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CUSHMAN & WAKEFIELD
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DATA CENTRES IN GREATER CHINA

Three points to process in 2024

February 2024

Greater China Research

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EXECUTIVE SUMMARY

The Greater China data centre market has continued to evolve since we published our last thematic paper on this market in 2022. As investors, developers and operators continue to involve themselves in the data centre market in the region, there are many themes, topics, and issues to consider. In this report we look at three key points and they are:

- The market;
- Government policy, and;
- Asset management.

The Market

When considering the overall data centre market in Greater China, the major city markets can be subdivided into four groups:

- Those that are powerhouse markets – such as Beijing and Shanghai;
- Those that are established markets – such as Hong Kong;
- Those that are developing markets – such as Guangzhou, and;
- Those that are emerging markets – such as Taipei (Figure 1).

Government Policy

One significant policy which is expected to further the development of the data centre market in the Greater China region is *The Action Plan for Quality Development of Computational Power Infrastructure* for the Chinese mainland.

The basic principles and goals of the plan through to 2025 are ensuring:

- A computational power infrastructure layout that is optimised (Figure 4), and;
- A computational power network that is sustainable, safe and reliable.

Asset Management

In Greater China, having a good understanding of the market and of the latest government policies is certainly key to the success in terms of data centre investment, development and operation. Recently, however, there is a third aspect to which investors and operators of data centres in the country are paying close attention to further ensure business success and that is optimal asset management.

The optimal asset management of data centres involves a number of aspects, including cost savings, performance improvement, consolidation and best practice encouragement.

INTRODUCTION

This report focuses on three major points to deliberate of late when investing in data centre projects in the Greater China market.

The report begins by centring on the first point to consider — The data centre market in the region — before looking at the second consideration point — Data centre-related government policy in the region.

Finally, data centre asset management in the Greater China market is the third consideration point to be examined, with the report wrapping things up with some key points raised in the narrative to take away.

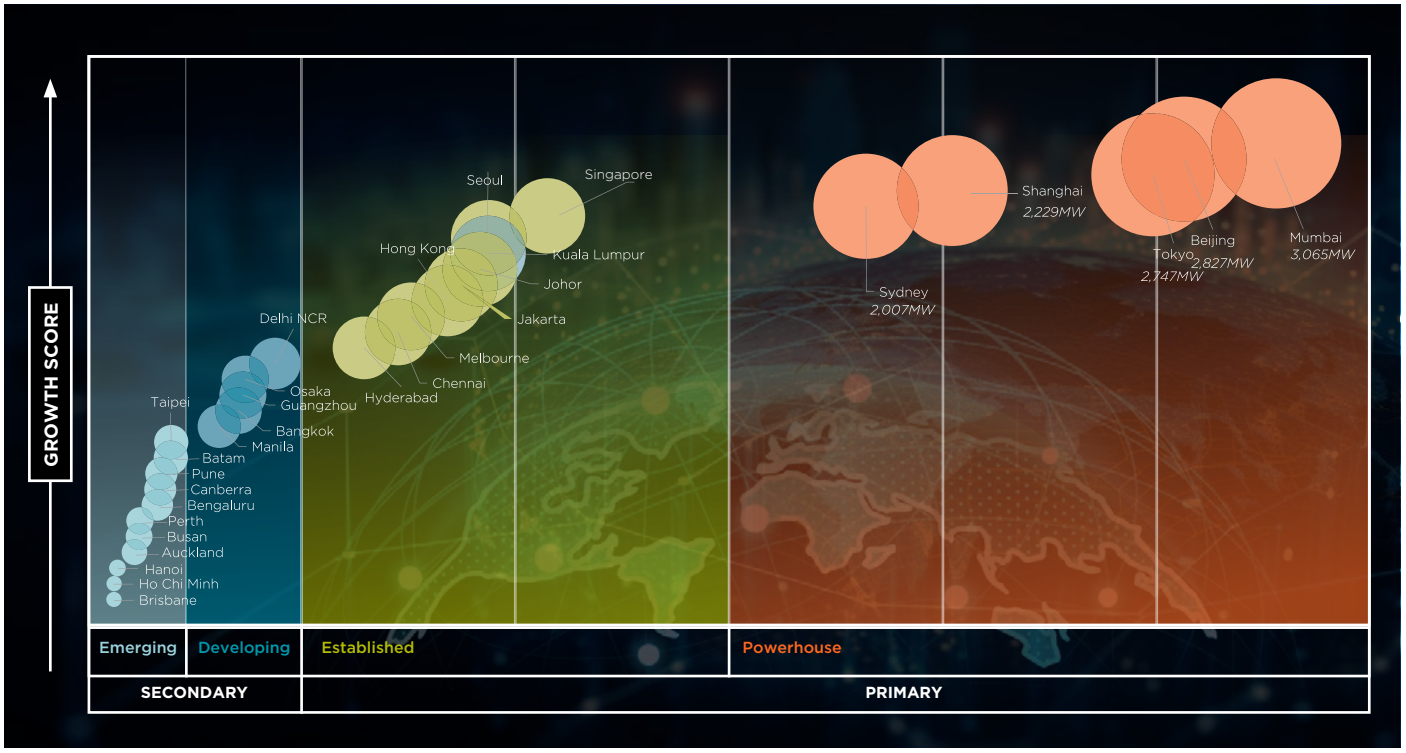
THE THREE POINTS TO PROCESS

The Market

When considering the overall data centre market in Greater China, the major city markets can be subdivided into four groups:

- Those that are powerhouse markets – such as Beijing and Shanghai;
- Those that are established markets – such as Hong Kong;
- Those that are developing markets – such as Guangzhou, and;
- Those that are emerging markets – such as Taipei (Figure 1).

Figure 1: Cushman & Wakefield Asia Pacific data centre maturity index (Q4 2023)



Source: Cushman & Wakefield

Our Maturity Index tracks 30 data centre markets across Asia Pacific* to compare their current maturity status as well as their evolution over the next five to seven years. It is a statistical comparison that evaluates markets on 21 parameters, including the IT MW capacities of each market's operational, under construction, planned and land banked stages of development, the summation of which is visually indicated by the size of each market's circle on the graph. The index also factors In vacancy rates, number and average size of data centres based on their status, number of operators that have operational data centres in each market, and the new operators that are in progress to enter the market. These data points are stacked into a parameter matrix and weighted to derive their overall growth score — the higher the growth score, the more evolved the market. The commonly used references to data centre markets as primary and secondary have been broken down further into the below four categories:

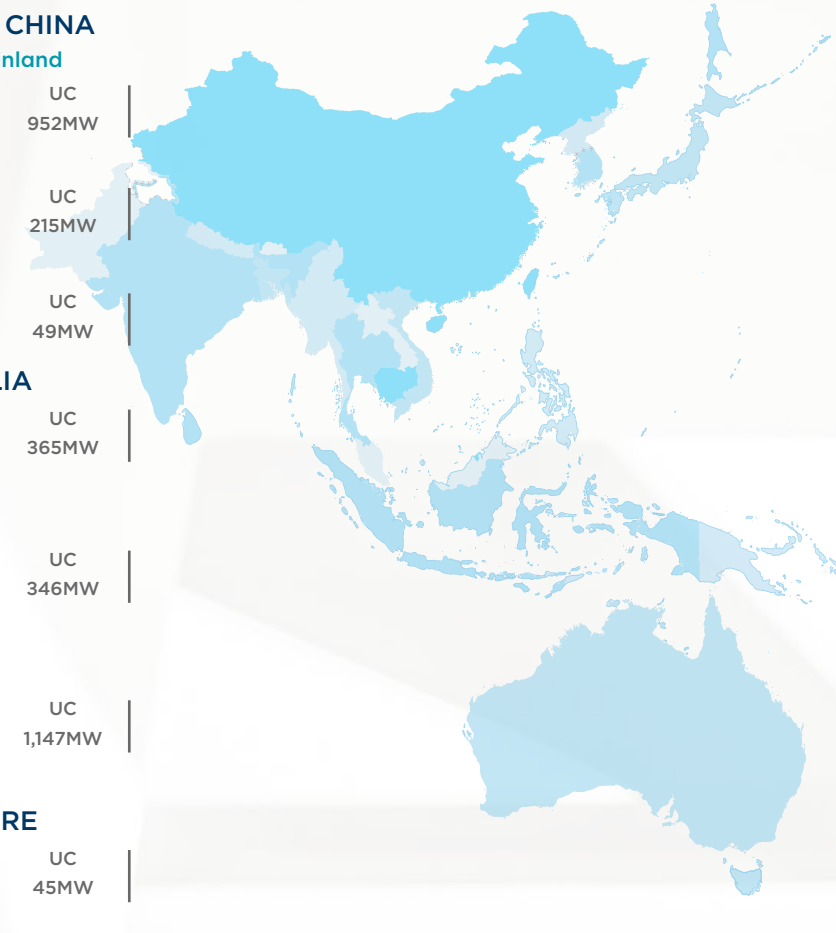
- Powerhouse;
- Established;
- Developing, and;
- Emerging.

*For all analysis, Asia Pacific region includes Australia, the Chinese mainland, Hong Kong, India, Indonesia, Japan, Malaysia, New Zealand, Philippines, Singapore, South Korea, Taiwan, Thailand and Vietnam only.

As the primary markets in Asia Pacific continue to grow rapidly, its secondary markets are expected to more than double their current cumulative operational capacity from 1.28GW to 2.96GW upon the delivery of all under construction and planned pipeline assets.

We anticipate that many markets across Asia Pacific, including those in Greater China, will witness accelerated growth owing to technological enhancements such as the adoption of cloud services and AI, deployment of 5G networks across geographies, increasing mobile and internet penetration, and ongoing government and enterprise digitisation initiatives, with such factors expected to drive markets to move across the development segments (Figure 2).

Figure 2: Asia Pacific data centre market – Key indicators and ranking per market size (Q4 2023)



1 / GREATER CHINA

The Chinese Mainland

IN OPERATION	UC
3,956MW	952MW

Hong Kong

IN OPERATION	UC
605MW	215MW

Taiwan

IN OPERATION	UC
257MW	49MW

2 / AUSTRALIA

IN OPERATION	UC
1,168MW	365MW

3 / JAPAN

IN OPERATION	UC
1,286MW	346MW

4 / INDIA

IN OPERATION	UC
1,074MW	1,147MW

5 / SINGAPORE

IN OPERATION	UC
973MW	45MW

6 / KOREA

IN OPERATION	UC
591MW	246MW

7 / INDONESIA

IN OPERATION	UC
222MW	147MW

8 / MALAYSIA

IN OPERATION	UC
189MW	224MW

9 / PHILIPPINES

IN OPERATION	UC
60MW	74MW

10 / NEW ZEALAND

IN OPERATION	UC
75MW	13MW

11 / VIETNAM

IN OPERATION	UC
45MW	15MW

12 / THAILAND

IN OPERATION	UC
65MW	77MW

Source: Cushman & Wakefield

Looking specifically at the Greater China market, according to the China Academy of Information and Communications Technology (CAICT), the Chinese mainland's data centre market volume exceeded RMB150 billion in 2021 and is expected to reach RMB243 billion by the end of 2023.

Meanwhile, the Beijing-Tianjin-Hebei region, the Yangtze River Delta region and Greater Bay Area continue to maintain strong data centre construction impetus, both in terms of the number of new cabinets and aggregate inventory (Figure 3).

Figure 3: Greater China – Data centre market snapshot and key indicators (Q4 2023)

Country	Population	Live MW	Pop. / MW
Greater China	1,456,817,210	4,818	302,370
Singapore	6,036,613	962	6,275

Q4 2023 KEY INDICATORS

No. of operators / data centres
67 / 330

In operation
4,818MW

Under construction
1,216MW

Planned
2,054MW

Vacancy
14%

Source: National Bureau of Statistics (China), Cushman & Wakefield

GOVERNMENT POLICY

Government Policy

In any data centre market, quality data centre infrastructure is an important resource to support the development of its digital economy and the Greater China market is no exception. Quality data centre infrastructure plays an important role in realising digital transformation, fostering future industries, and creating new momentum for economic development.

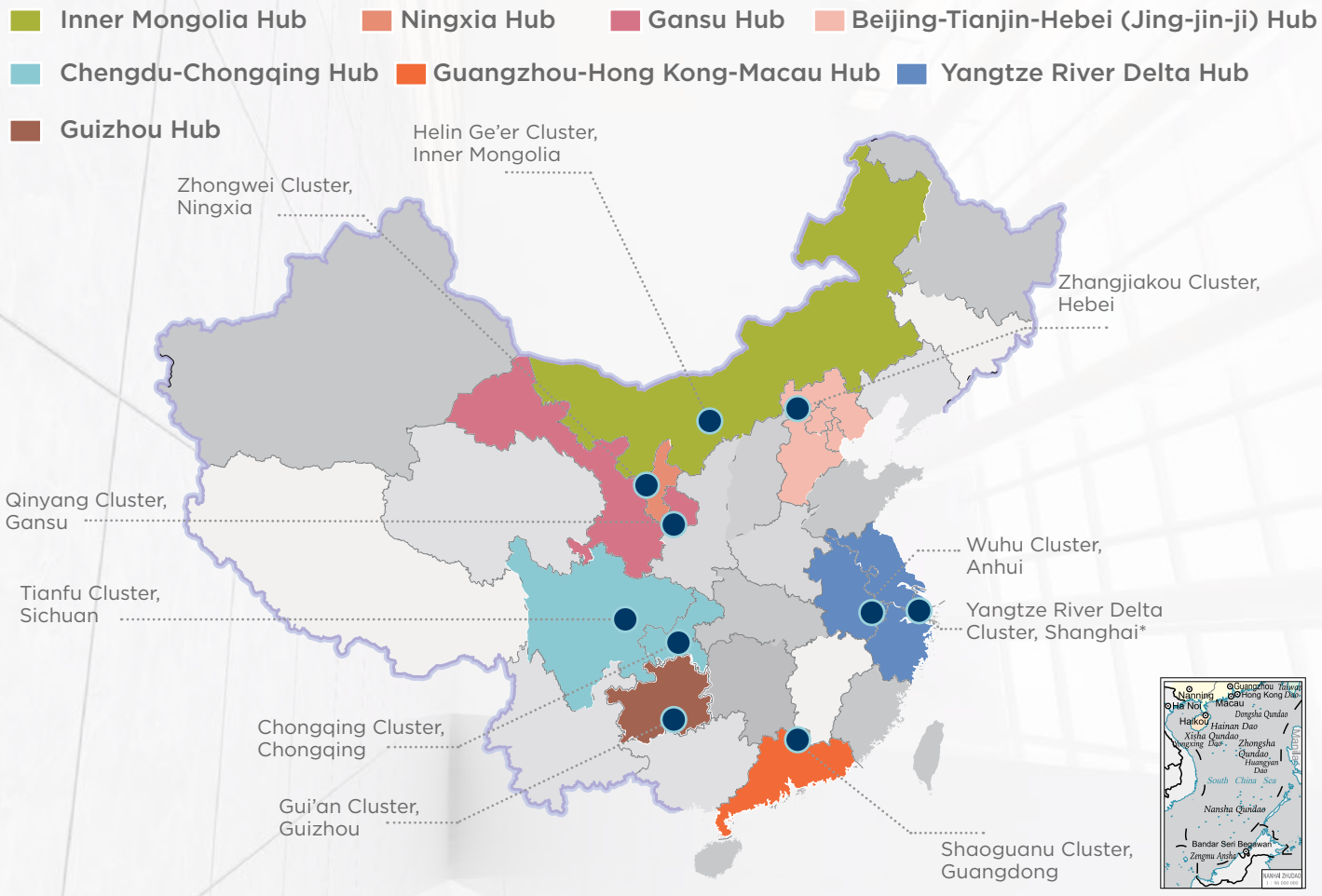
Knowing this and picking out a significant policy for the Greater China region, in October 2023, six government departments in the Chinese mainland, including the Ministry of Industry and Information Technology, the Office of the Central Cyberspace Affairs Commission Cyberspace Administration of China, the Ministry of Education of the People's Republic of China, the National Health Commission of People's Republic of China, the People's Bank of China, and the State-owned Assets Supervision and Administration Commission of the State Council, issued *The Action Plan for Quality Development of Computational Power Infrastructure* (including data centre infrastructure) (hereinafter referred to as "The Action Plan").

What are the basic principles and main elements of the Action Plan?

The basic principles and goals of the plan through to 2025 are ensuring:

- A computational power infrastructure layout that is optimised (Figure 4), and;
- A computational power network that is sustainable, safe and reliable.

Figure 4: The Chinese mainland: Computing hubs and data centre clusters (2023)



*Yangtze River Delta Ecological Green Integrated Development Demonstration Zone, Shanghai

Source: Asia Briefing, Cushman & Wakefield Research

Under the Action Plan, what will be the specific goals for computational power infrastructure development over the next three years?

The Action Plan proposes quantitative targets for development by 2025 in four areas, namely:

1. **Computational Power:** The scale of computational power is targeted at over 300 EFLOPS, and the share of intelligent computational power to reach 35%;

2. **Network Power:** Directly connected network transmission speed of no more than 1.5 times the theoretical delay to be achieved between data centre clusters at national hub nodes; the coverage rate of optical transport networks (OTNs) at key application sites to reach 80%; backbone and metropolitan area networks to fully support IPv6; and the use of new technologies, such as SRv6, to account for 40% of all applications;

3. **Storage Power:** The total amount of storage to be more than 1,800 EB, with more than 30% of the system being advanced storage capacity;

4. **Application Enablement:** More than 30 application benchmarks to be created in each of the key areas of industry, finance, healthcare, transport, energy and education.

Under the Action Plan, what specific work will be deployed to improve the comprehensive supply system of computational power?

The Action Plan is also looking to further develop edge computational power capacity and promote efficient and synergistic computational power capacity linkages between the country's eastern and western regions. Moreover, the plan is looking to strengthen the monitoring of indicators such as data centre power usage effectiveness (PUE) as well as building out capacity to assist the Chinese mainland's enterprises as they "go global".

Under the Action Plan, what are the specific arrangements for strengthening the efficient and flexible security of data centre storage capacity?

Among several initiatives, the Action Plan is looking to improve storage capacity as well as to promote the innovative development of storage technologies such as all-flash array (AFA) memory to achieve advancement in industry storage capacity.

How will the Action Plan promote the sustainable development of computational power infrastructure (including data centre infrastructure)?

The Action Plan will focus on guiding the green development of computational power infrastructure. It will look to improve resource utilisation and computational power efficiency by offering guidance on the optimal design and construction of computational power infrastructure as well as guidance on technology selection, equipment selection, green energy usage, etc.

How will the implementation of the Action Plan be ensured?

The implementation of the Action Plan will require governments at all levels, as well as basic telecommunication operators, third-party data centre service providers, internet enterprises and other types of market players, to give full play to their respective strengths in the overall construction and operation of computational power infrastructure in the Chinese mainland market. Specifically, the Action Plan proposes the:

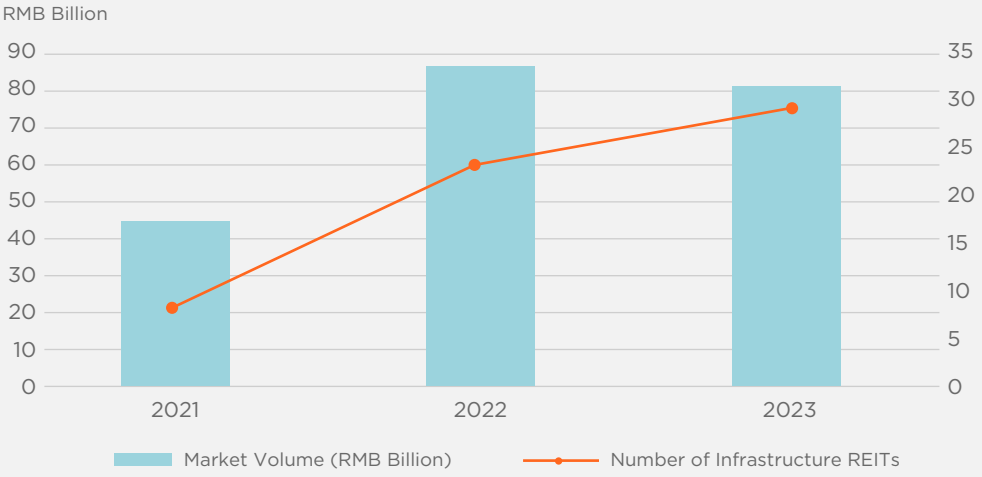
1. **Strengthening of development co-ordination:** Including a clear division of labour to organise and guarantee key tasks.

2. **Increasing of financial support:** ...for the innovative development of computational power infrastructure. Secondly, the plan will look to promote the declaration and issuance of real estate investment trust funds in the field of infrastructure for eligible projects (Figure 5), and, thirdly, the plan will encourage financial institutions to increase credit support for green computational power infrastructure.

3. **Deepening of communication and collaboration:** Full play will be given to the strengthening of related industry and organisational alliances, exchanges and standards.

4. **Strengthening of platform support:** ...by effectively promoting upstream and downstream technological innovation and collaboration and resource sharing within the industrial chain.

Figure 5: The Chinese mainland infrastructure REITs market volume and number (2021-2023)



Note:
*Chinese mainland infrastructure REITs contain industrial parks, affordable housing, port warehousing, turnpikes, power generation infrastructure and municipal engineering infrastructure.
**The data was published on 31 December in 2021 2022 and 2023.

Source: Wind, Cushman & Wakefield Research

Asset Management

In Greater China, having a good understanding of the market and of the latest government policies is certainly key to the success in terms of data centre investment, development and operation. Recently, however, there is a third aspect to which investors and operators of data centres in the country are paying close attention to further ensure business success and that is optimal asset management.

The optimal asset management of data centres involves a number of aspects, including cost savings, performance improvement, consolidation and best practice encouragement.

While there are many good practices surrounding data centre operations and management, the selected practices included here are effective high-value and efficiency-boosting options that will enable data centre investors and operators to make the most progression towards reaching their asset management optimisation goals.

Practice 1: Energy Monitoring

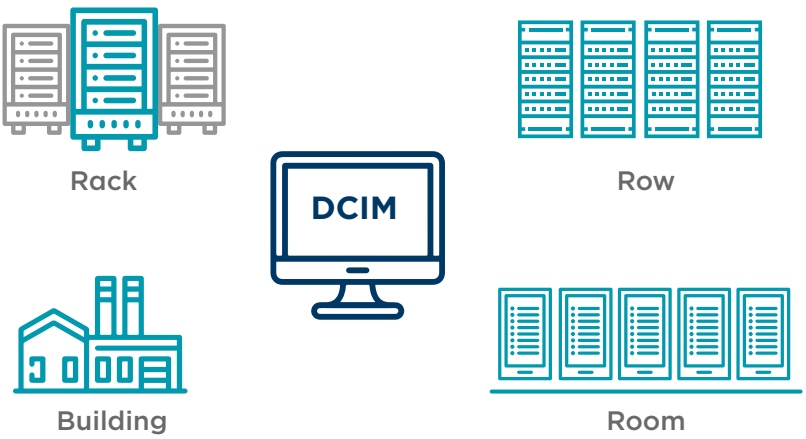
Practice goal explanation: % of GFA that has power monitoring in place

Example goal: Preferably 100%

Measures to adopt:

- Use a data centre infrastructure management (DCIM) software tool to manage the data centre (Figure 6);
- Systematise power monitoring by sensors/devices/ software to measure power demand and usage, and;
- Establish wireless sensors/devices/software to measure the real-time environment.

Figure 6: DCIM – One-stop view of the entire data centre



Source: Schneider Electric, Cushman & Wakefield Research

Practice 2: Power Usage Effectiveness (PUE)

Practice goal explanation: Amount of total data centre energy utilise by IT equipment (determined on a per-data centre basis) (Figure 7)

Example goal: Preferably ≤ 1.5 (Preferably ≤ 1.2 for new data centres)

Measures to adopt:

- Position servers in distinct hot and cold aisles to avert air conflation;
- Bed in variable speed drives to match energy usage to workload;
- Allow the supply air to reach higher temperatures to lessen workload demand on the chiller;
- Amplify the allowable humidity range to reduce humidification/dehumidification needs;
- Enhance airflow with blanking panels, grommets, and cable and tile management;
- Apply free cooling to support energy-intensive mechanical chillers;
- Apply direct liquid cooling to chill hot exhaust air more efficiently, and;
- Update lighting systems to reduce energy costs.

Figure 7: Data centre PUE calculation

$$PUE = \frac{\text{Total Facility Power}}{\text{IT Equipment Power}}$$

Source: Cushman & Wakefield Research

Practice 3: Virtualisation

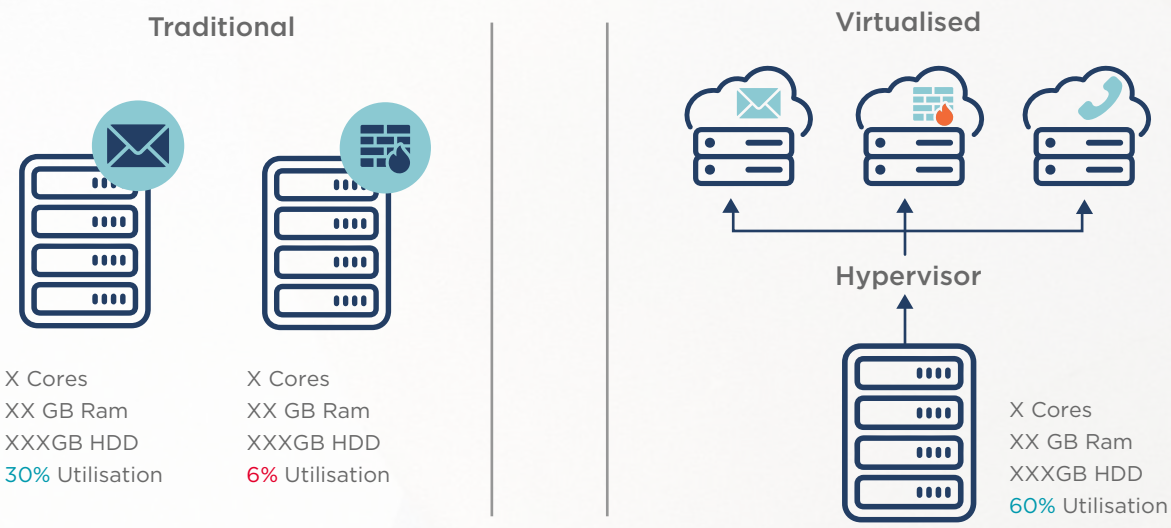
Practice goal explanation: Proportion of operating systems (OS) to physical servers

Example goal: Preferably ≥ 4

Measures to adopt:

- Post virtualisation, right-size to match up infrastructure power use with IT workload (Figure 8).

Figure 8: Data centres – Traditional vs Virtualised



Source: Park Place Technologies, Cushman & Wakefield Research

Practice 4: Data Centre Usage

Practice goal explanation: % of time busy (measured as 1 – % of time spent inactive), measured directly by continuous, automated monitoring software, discounted by the fraction of data centres fully equipped with automated monitoring

Example goal: Preferably ≥ 65%

Measures to adopt:

- Shut down ghost servers to mitigate space and energy costs, and (Figure 9);
- Employ server power management technology to ensure an enhanced power balance.

Figure 9: Data centre operational issues associated with ghost servers

Source: Cushman & Wakefield Research

Practice 5: Facility Usage

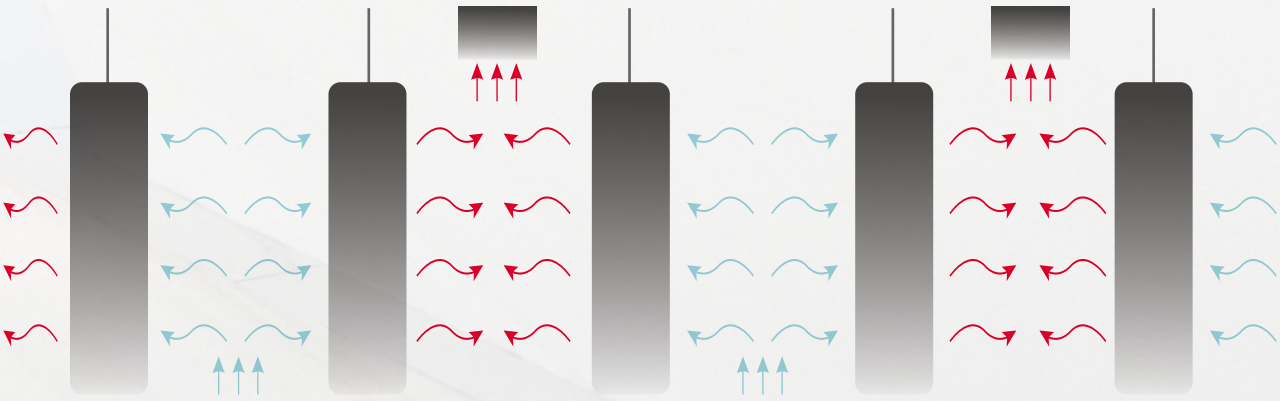
Practice goal explanation: % Portion of total GFA in tiered data centres that is actively used for racks that include IT equipment

Example goal: Preferably ≥ 80%

Measures to adopt:

- Use rack and row-based cooling to avoid isolated capacity (Figure 10).

Figure 10: Data centre rack and row-based cooling



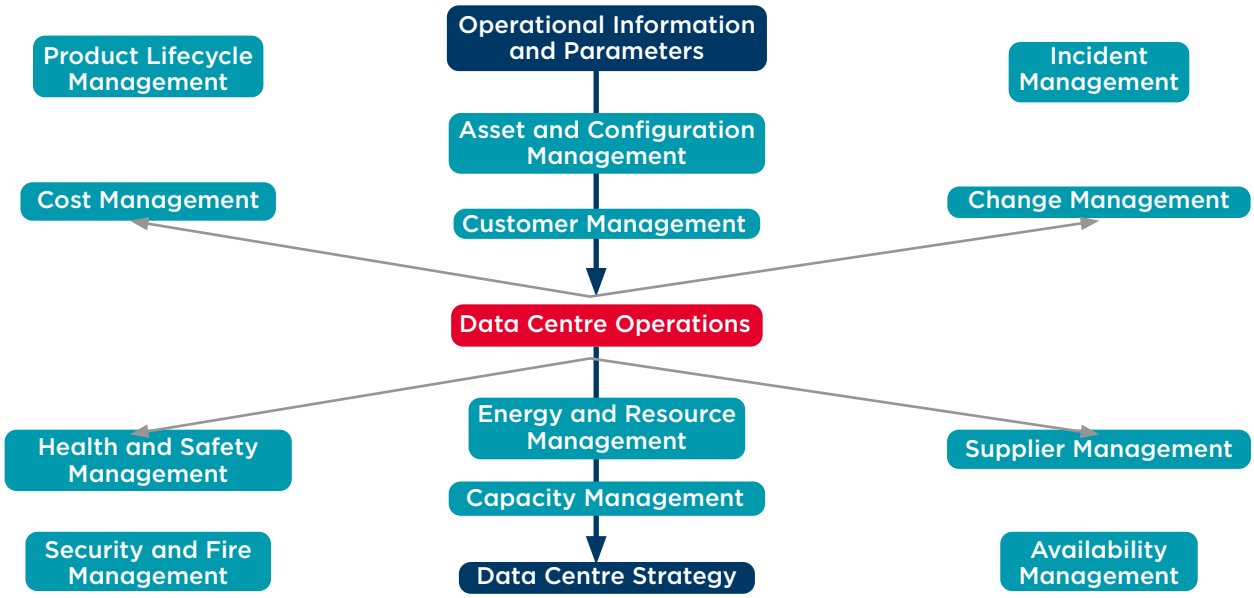
Source: Cushman & Wakefield Research

Practice 6: Facility/Operations Management

Measures to adopt:

- Suitably and systematically train facility management employees to augment operational efficiency and effectiveness, and;
- Measure and track to understand optimal performance over time (Figure 11).

Figure 11: Data centre operations management – Selected items to consider and outcome



Source: Cushman & Wakefield Research

Practice 7: Sustainability

Measures to adopt:

- Secure sustainable IT equipment and software to save energy and lessen the facility's environmental footprint (Figure 12).

Figure 12: Environmental impact – Selected industry contribution to global greenhouse gas emissions (2023)

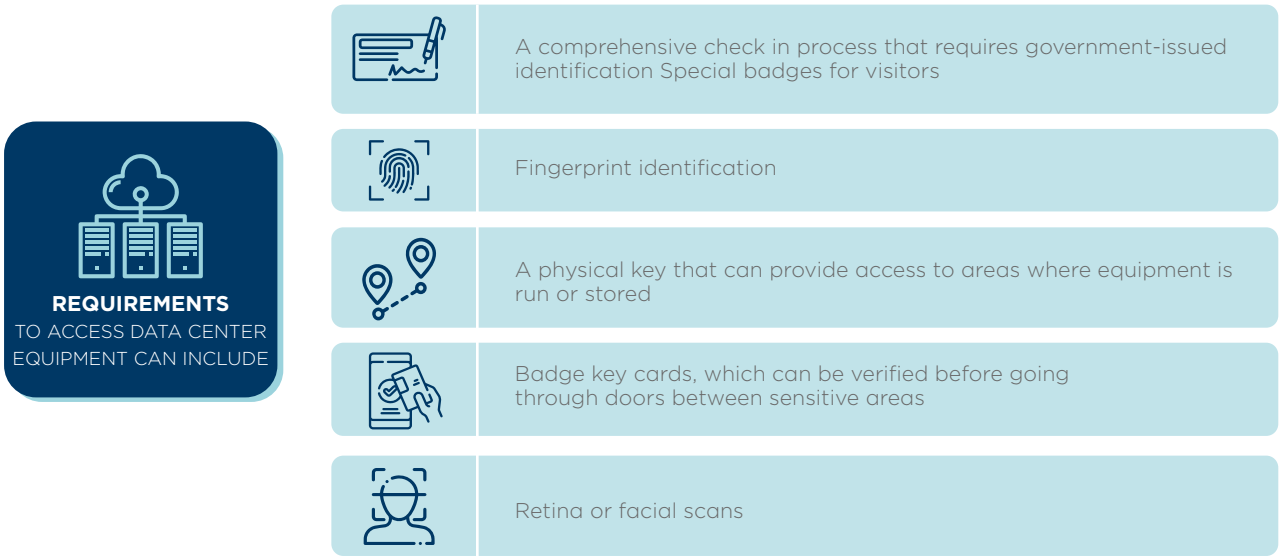
Source: 8billiontrees.com, Cushman & Wakefield Research

Practice 8: Security

Measures to adopt:

- Apply a layered security tactic to shield the physical and cybernetic facility features;
- Establish a disaster recovery strategy to safeguard operations and ensure operational continuation in the event of a crisis, and;
- Establish a potential human-instigated threat checklist to further lessen facility operational security weakness. (Figure 13).

Figure 13: Data centre security access examples



Source: Fortinet, Cushman & Wakefield Research

Practice 9: Facility, Equipment and Software Dependability

Measures to adopt:

- Enhance automation to mitigate human error and boost uptime (Figure 14).

Figure 14: Data centre building automation examples

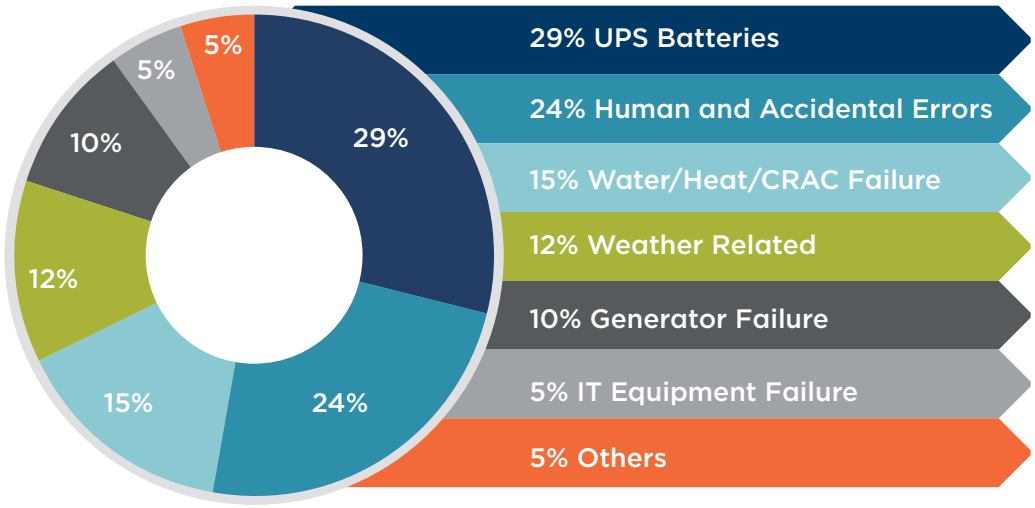
Source: Data Centre Talk, Cushman & Wakefield Research

Practice 10: Operational Change

Measures to adopt:

- Increase automation capabilities to avoid human error and increase uptime (Figure 15).

Figure 15: Data centre downtime causes



Source: Uptime Institute, Cushman & Wakefield Research

KEY TAKEAWAYS

The Market

- The Beijing-Tianjin-Hebei region, the Yangtze River Delta region and Greater Bay Area continue to maintain strong data centre construction impetus, both in terms of the number of new cabinets and aggregate inventory.

Government Policy

- The Action Plan is also looking to further develop edge computational power capacity and promote efficient and synergistic computational power capacity linkages between the country's eastern and western regions;
- Moreover, the plan is looking to strengthen the monitoring of indicators such as data centre power usage effectiveness (PUE) as well as building out capacity to assist the Chinese mainland's enterprises as they "go global".

Asset Management

- While there are many good practices surrounding data centre operations and management, it is important for data centre investors and operators to select data centre asset management practices that are effective high-value and efficiency-boosting options that will enable data centre investors and operators to make the most progression towards reaching their asset management optimisation goals.

Source: Cushman & Wakefield Research

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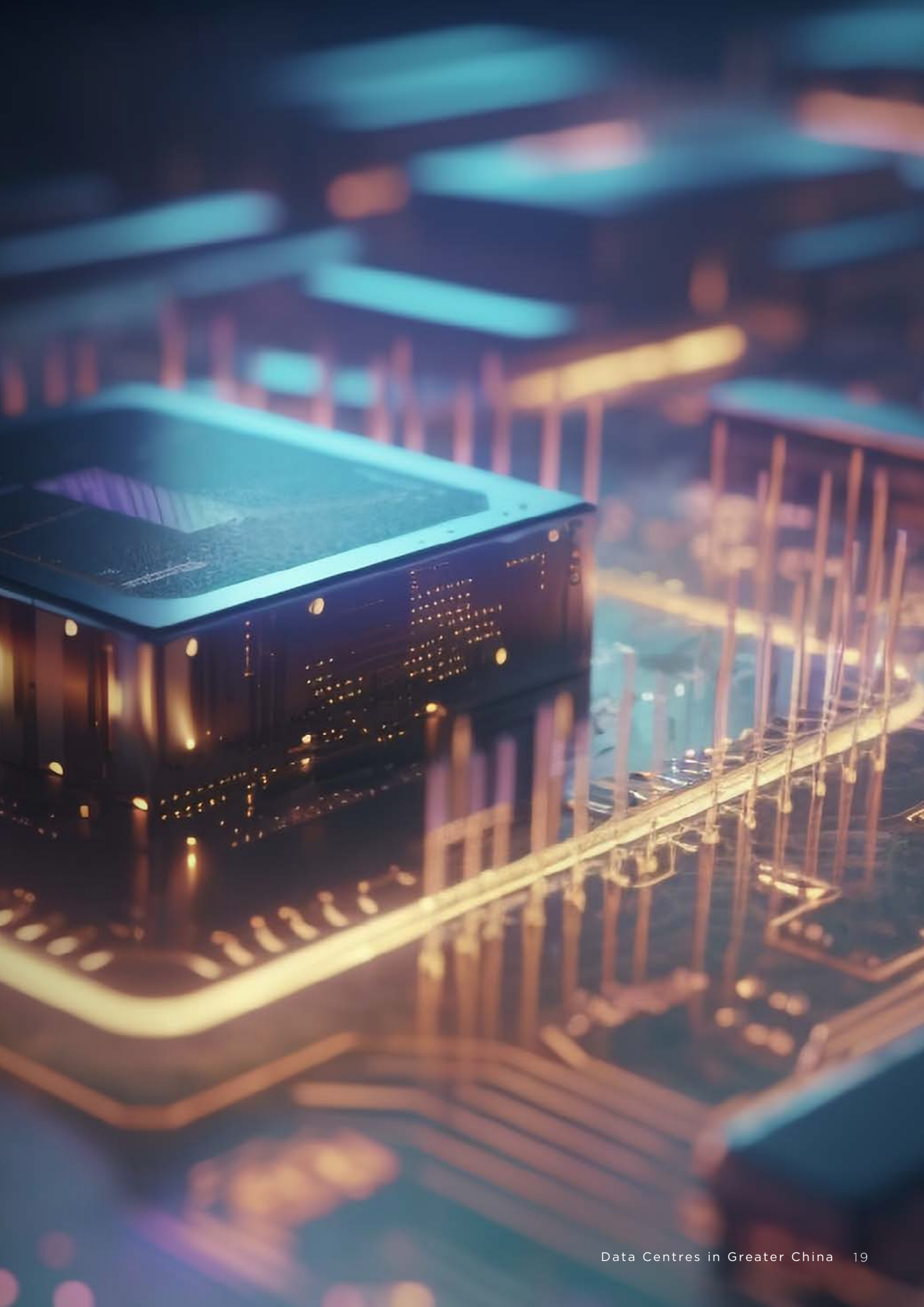

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