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Data Centres: Sustainable investment in Asia Pacific

Mark Cameron
Head of Sustainability, Asia Pacific

Leo Chung
Director, Research, Asia Pacific

SUMMARY

The framework proposed herein aims to review the current regulatory environment and market drivers for sustainability within the data centre (DC) sector. The paper also sets out overarching criteria for assessing the sustainability credentials and performance of a potential investment in the DC sector.

Without a clear position on how sustainability is integrated to the DC investment lifecycle, there exists the potential for misalignment with publicly stated positions on sustainability/ESG. The intention of this paper is to provide context and a framework to support investment teams when considering an investment.

SECTOR BACKGROUND & INVESTMENT THESIS

Technology advancement and the pandemic have transformed today's world to be more digital. The continued strong growth in data requirements underpins long-term demand for quality data centre space. DCs are also well placed to weather the economic downturn thanks to steady income flows. DC customers/tenants are willing to commit to long lease terms as it can be challenging to find space suited to their requirements. Once DCs have matured and are fully operational, they present good core/core+ income yield assets.

While DC development in Asia Pacific trails that of North America and Europe, Asia Pacific growth prospects are underpinned by rapid population growth and a young demographic. The Asia Pacific DC colocation market is estimated to expand at a compound annual growth rate of over 13% by 2026, outpacing growth rates of 7% in North America and 12% in EMEA. Asia Pacific has a diverse political geography, with each country in the region having its own laws and regulations which need to be complied with. This is less of an issue when operating in a single country (i.e. the United States) or within a region where there are agreed common rules and standards (i.e. the European Union). This unique requirement for data sovereignty is expected to generate additional local DC demand for the region — an example being Amazon and their intention to establish local DCs to assist their customers in meeting data sovereignty requirements.

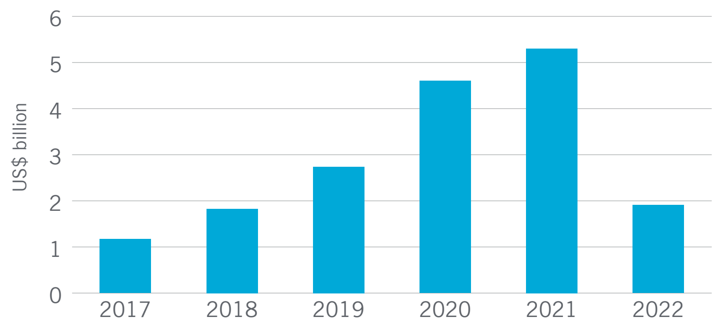
Similar to logistics, DCs have been highly sought after by investors during the pandemic, resulting in considerable cap rate compression since 2020. However, given prevailing higher financing costs and tightening pricing, DCs slowed last year (figure 1). Investors shifting their focus to project development, in collaboration with DC operators, also results in low investment volumes.

DATA CENTRE SUSTAINABILITY

While DCs play a critical role in the digital economy, they consume significant resources, especially energy and water. DCs account for 3% to 4% of greenhouse gas emissions globally[1] and heat rejection of cooling systems is typically evaporation, which consumes significant amounts of water. The Uptime Institute's research shows that a 1MW DC with traditional cooling methods uses about 25 million litres of water per year (equivalent to consumption of ~450 individuals per year).

Once DCs have matured and are fully operational, they present good core/core+ income yield assets.

Figure 1: Asia Pacific total data centre investment turnover



Source: MSCI, February 2023.

A global survey of IT and DC managers conducted by Uptime Institute in 2020 showed the average annual power usage effectiveness (PUE)* of large DCs improved from 2.50 to 1.59 since 2007. Furthermore, the PUEs of some internet giant DCs such as Google, Facebook, Baidu and others have been reported to be as low as 1.10[2].

For new DC developments it is typical to see target design PUE, on a full load basis, of 1.30-1.35 across tier 1 Asia Pacific markets. Across the region, a PUE range of 1.30-1.70 is typical with primary classification being age of facility and purpose (i.e. retail colocation, wholesale colocation and enterprise DC). Newer builds with a more streamlined/consistent IT infrastructure (i.e. wholesale or hyperscale colocation) can typically achieve a PUE of 1.30.

The generation source of the electricity consumed by DCs is of material consideration. DCs in a location with lower grid carbon intensity and access to renewable energy through power purchase agreements (PPAs)* or renewable energy certificates (RECs)* may present a more favourable option for DC operations than those locations with 'dirty' grids and low access to renewable energy.

1 IDC APAC Data Centre Operations Survey 2021
2 Schneider, White Paper 67, Guide to Environmental Sustainability Metrics for Data Centers 2022

REGULATORY AND MARKET STANDARDS IN ASIA PACIFIC

REGION	DATA CENTRE SUSTAINABILITY REGULATION	TYPICAL PUE OF EXISTING STOCK[3]	ELECTRICITY GRID DECARBONISATION[4]	OTHER
Australia	No/limited DC specific sustainability regulation	1.28-1.50	Moderate (Grid decarbonisation and availability of renewables at scale varies by state)	NABERS for data centre certification available
China	Requiring new DCs released since 2021 to have a PUE of 1.25-1.3 and utilisation rate of more than 60%	1.25-1.70	Limited	
Hong Kong	No/limited DC specific wsustainability regulation	1.30-1.70	Limited	
Japan	No/limited DC specific sustainability regulation	1.20-1.40	Progressing	
Singapore	Requiring new build DCs since 2022 to have a PUE of 1.3 or lower and platinum rating under the Green Mark Scheme by the local regulators	1.30-1.50	Progressing	
South Korea	No/limited DC specific sustainability regulation	1.30-1.40	Progressing	

OPERATOR PROGRESS ON SUSTAINABILITY

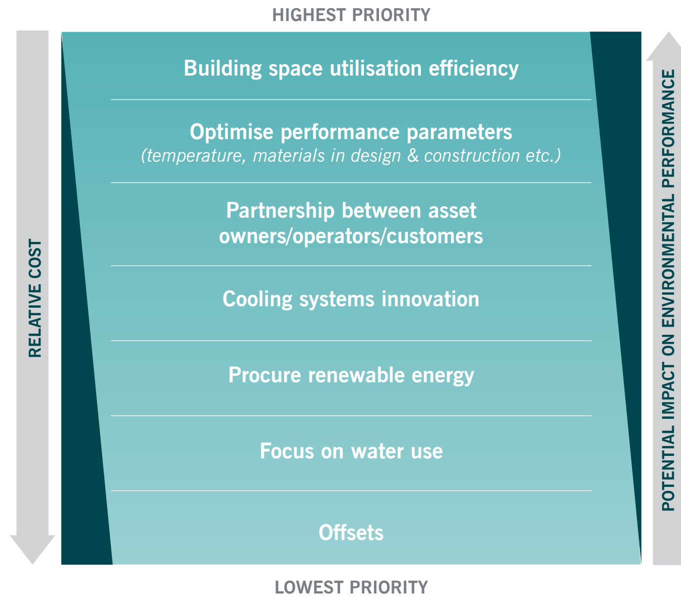
In recent years, positive steps have been made, with a number of DC colocation operators making public commitments to sustainability and to achieving net zero carbon (NZC)/carbon neutrality. This move to action can be evidenced by the formation of group initiatives such as the EU Climate Neutral Data Centre Pact[5], which brings together operators and trade associations in Europe with commitments to be 'climate neutral' by 2030 through a focus on energy efficiency, clean energy, water, circular economy and circular energy systems.

PRIORITY CONSIDERATIONS FOR ENVIRONMENTAL PERFORMANCE

DC operators understand the need to improve environmental performance in the sector, with a recent JLL study finding that becoming more sustainable and socially responsible is the #1 priority for DCs in Asia[6]. The same study finds that the top features undertaken by operators to drive more sustainable operations include:

- Building management systems including automatic controls and sub-metering
- Airflow management solutions (e.g. hot-cold aisles)
- Artificial intelligence/machine learning controls for air conditioning
- Peak shaving using uninterruptible power supply (UPS)
- Direct to chip or cold plate technologies
- Rainwater harvesting systems

From a real estate investor perspective, a number of measures have a considerable impact on overall environmental performance. These measures are identified and prioritised as:



KEY CRITERIA IN DETERMINING RELATIVE SUSTAINABILITY PERFORMANCE OF DATA CENTRES

Based on a review of available public reports such as white papers, industry interviews and Nuveen market intelligence, the following criteria are identified as key in determining the sustainability credentials and performance of a DC from the perspective of a landlord.

Alongside reviewing the underlying asset criteria outlined above, asset managers should consider the effect the DC acquisition will have on overall strategy sustainability goals – i.e. if the strategy is NZC aligned, how does the DC investment figure in the strategy lifecycle? Or if the strategy is Article 8/9 under SFDR*, how does the DC acquisition affect sustainable investment metrics? Similarly, where a strategy or entity has a NZC commitment, the carbon intensity impact of the DC should be considered.

3 Based on design PUE at full load for newer assets (i.e. those constructed within the past 5 years)
4 Function of grid carbon emissions intensity (gCO2e/kWh) & availability of renewable energy purchasing options including PPAs, RECs
5 EU Climate Neutral Data Centre Pact, https://www.climateneutraldatacentre.net/self-regulatory-initiative/
6 JLL, ESG ambitions: Shaping the future of data centres Asia Pacific 2022

NET ZERO CARBON, CARBON NEUTRALITY AND DATA CENTRES

DCs consume large amounts of energy and water in their operations. Whilst progress is being made to improve resource efficiency with new technologies, means of operating and improved design/construction practices, there will remain considerable residual carbon emissions (both embodied and operational) and consumption which will have to be addressed.

It is unlikely that DCs can be considered NZC unless sufficient on-site or dedicated renewables can be sourced locally. A further challenge for DCs is the lack of independent benchmarks (such as CRREM)* setting out appropriate decarbonisation or energy efficiency pathways, which makes charting a path to NZC challenging.

With that being said, DCs are critical infrastructure and demand for them will only increase in the decades to come. It is therefore positive that institutional investors with a focus on achieving NZC are active investors in the sector. This will continue to push the boundaries of the sustainability standards that these buildings can achieve and present the opportunity to be a key part of the transition to a low carbon economy.

CATEGORY	KEY CONSIDERATION	SUSTAINABILITY VIEW (MORE PREFERABLE)	SUSTAINABILITY VIEW (LESS PREFERABLE)
DC operating partner	For a development or standing asset — what are the ESG goals of the DC operating partner?	Understanding of who the operator will be, provided the operator has a clear set of ESG policy & targets	Forward commitments where end operator may be unclear, or where an operator does not have ESG policy & targets
DC operation engagement	Does the in-place contract include sustainability clauses/metrics?	Contract including elements such as data sharing, commitments to performance improvements, operator to source renewable energy	Contracts with no reference to sustainability/ESG/ environmental performance
Net zero carbon/ carbon neutrality	Does the current operator or future operator (in the case of forward commitment) have a net zero carbon/carbon neutrality commitment?	Operator with feasible net zero carbon/ carbon neutrality commitment and strategy	Operators with no discernible net zero carbon/carbon neutrality targets
Utility grid decarbonisation	Is the asset in a location with a decarbonising grid (i.e. one moving to renewable generation sources)	Assets in location with a clear pathway to decarbonise the electricity grid	Assets in location with no clear pathway to decarbonise electricity grid supply
Access to renewable energy	Is the asset in a location with options to source direct renewable energy (from grid, PPA or on-site renewables)?	• Location with access to renewable energy via tariffs or PPA • Locations with access to purchase renewable energy certificates	• Locations with limited/no options to directly source renewable energy • Locations with no REC market

Power usage effectiveness	What is the current PUE of the asset and how does it compare to 'market-standards'?	Typically expect assets to indicate annual operational $1.3<PUE<1.8$[7] across APAC	Assets which exceed 1.8 PUE are considerably below market performance with no business plan to improve
Green building/ operational performance certification	Does the asset have a green building or operational performance certification? (e.g. LEED, BREEAM, NABERS)	Certification in place	No certification in place, no business plan to achieve
On site back-up power	What back-up power is provisioned for the facility?	Assets utilising fossil-free sources of back-up power	Assets utilising fossil-fuel generators (e.g. diesel)
Water stress	Is the asset located in, or potentially in a region facing water stress?	Assets in low water stress regions	Assets located where water stress is, or is likely to become, a material issue by 2050
Water use efficiency	Does the asset employ systems or management to reduce water consumption?	• Assets which utilise measures to reduce water consumption of heat rejection systems including alternate water sources, modern cooling towers, recirculating cooling towers with limited blow-down etc. • Assets with a calculated water usage effectiveness in m^3/kWh	Assets with aging heat rejection infrastructure, no management plan in place or poorly designed enclosures which limit hear rejection potential
Embodied carbon (development/ repositioning)	If asset is development or involves repositioning, has embodied carbon been considered and a baseline with relative improvements established?	Embodied carbon calculated as part of development, with a reference model established and relative reductions in embodied carbon indicated	Development/repositioning assets which have no calculation of embodied carbon
Space utilisation efficiency	Has a study been undertaken to review & improve space utilisation?	Assets which have considered space utilisation as a factor in reducing energy wastage	Assets with no discernible review of utilisation or which show poor usage of space resulting in inefficient use of resources
DCIM* optimisation, demand side management	Does the asset include a modern DCIM?	• Assets which include modern DCIM able to monitor and report on efficiency and performance of building service provisions • Assets utilising AI/ML* platforms within DCIM operations preferred	Assets with limited or no DCIM

7 Note that 'market-standard' PUE can vary greatly by geography, DC construction etc.

For more information, please visit nuveen.com/realestate

*Glossary

AI/ML	Artificial Intelligence / Machine Learning
CRREM	Carbon Risk Real Estate Monitor (CRREM) is a tool developed to chart the required decarbonisation and energy reduction pathways for real estate by sector and location. The latest tool release does not include a data centre pathway.
DCIM	Data Centre Infrastructure Management (DCIM) monitor and optimise energy consumption and utilisation of IT and building facilities within a data centre.
PPA	A Power Purchase Agreement (PPA) is a long-term agreement between a renewable energy developer and a consumer for the purchase of renewable energy.
PUE	Power Usage Effectiveness (PUE) is a metric used to determine the energy efficiency of a data centre. PUE is determined by dividing the total amount of power entering a data centre by the power used to run the IT equipment within it. PUE is expressed as a ratio, with overall efficiency improving as the quotient decreases toward 1.0.
REC	Renewable Energy Certificates (REC) are a market-based instrument that represents the property rights to the environmental, social, and other non-power attributes of renewable electricity generation. RECs are created when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource.
SFDR	The Sustainable Finance Disclosure Regulation (SFDR) is a European regulation introduced to improve transparency in the market for sustainable investment products, to prevent greenwashing and to increase transparency around sustainability claims made by financial market participants.

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