

Market Insight Report Reprint

Call for sustainability grows louder in APAC region

May 4 2021

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Introduction

451 Research recently attended the virtual DCD Asia-Pacific Building at Scale seminar on datacenter design and construction, where topics including environmental sustainability of the sector, hyperscale expansion and the growth of edge datacenters in the region were discussed. The sustainability issue was a binding theme for many of the sessions as governments from the region's key datacenter markets including Singapore and China enacted policies to rein in the enormous environmental impact of the industry. The industry is under a twofold pressure since corporations – the datacenters' customers – commit to net zero emission targets, compelling datacenter providers to reduce their carbon footprint in their operations. A few strategic plans were put forward, including on-site clean energy generation and modular datacenter design to optimize the usage of resources.

The DCD Asia-Pacific event was attended by executives from multi-tenant datacenter (MTDC) and hyperscale wholesale providers, investment management firms and services providers.

THE 451 TAKE

A combination of push and pull factors are at play in the ongoing sustainability drive seen at the datacenter industry just as the APAC region is expecting a wave of new facilities following the COVID-19-induced digitalization. The growing call for sustainability can no longer be ignored, but the industry must avoid falling into the pitfalls of 'greenwashing.' Many of the sustainability solutions offered at the DCD Asia-Pacific Building at Scale seminar are not the most novel ideas, but nonetheless sensible ways to approach the many environmental damaging aspects of the business. This raises the question of why few are walking the talk. Providers that lacked the urgency to act previously must now step up their game, while those who do not, will, like fossil fuels, be eventually phased out of the market.

Context

Most datacenter providers are rightly focusing on renewable energy sources, given the power-gobbling nature of their operations. Bigger companies as well as bigger customers (e.g., the hyperscalers and the cloud giants) will have the muscle to rope in the power grid operators and governments to generate renewable energy. The wider APAC region is rich in natural resources for renewable energy. It is up to the stakeholders involved to look into integrated grid solutions to feed renewable energy to the developed markets in the major cities, or providers may find motivation to build facilities in locations closer to green power transmission sites.

Power conundrum

Datacenters operating near the equator, particularly in Southeast Asia for the APAC region, require more power for cooling, with high temperatures averaging between 26 and 33 Celsius, coupled with all-year high humidity. The tropical climate subsequently renders a higher PUE (power usage effectiveness) for facilities in the region, while Patrick Chan, vice president, South Asia of Uptime Institute, noted that extreme heat due to climate change will make datacenter cooling more challenging. Although overall better operational efficiency has helped some providers to bring down their PUE levels, the harder, and perhaps more pertinent, task is to transition to cleaner energy sources for both the providers and the customers to achieve their decarbonization goals.

Datacenters are primarily powered from the grid and secondarily from on-site diesel generators. The conundrum lies in the primary source, given that a large proportion of power plants in APAC generate electricity from fossil fuels. Delegates at the seminar expressed frustration that they could not see a solution to the problem, unless the utility operators, which in many cases are state-owned, undertake to procure green energy. Despite an abundance of natural resources, APAC has been largely behind in renewable energy.

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Singapore, which generates 95% of its electricity from natural gas, has been one of the more proactive governments in exploring renewable energy, to the extent of imposing a moratorium on datacenter construction until 2021 to look for renewable energy sources. However, Singapore's state-owned power grid operator, SP Group, is constrained by limited resources of the city-state and has few options but to import renewable energy from its neighbors through the regional interconnected grid. The Laos government had earlier invited Singapore to invest in building hydropower plants in the Indochina nation, while the idea was for Singapore to invest in hydropower dams in Laos and later purchase electricity from Malaysia with renewable energy credits.

Power could be traded cross-border through the Lao PDR-Thailand-Malaysia integration project incepted in 2013, although Singapore had joined only recently under its plan to import 100MW from Malaysia. Nevertheless, the plan for Singapore to invest in hydropower plants in Laos has yet to take off. Instead, Singapore energy firm Evolution Power Investment Corporation invested in building a 1,000MW coal plant in Laos in June 2020. The turn of events just underlines the complications of developing renewable energy in third world economies.

Sunseap, a solar energy provider backed by Singapore's sovereign wealth fund Temasek, has had more success as the supplier of solar energy for Apple's and Microsoft's datacenters in Singapore. The firm launched a 5MW-peak offshore floating solar farm off Singapore's coast in March and had earlier ventured overseas to build a 168MW solar farm in Ninh Thuan, on the south-central coast of Vietnam. Sunseap later set up a joint venture with Malaysia's state-owned grid operator, Tenaga Nasional Berhad (TNB), in March for Singapore to import electricity from its neighbor. Separately, TNB will buy a 39% stake in five solar rooftop projects owned by Sunseap in Vietnam.

The hydrogen economy

On-site generation of renewable energy using hydrogen fuel cells could be the answer for datacenter providers to meet insufficient clean energy supply, a forward-looking solution that will be a departure from the status quo model of buying power from a third-party utility provider, said Susanna Kass, datacenter advisor at the UN Sustainable Development Group in a session titled 'How do you know how well your cloud and edge data centers are really doing when it comes to sustainability?'

Kass wrote about the Rack Level Fuel Cell approach in her whitepaper Designing and Building the Next Generation of Sustainable Data Centers co-authored with Alberto Ravagani. The technique involves installing fuel cells at the rack level, which is then paired with renewable natural gas supplied by the gas line.

The approach was tested years earlier with various methods, including proton-exchange membrane fuel cells and solid oxide fuel cells by companies including Microsoft, as well as through the collaborations between German carmaker Daimler with Hewlett Packard Enterprise and the US Department of Energy's National Renewable Energy Laboratory. Microsoft has also explored using hydrogen fuel cells to replace the diesel generators.

Glenn Allan, senior consulting infrastructure engineer who spoke at the 'How close are APAC datacenters to developing and delivering on renewable energy strategies' session, said datacenter providers could start thinking about using liquid hydrogen, although the hydrogen technology would probably take another decade to mature.

Allan suggested that datacenter operators to look at dynamic ways of load shifting to reduce energy expenditure. Yet this approach may not be suitable for MTDC operators that need to cater to the needs of different customers in their facilities.

While on-site hydrogen production is a long-term solution that could help providers sidestep the government coordination effort required in sourcing renewable energy, the drawback remains that hydrogen production itself typically consumes more energy than it emits. Hydrogen burns without emitting greenhouse gases and can be produced from electrolysis. To be truly green, the resources used to generate hydrogen must also have renewable origins. Hydrogen storage and distribution could also be less efficient and increase operational cost in datacenters.

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The big picture

The best renewable energy is still energy not used, and the same goes for resources in the entire supply chain of the datacenter construction and operations. Kass said datacenter providers should not overbuild and overprovision, but instead build with a modular approach and scale growth accordingly. She urged providers to think about upscaling to keep materials in perpetual use besides designing the datacenters for disassembly to avoid landfill issues.

At the same time, metrics are closely related to sustainability. Artificial intelligence, blockchain and IoT will help providers to strengthen the resilience of the supply chain and act responsibly in their operations, said fellow panelist Blaise Porter, responsible business director, Fujitsu Australia. Setting targets is also an important step in the sustainability drive of the providers. "If you know you can achieve them you are not being aggressive enough," said Porter.

Meanwhile, datacenter providers should also look at what goes into the construction of the facilities because concrete and steel are embodied carbon hotspots locked in the building for its lifetime, Mark Porter, director, supply chain and international collaboration, Renewable Energy Buyer Alliance, said during the session titled 'How close are APAC datacenters to developing and delivering on renewable energy strategies?' After all, the cement sector is another big polluter, contributing to 7% of industrial energy use and another 7% of global carbon dioxide emissions, according to the International Energy Agency.

However, few viable alternatives are available to replace the raw materials. Amazon works with CarbonCure, a Canadian startup that develops a technology to introduce recycled carbon dioxide into fresh concrete for its datacenters. CarbonCure said carbon dioxide is converted into solid calcium carbonate and embedded into the concrete, while stronger structure of the mineral allows the contractors to use less cement. CarbonCure is backed by big-name investors including Amazon's Climate Pledge Fund, Bill Gates' Breakthrough Energy Ventures, BDC Capital and GreenSoil Investments.

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