Sustainable Data Centres: The search for Resource Efficiency and Carbon Mitigation

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Data centres are a significant contributor to energy consumption and carbon emissions, making resource efficiency and carbon mitigation crucial in their sustainable development. In this article, we explore the experiences of Singapore and the UK in addressing this issue.

Singapore update

Data centres were responsible for about 7% of Singapore's total electricity consumption in 2020, according to the Singapore Ministry of Trade and Industry (MTI). As at January 2022, there were more than 70 operational data centres (DCs) in Singapore. This set of statistics came after a 3-year moratorium on new data centre development since 2019 because data centres in tropical countries such as Singapore guzzle energy in order to power cooling systems that allow the equipment to operate within acceptable temperature range. The moratorium was a respite for the DC industry to re-calibrate, and served as a temporary stay on the explosion of hyperscale facilities servicing telecommunication giants and cloud

conglomerates which will derail Singapore's national target to achieve net zero emissions by 2050 and to reduce emissions to around 60MtCO2e in 2030

On 20 July 2022, the Singapore Economic Development Board (EDB) and the Singapore Infocomm Media Development Authority (IMDA) launched a pilot Data Centre (DC) - Call for Application Exercise (2023 DC Pilot Call) will facilitate the building of new DC capacity, ensure the adherence to data centre regulations, and allow for the measured and sustainable growth of DCs in Singapore. This is a cautious wade-in which came after the 3-year moratorium because DCs are critical enablers of the digital economy. (see *Summary of Pilot DC-CFA Key Parameters & Criteria here*)

EDB and IMDA will partner with the industry to facilitate DCs that not only bring in state of the art technologies and best practices for sustainability, particularly in the areas of energy efficiency and decarbonisation but also make a significant contribution to Singapore's broader economic objectives. As many DCs in Singapore are already striving to be more energy efficient and sustainable, the 2023 DC Pilot Call seeks to leverage on the expertise and capabilities of the industry to further push the technology boundaries in these areas and to help level up the baseline for the sector whilst providing new capacity for DC growth to support Singapore's digital economy. As such the 2023 DC Pilot Call has been structured with flexibility in mind to stimulate innovative proposals.

The 2023 DC Pilot Call will close on 21 November 2022 with key evaluation criteria based on Sustainability: Best in Class Resource Efficiency and Decarbonisation. Not unsurprisingly, the pilot call is also intended to serve as a useful exercise to explore the fixed asset investments and total business expenditure for the DC and the desirable business activities that are brought in together with the DC (such as R&D, product development etc) that contribute to the broader economic value and outcomes for Singapore.

The UK experience

The UK Government has revised its Net Zero Strategy with a clear focus on making sure all new buildings are to be 'net-zero carbon ready' and pressure to be energy efficient and to decarbonize is coming from all angles.

The implementation and revision of the Minimum Energy Efficiency Standards (MEES) mean that commercial leases, including for DCs, can only be granted where the property holds an energy performance certificate (EPC) with a minimum rating of E (with some exceptions), rising to C by 2027 and to B by 2030. This will be a significant priority for landlords and developers, who may need to significantly update or retrofit existing infrastructure as a result.

Climate related financial directives mean that reporting on climate related risks is mandatory for certain parties (including large business owners, asset managers and owners), for example, the Streamlined Energy and Carbon Reporting implemented by the Department for Business, Energy and Industrial Strategy and the Financial Conduct Authority's Listing Rules. This reporting is public which means pressure to disclose good 'green' results is high.

Creative and efficient design (and a move away from expensive and carbon intensive 'over-designing'), positioning of servers, heat resistant technology and innovation are part of this process but a big part of it is making sure that as an energy intensive industry, the energy being used is clean and green in the first place. Commercial models for delivering energy are evolving and corporate Power Purchaser Agreements (PPAs) are a key example.

Developers are increasingly looking to join up with Independent Network Operators (IDNOs) that offer alternative routes to connect to the National Grid. There have been progressively more applications for wind and solar grid connections as a result of demand for the adoption of renewable energy and a large backlog in connections to the National Grid mean that parties are looking to get connected as soon as possible. Small modular reactors are also being examined as potential sources of clean – and reliable-

energy. We expect to see further innovation on this issue, including different types of energy products, such as ' Energy as a Service'.

Increased data consumption inevitably means increased energy consumption but there is a clear push towards using sustainable energy and innovative means of reducing energy requirements in the first place. There are carrots as well as sticks in this changing landscape and developers who are able to reduce emissions and improve energy efficiency have the opportunity to position themselves as industry leaders and make their offering more desirable, particularly for consumers with high sustainability awareness who want to use data centres that will not significantly add to their own carbon footprint through their supply chain.

What's next

As the usage of digital applications and services increases, the demand for data storage and processing for businesses and consumers is set to rise exponentially. However, DCs will need to be accountable for their use of resources such as land, water, and energy.

We anticipate that all DCs, whether colocation centres or hyperscalers, will be monitored by consumers and watchdogs alike on their emissions, energy efficiency, water efficiency and climate goals. Greentech and design innovations, such as on-site power generation, clever cooling methodologies, use of distributed sensors and floating DCs will certainly all come into play and be harnessed to reduce DCs' carbon footprint. Going forward, nations will most certainly be regulating and calibrating the growth of DC capacity in a sustainable manner consistent with their climate change commitments.