Enabling data centre sustainability continues to be key for both governments and operators

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There has continued to be a growing emphasis on ensuring the sustainability of data centres worldwide since our last article on data centre sustainability in November 2021, from both a government perspective and an operator perspective. This is becoming even more critical because consumers, businesses and governments are becoming increasingly aware of the direct negative effects that data centres can have. These include noise emissions, high water usage and, more critically, an indirect increase in carbon emissions due to high electricity consumption.

Technology continues to be the key to unlocking large-scale improvements in data centre sustainability. Bright spots have emerged, including signs of increasing industry collaboration, which may potentially enable a more sustainable data centre industry for all.

Governments continue to implement measures to tackle data centre sustainability

Governments have ramped up their efforts to improve data centre sustainability over the past 9 months. Some examples are given in Figure 1.

Figure 1: Recent government initiatives to manage data centre sustainability

Country	Initiative
Germany	The Frankfurt City Council announced, in June 2022, that it will be limiting data centres to specific neighbourhoods. In addition, it intends to impose guidelines to ensure that new facilities are energy-efficient and it will design a heating plan for the city that uses heat generated by data centres.[1]
Singapore	The IMDA launched a pilot in July 2022 that invited applicants for new data centres after lifting a moratorium on new data centres that was first imposed in 2019. Applicants will be evaluated based on key criteria including sustainability, with the aim to have "best-in-class resource efficiency and decarbonisation".[2]
Netherlands	The Dutch government announced, in February 2022, that it would be reimposing a 9-month moratorium on new hyperscale data centres while it develops new rules to manage new builds. This is due to concerns that include the very high consumption of renewable energy by such facilities, which could have been used for other purposes.[3]

Source: Analysys Mason

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[1] Stadtplanungsamt Frankfurt am Main, *Facilitating computer centers.* Available at: https://www.stadtplanungsamt-frankfurt.de/facilitating_computer_centers_22137.html?langfront=en&psid=86sgqo3jl6288e0pmmc8orc8k3.

[2] IMDA (2022), *ANNEX A: Summary of Pilot DC-CFA Key Parameters & Criteria.* Available at: https://www.imda.gov.sg/-/media/Imda/Files/News-and-Events/Media-Room/Media-Releases/2022/07/Annex-A---Summary-of-Pilot-DC-CFA-Key-Parameters-and-Criteria.pdf.

[3] Rijksoverheid (2022), *Kabinet besluit tot aanscherping regels hyperscale datacenters.* Available at: https://www.rijksoverheid.nl/actueel/nieuws/2022/02/16/kabinet-besluit-tot-aanscherping-regels-hyperscale-datacenters (in Dutch).

Similar measures to manage data centre sustainability are likely to be considered and introduced by more countries, particularly as the general populace becomes increasingly aware of its impact, as illustrated by the examples in Figure 2.

Figure 2: Examples of the direct disruption and impact caused by data centres

Country	Description
Netherlands	Meta's planned development of the largest data centre in the Netherlands saw backlash from residents who argued that "it asks too much of our electricity, it asks too much of our water".[4] Meta initially obtained local council approval for the facility, but it was forced to put a hold on its plans in March 2022 after facing political opposition in the Dutch Senate.
UK	The Greater London Authority issued a letter to developers in July 2022 warning them that new developments in three boroughs may be rejected due to insufficient electrical capacity. It further cited that a key reason for this is the recent rise in the number of data centres that "use large quantities of electricity, the equivalent of towns or small cities, to power servers and ensure resilience in service".[5]
USA	Residents in Prince William County, a part of Northern Virginia that has the largest data centre market in the world, raised complaints about "catastrophic noise" emerging from data centres and sought a pause on approvals for new data centre builds until the issue was addressed.[6]

Source: Analysys Mason

Data centre operators need to improve their sustainability to improve access to financing

Improving the sustainability of data centres is not only in the interest of governments. Data centre operators should also take note due to:

- increasingly stringent requirements for new data centre builds imposed by regulators and governments
- environmental, social and governance (ESG) initiatives becoming an important evaluation criterion used by enterprises when selecting suppliers that offer data centres
- the growing emphasis on ESG factors by financiers, which can affect a data centre operator's ability to attract funding and/or investment.

Traditional credit rating agencies now also offer ESG ratings due to demand from investors to assess the sustainability of corporate entities. This provides evidence of the growing importance of ESG factors in supporting funding or investment.

Data centre operators are thus increasingly using sustainable financing to raise funds to support their operations and expansion plans. This can be through the issuance of green bonds, which are bonds that are raised for climate or environmental sustainability projects. Leading data centre operators have used such bonds extensively in recent years. For example:

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[4]   Wired (2022), *Facebook's Data Center Plans Rile Residents in the Netherlands.* Available at:
       https://www.wired.com/story/facebook-dutch-data-center/.

[5]   Financial Times, *West London faces new homes ban as electricity grid hits capacity.* Available at:
       https://www.ft.com/content/519f701f-6a05-4cf4-bc46-22cf10c7c2c0.

[6]   DCD (2022), *Prince William residents complain of "catastrophic noise" from data centers.* Available at:
       https://www.datacenterdynamics.com/en/news/prince-william-residents-complain-of-catastrophic-noise-from-data-centers/.

- **Equinix** issued USD1.2 billion of green bonds in April 2022 to reach a total of approximately USD4.9 billion of green bonds issued[7]
- **Digital Realty** issued two additional green bonds in 2021, bringing it to over USD6 billion raised via green bonds since 2015.[8]

The importance of sustainability for data centre operators when trying to attract financing is expected to increase further. Indeed, 83% of respondents to a worldwide survey of senior executives in 2022 expect that scrutiny and due diligence surrounding ESG issues when making data centre investment/development decisions will increase greatly over the next 24 months. In addition, the survey results further revealed that 75% of both debt providers and equity investors are willing to pay a premium to invest in a data centre facility with very good or excellent ESG credentials.[9]

Innovation will continue to be at the forefront of improving data centre sustainability

Innovations in data centre cooling and clean energy will continue to be critical to improving the energy efficiency of data centres and reducing their carbon footprints. New advances continue to be made; hyperscalers are particularly committed to research and development to improve data centre sustainability.

- Microsoft announced, in July 2022, that it had made a breakthrough in successfully testing a first-of-its-kind hydrogen generator running at 3MW. This provides evidence that a zero-carbon-emissions alternative to traditional diesel-powered back-up generators is feasible.[10]

- Google has implemented a carbon-intelligent platform that is able to "shift moveable compute tasks between different data centres, based on regional hourly carbon-free energy availability" to support its goal of operating fully on carbon-free energy by 2030.[11]

- Meta has been using advanced data centre cooling approaches, such as direct evaporative cooling, to reduce water usage when cooling its data centres. It has stated that its facilities are thus "over 80% more water efficient that the average data centre".[12]

[7] Equinix (2022), *Equinix Prices $1.2 billion of Green Bonds in its Fourth Offering to Advance Sustainability Initiatives.* Available at: https://www.equinix.com/newsroom/press-releases/2022/04/equinix-prices-1-2-billion-of-green-bonds-in-its-fourth-offering-to-advance-sustainability-initiatives.

[8] Digital Realty (2022), *Digital Realty Becomes First Data Center Operator to Reach One Gigawatt of IT Capacity of Sustainable Building Certifications*. Available at: https://investor.digitalrealty.com/news-and-events/news/press-release-details/2022/Digital-Realty-Becomes-First-Data-Center-Operator-to-Reach-One-Gigawatt-of-IT-Capacity-of-Sustainable-Building-Certifications/default.aspx.

[9] DLA Piper (2022), *Global Data Centre Investment Outlook.* Available at: https://inform.dlapiper.com/10/7143/uploads/the-meteoric-rise-of-the-data-centre---global-data-centre-investment-outlook.pdf.

[10] Microsoft (2022), *Hydrogen fuel cells could provide emission free backup power at datacenters, Microsoft says.* Available at: https://news.microsoft.com/innovation-stories/hydrogen-fuel-cells-could-provide-emission-free-backup-power-at-datacenters-microsoft-says/.

[11] Google (2021), *We now do more computing where there's cleaner energy.* Available at: https://blog.google/outreach-initiatives/sustainability/carbon-aware-computing-location/.

[12] Meta, *Enhancing Water Efficiency Through Advanced Cooling Technology*. Available at: https://sustainability.fb.com/wp-content/uploads/2020/12/FB_Enhancing-Water-Efficiency-Through-Advanced-Cooling-Technology.pdf.

Co-location providers are similarly exploring innovations that can improve sustainability. For example, Equinix opened its first co-innovation facility (CIF) to work with partners and test sustainable innovations such as fuel cell technology and liquid cooling.[13]

The implementation of such innovations across the industry will be facilitated by the increasingly collaborative environment regarding sustainability measures. An example of this collaboration is the launch of the Low Carbon Patent Pledge (LCPP) in 2021 by key industry players including HPE, Meta and Microsoft. Members of the LCPP agree to share patents for low-carbon technology applications. Alibaba Cloud joined the LCPP in April 2022 and made nine of its patents related to green data centre technology available to external parties.[14] This highlights the common goal of the cloud and data centre industries of ensuring a sustainable future.

Conclusion

The impact that data centres have on sustainability is becoming increasingly apparent, not only to governments, but also to the general populace due to noise emissions, excessive water usage and, most critically, carbon emissions. The measures to manage sustainability that are starting to be introduced by governments in mature data centre markets thus need to be expanded to other markets to ensure an increase in data centre sustainability. In addition, data centre operators also have a need to manage sustainability concerns to ensure compliance with new regulation, to secure customers and to obtain access to financing and/or to maximise valuations. Investments in innovation will continue to be critical because they will play a key role in enabling large improvements in data centre sustainability. Additional measures such as sourcing renewable energy and improving energy efficiency will continue to be important approaches for all data centre operators to consider.

Analysys Mason has conducted multiple projects in the data centre space worldwide, including market studies, due diligence exercises and helping regulators to develop their data centre policies. For further information, please contact Jay Lee (Manager).

For more information about Analysys Mason's capabilities across the digital infrastructure value chain (including submarine cables, terrestrial links and CDNs), including economic impact assessments, policy and regulatory issues, please contact Dion Teo (Principal).

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[13]   Equinix (2022), *Leading Partners Join Forces with Equinix to Test Sustainable Data Center Innovations Including Fuel Cell and Liquid Cooling Technologies.* Available at: https://www.equinix.com/newsroom/press-releases/2022/01/leading-partners-join-forces-with-equinix-to-test-sustainable-data-center-innovations-including-fuel-cell-and-liquid-cooling-technologies.

[14]   Alibaba Cloud (2022), *Alibaba Group Joins Low Carbon Patent Pledge to Accelerate the Adoption of Green Technology*. Available at: https://www.alibabacloud.com/blog/alibaba-group-joins-low-carbon-patent-pledge-to-accelerate-the-adoption-of-green-technology_598862.