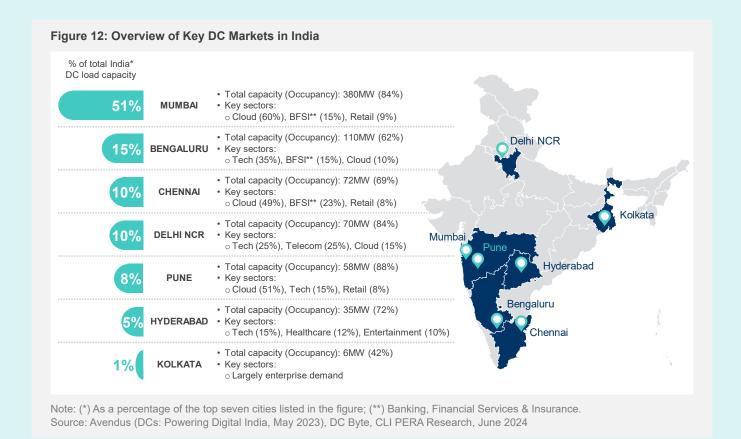
- Aconducive regulatory framework, as well as other government initiatives such as the 'Digital India' programme.
- Much-improved stability in both the geopolitical <sup>13</sup> and commercial real estate environments.
- A burgeoning ecosystem of skilled IT professionals.
- The classification of DCs as "infrastructure" in India's FY2022-23 Budget (this designation now applies to DCs with a capacity exceeding 5MW, providing significant impetus towards creating an institutionalised asset class).

The anticipated increase in demand for local data storage and management has created an initial wave of institutional interest in Indian DC assets that is likely to continue in the coming years. In particular, colocation DC inventory is projected to almost quadruple by 2030 <sup>14</sup>, and will be matched by incremental increases in capacity by global cloud players and technology firms.

Demand in this subsector is rising partly due to the trend of captive-to-colocation migration identified above, and partly as a result of operational challenges experienced by enterprises using captive DCs during the pandemic.



- 11 Source: Avendus "Data Centres: Powering Digital India", May 2023.
- 12 The value of digital payment transactions increased from INR 72 billion to INR 114 billion (+58% YoY) in FY2022–23. Unified Payments Interface (UPI), an instant payment system, started in FY2016–17 and currently accounts for over 75% of retail digital payments in India. Notably, total transaction value of UPI is projected to almost quadruple from FY2022-23 to reach INR 524 trillion in FY2027-28. Source: PwC "The Indian Payments Handbook 2023-2028", September 2023.
- 13 For instance, US-India relations entered a new chapter in 2023, with deepening collaboration in technology initiatives (e.g. semiconductor supply chains, advanced telecommunications, advanced computing, and Al). In recent years, India has also ramped up efforts to join other bilateral and regional agreements, and has signed multiple major Free Trade Agreements and partnerships.
- 14 Total colocation inventory in India is expected to reach 2,749MW in 2030 from 721MW in 2022. Source: JLL India Colocation DC Industry report, August 2022.



Additionally, there is a growing organic demand stemming from increased data usage flowing from accelerated adoption of 5G technology <sup>15</sup>.

The seven major cities in India – Mumbai, Bengaluru, Chennai, Hyderabad, Delhi NCR, Pune, and Kolkata – are the focal points for new DC development, offering strategic locations with proximity to key business centres. Mumbai stands out as the preeminent hub, hosting more than half of the country's DC capacity (Figure 12). Other cities are also emerging. Specifically, Chennai's growing prominence is driven by the presence of multiple cable landing stations, as well as its rise as a popular disaster recovery site due to its strategic geographical location. Bengaluru and Hyderabad are also seeing increased DC demand as a result of the

substantial and growing presence of local IT / ITeS <sup>16</sup> firms and biotechnology firms. Delhi NCR is garnering attention as a hub for media, tourism, e-commerce, and technology startups, as well as automobile manufacturing and associated services. The market in Kolkata, meanwhile, is driven largely by enterprise demand.

While the Indian government's focus on digital initiatives and economic reform has boosted transparency and created a more favourable business landscape, the challenges of operating in an emerging market underscores the importance of collaborating with a dependable local partner who can navigate the country's regulatory complexities and offer opportunities to tap expertise in Indian DC networks.

# 5. Strategic Imperatives and Considerations

# CRITICAL ELEMENTS IN DC LOCATION AND SITE SELECTION

As in other markets worldwide, access to power and land have long been important issues for DC investors. Recently, however, power availability has taken centre stage as a crucial determinant for DC locations, closely followed by a growing emphasis on sustainability (Figure 13).

## **GREENING STRATEGIES FOR DCs**

In particular, the rapid expansion of the regional DC industry, together with the energy-intensive nature of AI workloads, has added further fuel to long-standing concerns over the environmental impact of DC infrastructure <sup>17</sup>, bringing DC users and operators under increasing pressure to reduce their carbon footprints <sup>18</sup>.

- 15 The number of 5G base transceiver stations (BTS), vital for 5G network deployment and operations increased sevenfold from around 54k at the start of 2023 to about 398k BTS by year-end. Mumbai, Chennai, and Bengaluru are the top cities with the highest number of 5G BTS. Source: India Department of Telecommunication.
- 16 Information Technology / Information Technology-enabled Services.
- 17 DCs consume around 1% to 3% of global electricity usage. For example, DC electricity consumption was 2.5% of the US total (~130 TWh) in 2022 and is expected to triple to 7.5% (~390 TWh) by 2030. Source: International Energy Agency, Boston Consulting Group.
- 18 Among global leading DC operators, Digital Realty, Equinix, Schneider Electric, Google Cloud, EdgeConneX and CapitaLand Investment have operations in APAC that embed green solutions as part of their ecosystems.

Figure 13: Dynamics of DC Site Selection - Power, Land and Sustainability



- With the burgeoning demand for power currently surpassing the rate of growth in DC supply, countries are grappling with the **challenge of allocating sufficient power resources to meet this escalating demand**, particularly those with limited secured power access
- Hence, sourcing enough power is of top priority among stakeholders, and addressing this issue has become an essential component of strategic development for new DC projects



- Limited availability and access to serviced land has inspired creative architectural solutions, such as the construction of vertical DCs which, while mitigating the issue of limited space, also lead to higher building and operating expenses
- The shift of DCs from urban to suburban localities further underscores the **critical need to secure** appropriate land for future growth



The emphasis on sustainability, through renewable energy use and technological innovations, is becoming a key component in the strategic planning for both operational DC and new developments, indicating a shift towards more eco-friendly and efficient infrastructure development in the investment landscape

Source: CBRE, CLI PERA Research, June 2024

As a result, DC users are adopting new server designs and energy-efficient hardware that ensure more effective and energy-efficient use of computing resources. In addition, operators are increasingly using advanced cooling and airflow management systems that can optimise temperature regulation and curtail energy waste, as well as renewable energy sources such as solar or wind power that reduce reliance on fossil fuels. By embracing green solutions, DC operators <sup>19</sup> are able not only to mitigate their impact on the environment, but also cut operational and maintenance costs.

### **RISKS REMAIN**

Although capacity shortages and rapidly rising demand have created favourable investment conditions, the APAC DC sector is not without risks. These include:

**Cyclical demand:** Global economic shifts or geopolitical factors represent significant threats to DC asset performance, both individually and collectively. Economic downturns, for example, can lead to reduced business IT spending, which in turn can impact take-up and occupancy rates.

**Regulatory compliance:** Data privacy and security regulations vary widely from market to market and are subject to rapid change, with potentially serious consequences for DC infrastructure demand. Additionally, compliance with

local rules is essential to secure permits and regulatory approvals and to meet environmental and safety criteria. As a result, any change in local regulatory standards during the development or operational phases may necessitate costly modifications.

**Obsolescence:** Infrastructure must be future-proof and Al-ready. The rapid evolution of technology, regulations, and demand for new infrastructure typologies means that obsolescence risk is real. New DC infrastructure should therefore be constructed to the extent possible to allow for potential upgrades that will enable future operational efficiency, security, and cost-effectiveness.

**Scope of occupier base:** The dominance of major cloud operators sets a limit on the available pool of large customers, especially if they opt in future to build and manage their own DC infrastructure. The market share and capacity requirements of cloud operators also give them significant pricing power that can affect negotiations with landlords and DC providers across the industry.

**Specialised capability:** Various risks associated with the complexities and scale of DC operations, such as difficulty securing serviced sites, access to power supplies, and a range of operational, financial and regulatory concerns, underline the importance of partnering with DC developers that have a strong network and expertise in these sub-domains.

### **APAC IS WHERE CONNECTIVITY MEETS OPPORTUNITY**

As demand for digital services continues to accelerate in the APAC region, the importance of the DC sector will only rise further. Each key market within the region has unique characteristics, offering investors a wealth of opportunities to tap into this fast-growing new economy sector. Given that DCs are a specialised asset class, it is crucial for investors to collaborate with dedicated partners who possess deep product knowledge and an intimate understanding of the markets in which they operate.

19 CapitaLand Investment operates five colocation DCs across Europe that procure 100% of its electricity from renewable sources.



# About CapitaLand Investment Limited

Headquartered and listed in Singapore, CapitaLand Investment Limited (CLI) is a leading global real asset manager with a strong Asia foothold.

As at 31 March 2024, CLI had S\$134 billion of assets under management as well as S\$100 billion of funds under management (FUM) held via six listed real estate investment trusts and business trusts, and more than 30 private vehicles across Asia Pacific, Europe and USA. Its diversified real estate asset classes cover retail, office, lodging, business parks, industrial, logistics, self-storage and data centres.

CLI aims to scale its FUM and fee-related earnings through fund management, lodging management and commercial management, and maintain effective capital management. As the investment management arm of CapitaLand Group, CLI has access to the development capabilities of and pipeline investment opportunities from CapitaLand's development arm.

As a responsible company, CLI places sustainability at the core of what it does and has committed to achieve Net Zero carbon emissions for Scope 1 and 2 by 2050. CLI contributes to the environmental and social well-being of the communities where it operates, as it delivers long-term economic value to its stakeholders.

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