

Renewable Energy and Data Centres in Asia-Pacific (APAC)

A Review of Policy Enablers in Japan, Australia, and India



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Renewable Energy and Data Centres in the Asia-Pacific (APAC): A Review of Policy Enablers in Japan, Australia, and India

Introduction: Data Centres and Energy Usage

Data centres are on the rise throughout the APAC region, with projections indicating significant market expansion. This growth surge is driven by various factors, including the rapid increase in internet usage, the booming e-commerce sector, widespread digital transformation efforts, and the adoption of cutting-edge technologies like AI and cloud computing.

As the demand for data processing and storage escalates, so does the consumption of resources to power data centre infrastructure, including servers, cooling systems, and other equipment.

Recognizing the environmental impact of the energy-intensive operations of data centres, many operators have made public sustainability commitments. A primary focus for these operators is to accelerate

the transition away from fossil fuels toward clean energy sources to mitigate the environmental impact of data centres.

While data centre operators are taking steps in support of the energy transition, governments across APAC also play an important role in facilitating such a shift with the creation of a conducive regulatory environment.

The following case studies from Japan, Australia and India exemplify how governments can support data centre operators to integrate renewable energy through the implementation of enabling policies. These case studies also serve as a repository of policy options that can be adopted by other governments in APAC to accelerate the adoption of renewable energy in data centre operations.

Case Study I: Japan

Japan's data centre market is forecasted to reach USD 30 billion in 2026 from USD 24 billion in 2022- which translates to an annual growth rate of 5.5%.¹ As the market continues to expand in size, increasing energy consumption from data centres thus becomes an issue that needs to be addressed.

In response, the Japanese government announced the “Green Growth Strategy” in 2020 to achieve carbon neutrality in 2050. Under this strategy, data centres are required to “use renewable energy for a portion of their energy requirements”.²

Following this directive, the Japanese government has devised several policy measures to facilitate the adoption of renewable energy among data centres:

a. Diversifying Renewable Energy Mix: In October 2021, the Japanese

the country’s total energy mix by 2030.³ To materialize this target, the Japanese government introduced initiatives such as an auction system for renewable energy projects to enable competition and facilitate direct access to renewable energy.⁴

b. Expanding Investments in Renewable Energy: To catalyse public-private investments in the renewable energy space, the Japanese government launched the Japan Climate Transition Bond, aiming to raise JPY 120 trillion (USD 77 billion) to implement the Green Transformation (GX) policy. Part of the bond proceeds will be allocated to developing perovskite solar cells and floating offshore wind to facilitate the installation of additional solar and wind farms.⁵

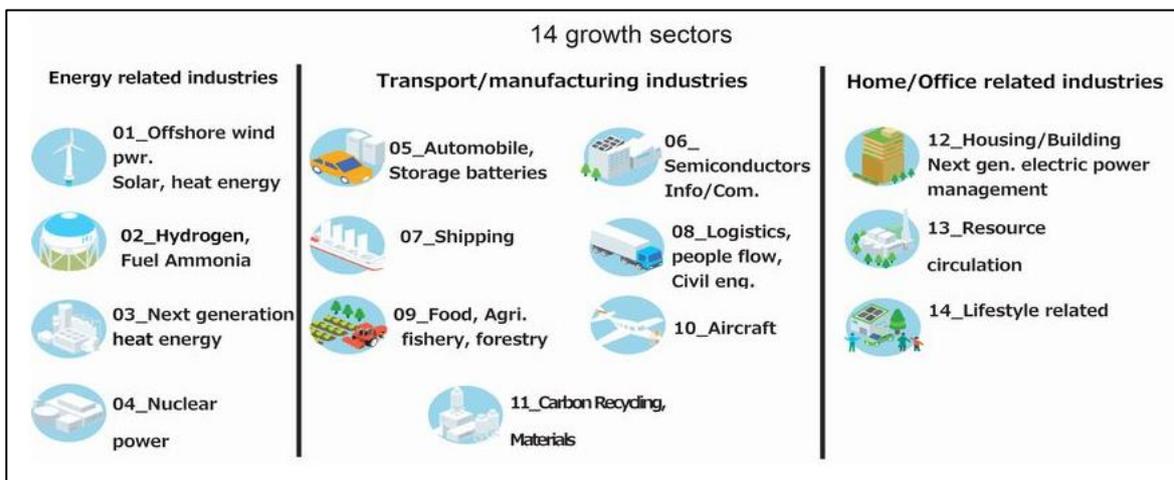


Figure 1: METI Japan - 14 Growth Sectors - Green Growth Strategy Through Achieving Carbon Neutrality in 2050

government released the Sixth Strategic Energy Plan, targeting to increase renewable energy to comprise 36%-38% of

c. Facilitating Renewable Energy Procurement through Power Purchase Agreements (PPAs): To

¹<https://www.jetro.go.jp/en/invest/insights/japan-insight/booming-data-center-market-draws-multinationals.html>
²<https://www.ijj.ad.jp/en/datacenter/tech/cn/>
³https://www.meti.go.jp/english/policy/energy_environment/global_warming/ggs2050/index.html

³<https://www.weforum.org/publications/fostering-effective-energy-transition-2023/full/japan-7b13ba5d4d/>
⁴<https://www.weforum.org/publications/fostering-effective-energy-transition-2023/full/japan-7b13ba5d4d/>
⁵<https://thediplomat.com/2024/02/the-benefits-of-japans-climate-transition-bond/>

foster partnerships between developers, retailers and corporate power consumers, the Ministry of Economy, Trade, and Industry (METI) encouraged the formulation of physical, virtual, on-site or off-site PPAs under the Electricity Business Act.⁶ Recently, Microsoft signed a 20-year Virtual PPA with Shizen Energy, where the developer is expected to provide renewable energy from a 25MWac solar farm in Inuyama City, Aichi Prefecture.⁷ In a similar vein, Amazon entered into a 20-year Offsite PPA with Clean Energy Connect (CEC), an ITOCHU portfolio company, to develop 700 solar power plants to power the company's businesses in Japan.⁸

c. Providing Subsidies for the Construction of Green Data Centres:

At present, more than 80% of the data centres in Japan are located in Tokyo and Osaka. Recognizing the concentration of data centres, METI proposed a JPY 45.5

billion subsidy program over the next four years to decentralize data centres to Hokkaido and Kyushu to leverage their renewable energy resources and their power generation capacity.⁹

d. Stimulating Research and Development of Renewable Energy:

Apart from offering subsidies and facilitating PPAs, the Japanese government is directing investments towards research aimed at enhancing energy efficiency in data centres. For example, the New Energy Industrial Technology Development Organization (NEDO) funded a project on "Next Generation Green Data Center Technology" to improve the energy efficiency of data centres through photonics-electronics convergence technology.¹⁰ In addition, the government pledged to allocate proceeds from the Climate Transition Bond to develop next-generation semiconductors to reduce power consumption in data centres.¹¹

⁶ https://www.renewable-ei.org/pdf/download/activities/REI_CorporatePPA_Infopack_EN_2023.pdf
⁷ https://www.shizenenergy.net/en/2023/10/13/seg_vppa_microsoft/
⁸ <https://www.itochu.co.jp/en/news/press/2023/230215.html>

⁹ <https://japannews.yomiuri.co.jp/politics/politics-government/20230531-112995/>
¹⁰ <https://green-innovation.nedo.go.jp/en/project/building-next-generation-digital-infrastructure/>
¹¹ <https://thediplomat.com/2024/02/the-benefits-of-japans-climate-transition-bond/>

Case Study 2: Australia

Australia's data centre market is experiencing remarkable growth, where it is expected to soar from USD 6.31 billion in 2022, to USD 9.49 billion in 2028.¹² Like Japan, the Australian government has put in place several policies to assist data centres in accelerating the transition to renewable energy.

a. Diversifying Renewable Energy Mix and Increasing Generation: The Australian government implemented the Renewable Energy Target (RET) scheme to promote renewable energy generation. The RET through generation of Large-scale Generation Certifications (LGCs) and Small-scale Technology Certificates (STC), creates a market to incentivise the generation of and use of renewable energy setting a target to deliver an extra 33,000 gigawatt hours (GWh) of electricity from renewable sources every year from 2020 to 2030.¹³ This initiative aims to significantly increase the proportion of renewable energy in Australia's energy mix,



Image 1: Planned renewable energy mix in Australia

including solar, wind, and hydropower. Projections indicate that by 2030, 61% of

energy from Australia will come from renewable sources.¹⁴

Businesses and individuals also enter into power purchase agreements or purchase and surrender LGCs to reduce their scope 2 or indirect emissions footprint. By surrendering LGCs, an entity claims the renewable attribute of the electricity generated. An example is Equinix's recent long-term PPA with TagEnergy for 151MW of wind energy to power its International Business Exchange (IBX) data centres across Australia. In a similar vein, Microsoft entered into a 15-year power purchase agreement with Fotowatio Renewable Ventures Australia (FRV) to harness solar energy for its data centers in Australia¹⁵ and Google entered into an innovative collaboration with AirTrunk and OX2 to develop a new solar farm in New South Wales which is expected to add 25 megawatts (MW) of new renewable energy generation capacity into Australia's energy grid.¹⁶

b. Expanding Investments in Renewable Energy: In conjunction with the RET, the Australian government set up the Capacity Investment Scheme (CIS), a national framework to encourage investments in renewable energy capacity.¹⁷ Under the CIS, the Australian government enters into Renewable Energy Transformation Agreements with states and territories, where they are expected to contribute to renewable energy generation, maintain electricity system

¹² <https://w.media/australia-data-center-market-investment-analysis-report-2023-2028/>, <https://cer.gov.au/schemes/renewable-energy-target>

¹³ <https://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target>

¹⁴ [https://www.apec.org/docs/default-source/publications/2022/10/key-recommendations-public-private-approaches-to-decarbonizing-power-systems-in-apec.pdf?sfvrsn=8d1d4c11_2](https://www.apec.org/docs/default-source/publications/2022/10/key-recommendations-public-private-approaches-to-decarbonizing-power-systems-in-apec/222_ewg_key-recommendations-public-private-approaches-to-decarbonizing-power-systems-in-apec.pdf?sfvrsn=8d1d4c11_2)

¹⁵ <https://news.microsoft.com/en-au/features/microsoft-and-frv-australia-team-up-to-add-renewable-energy-to-the-grid/>

¹⁶ <https://blog.google/intl/en-au/company-news/outreach-initiatives/advancing-renewable-energy-in-australia-through-collaboration/>

¹⁷ <https://www.dcccew.gov.au/energy/renewable/capacity-investment-scheme>

reliability, and address regulatory and other non-market barriers creating investment bottlenecks.¹⁸ In November 2023, the government announced the expansion of the scheme to include 32 GW of new renewable energy capacity.¹⁹

c. Demarcating Renewable Energy Zones (REZ): REZs are a cluster of large-scale renewable energy projects. REZs usually encompass new renewable energy generators and infrastructure, storage, and high-voltage transmission infrastructure.²⁰ The combination of multiple projects into one REZ helps the Australian government to invest more effectively. At the same time, it also helps in identifying gaps and highlights the targeted reform necessary to facilitate and incentivize renewable energy investments in certain states or territories.²¹

d. Facilitating Renewable Energy Procurement through the GreenPower Program: To facilitate corporations and businesses to purchase renewable energy, the Australian government introduced the GreenPower program. The program covers state governments under the National GreenPower Steering Group, which include New South Wales, Victoria, South Australia, and the Australian Capital Territory.²²

Under this program, businesses can purchase GreenPower through various channels, including electricity retailers,

decoupled providers, PPAs and GreenPower Connect.²³



Image 2: If the business purchases 10% or more of its annual electricity usage as GreenPower, they are eligible to use the GreenPower logo on your marketing and business materials.²⁴

e. Funding for Green Data Centres: The Australian government has two funding programs in place to incentivize the establishment of green data centres. These programs include “The Industrial Energy Transformation Studies”, which aims at financing engineering and feasibility studies to reduce emissions and lower energy costs. The “Clean Building Management Investment Trust” also offers tax concessions for managed investment trusts.²⁵ Apart from the above, Victoria operates the Victorian Energy Upgrades (VEU) program, which provides rebates or discounts for energy-efficient products by generating Victorian Energy Efficiency Certificates (VEECs). Each VEEC represents one ton of greenhouse gas emissions reduction and is sold to energy retailers. Recently, Equinix claimed VEECs to fund the deployment of a 1MW rooftop solar system at its MEI IBX data centre in Melbourne.²⁶

Case Study 3: India

India’s data centre industry is expected to reach USD 4.5 billion by 2025, growing

¹⁸ <https://www.dccew.gov.au/energy/renewable/capacity-investment-scheme>

¹⁹ <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/112323-australia-expands-auction-plan-aiming-for-32-gw-new-renewables-storage>

²⁰ <https://www.energyco.nsw.gov.au/renewable-energy-zones>

²¹ https://www.apec.org/docs/default-source/publications/2022/10/key-recommendations-public-private-approaches-to-decarbonizing-power-systems-in-apec/222_ewg_key-recommendations-public-private-approaches-to-decarbonizing-power-systems-in-apec.pdf?sfvrsn=8d1d4c11_2

²² <https://www.greenpower.gov.au/sites/default/files/2020-07/GreenPower%20for%20Businesses%20Guide.pdf>

²³ <https://www.greenpower.gov.au/sites/default/files/2020-07/GreenPower%20for%20Businesses%20Guide.pdf>

²⁴ <https://www.greenpower.gov.au/about-greenpower/brand-and-marketing>

²⁵ <https://www.globalaustralia.gov.au/news-and-resources/news-items/australia-apacs-rising-regional-hub-green-data-centres>

²⁶ <https://blog.equinix.com/blog/2024/02/26/rooftop-solar-systems-in-melbourne-green-the-grid/>

from 1.318 GW to 1.4 GW by 2025.²⁷ Global data centre operators are keen to expand the data centre industry with a sustainable focus. Below are some policy initiatives introduced by the Indian government to assist data centres in assessing renewable energy in the country.

In 2020, the Ministry of Electronics and Information Technology (MEITY) proposed the Data Centre Policy to foster data centres in India while addressing various bureaucratic, infrastructure, and energy challenges.²⁸ This policy envisions India as a global “Data Center Hub” and aims to encourage the use of renewable energy and its efficient utilization within the business environment.

a. Diversifying Renewable Energy Mix and Increasing Generation: The Indian government is committed to increasing renewable energy capacity to 500 GW by 2030 with a mix of wind, biomass, solar and hydropower.²⁹ To achieve this ambitious target, the government has implemented several initiatives. Among these, it has earmarked USD 2.5 billion for a Production Linked Incentive (PLI) Scheme aimed at incentivizing the manufacturing of solar PV modules and wafers, thereby bolstering the addition of solar power to the energy mix.³⁰



Image 3: India Ministry of New and Renewable Energy announcement on PLI for high efficiency modules³¹

b. Expanding Investments in Renewable Energy: In the Union Budget 2023-2024, the Ministry of Power formulated various schemes to invest in renewable energy in India. Such schemes include allocating INR 19,700 cr (USD 2.3 million) for priority investments towards energy transition, investing in battery energy storage systems through the Viability Gap Funding Scheme, and providing funding for interstate transmission systems and grid integration systems for renewable energy.³²

c. Facilitating Renewable Energy Procurement through PPAs and other Mechanisms: To facilitate the procurement of renewable energy in the country, the Indian government offers various mechanisms. These options include “renewable energy generation in behind-the-meter applications, PPAs with

²⁷ <https://datacentremagazine.com/technology-and-ai/india-data-centre-enterprises-continue-to-invest>

²⁸ https://www.meity.gov.in/writereaddata/files/Draft%20Data%20Centre%20Policy%20-%2003112020_v5.5.pdf

²⁹ <https://www.investindia.gov.in/sector/renewable-energy>

³⁰ <https://www.investindia.gov.in/team-india-blogs/indias-data-center-companies-are-well-placed-drive-sustainability-imperative>

<https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/121923-india-set-to-ramp-up-renewables-capacity-in-2024-but-thermal-dash-continues>

³¹ <https://twitter.com/mnreindia/status/1488432626956664836>

³² <https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1907698>

renewable energy generators, green power purchase from distribution utility via green tariff, and procurement through Renewable Energy Certificates".³³ For example, in June 2023, the Princeton Digital Group (PDG) signed a PPA with Tata Power Renewable Energy Limited (TPREL) to power the MUI data centre with up to 50% renewable energy.³⁴ Apart from PDG, Microsoft also signed a PPA of 150 MW of solar energy with ReNew Power in December 2022 to accelerate energy transition.³⁵

d. Offering Incentives for Renewable Energy Usage: To encourage the uptake of renewable energy, state governments provide incentives for its usage. For example, in Karnataka, data centres qualify for industrial power tariffs if 30% of the energy consumption is derived from

renewable sources.³⁶ Additionally, a reimbursement of INR 0.5 surcharge per unit will be given across a five-year period if over 50% of the energy utilized in the data centre is renewable.³⁷ Similarly, Telangana, data centres could benefit from a 60% reduction in the conventional cross-subsidy charge for wind energy and a 70% of the conventional charge for solar energy consumption. Moreover, the Indian government has implemented Captive Power Generation, allowing individuals, cooperative societies, and companies to produce electricity for their own consumption.³⁸ Under the group captive mechanism, companies can efficiently manage electricity costs and benefit from various government incentives, including discounts on wheeling charges and net metering.³⁹

³³<https://www.spglobal.com/commodityinsights/en/ci/research-analysis/india-promotes-renewable-procurement-through-open-access.html>

³⁴<https://princetonpdg.com/newsroom/princeton-digital-group-signs-25-year-renewable-energy-agreement-with-tata-power-renewable-energy-limited-for-its-48mw-mumbai-data-center/>

³⁵<https://energy.economicstimes.indiatimes.com/news/renewable/renew-power-microsoft-sign-150-mw-renewable-energy-agreement/96283559>

³⁶ <https://law.asia/india-data-centre-infrastructures/>

³⁷ <https://law.asia/india-data-centre-infrastructures/>

³⁸ <https://www.ceew.in/cef/quick-reads/explains/captive-power-generation>

³⁹ <https://www.ceew.in/cef/quick-reads/explains/captive-power-generation>

Summary of Policy Enablers

Governments in Japan, Australia and India have adopted policies to help facilitate the use of renewable energy in data centres, which can be broadly categorized into three approaches: diversifying the renewable energy mix and increasing generation, expanding investments in renewable sources, and facilitating direct renewable energy procurement.

a. Diversifying Renewable Energy Mix and Increasing Generation: All three countries featured have set clear renewable energy targets and introduced initiatives to diversify and boost the supply of renewable energy. Japan, for example, implemented FiP and an auction system for renewable energy projects. Australia, on the other hand, has devised large-scale generation certifications (LGCs) or small-scale technology certificates (STC) to encourage energy supply, from various sources such as wind, solar to hydropower. Having a diverse and stable supply of renewable energy helps data

centres meet their energy commitments, enhances energy security, and reduces the risks associated with relying solely on a single energy source.

b. Expanding Investments in Renewable Energy: In addition to leveraging existing renewable energy developers and retailers for energy generation, all three governments have committed to increasing investments in renewable energy projects and technologies. Notably, Japan focuses on developing next-generation renewables and energy-efficient technologies. Similarly, India has implemented schemes to invest in technologies and upgrade existing infrastructure to facilitate renewable energy transmission. Australia's Capacity Investment Scheme also played a significant role in boosting renewable energy supply.

c. Facilitating Renewable Energy Procurement through PPAs and other Mechanisms: In India, Australia, and Japan, PPAs are a common tool to

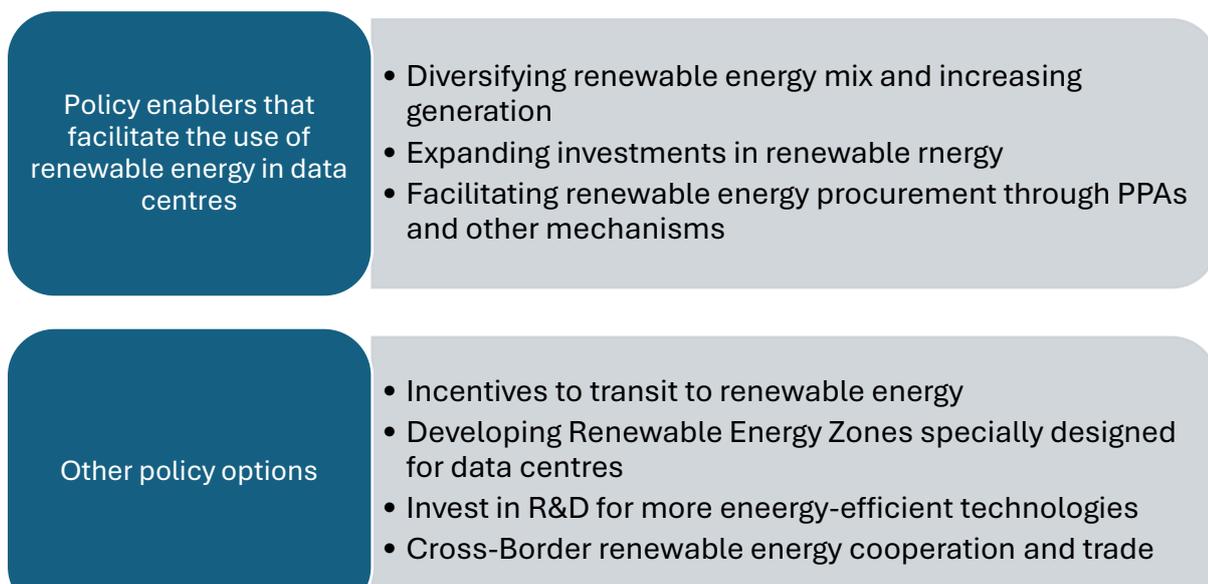


Figure 2: Policy Enablers and Options for Facilitating Access to Renewable Energy for Data Centres

facilitate direct renewable energy procurement from developers and retailers. Given the high and constant electricity demand of data centres, PPAs enable them to lock in electricity prices, ensure predictability in energy costs, and maintain stable access to renewable energy sources.

In addition to the aforementioned approaches, governments can explore further policy options to promote renewable energy adoption in data centres.

a. Incentives: Governments can offer tax incentives or rebates to encourage data centres' transition to renewable energy sources.

b. Renewable Energy Zones: Establishing renewable energy zones specifically designed for data centre operations can enhance the integration of clean energy. These zones can provide an environment conducive to accelerating sustainable power generation.

c. Research and Development: Governments should promote research and development in energy-efficient technologies and software relevant to data centres. This includes innovations that optimize energy consumption and production. For example, Google developed and piloted a new way to reduce

data centres' electricity consumption when there is high stress on the local power grid, by shifting some non-urgent compute tasks to other times and locations, without impacting the services it provides⁴⁰.

d. Cross-Border Renewable Energy Cooperation and Trade: As energy demand increases, promoting cross-border collaboration on renewable energy is another viable option, particularly for governments grappling with limitations in accessing and generating clean energy. Through such cooperation, governments can gain extensive access to renewable energy supply systems, attract foreign direct investments in renewable infrastructure, and contribute significantly to climate benefits.⁴¹ Noteworthy examples of this collaboration include electricity exchange between India and Bhutan,⁴² Laos and Thailand,⁴³ as well as the electricity certificate market established between Norway and Sweden.⁴⁴

By combining multiple policy measures, governments can create a robust regulatory framework that accelerates the transition to renewable energy in data centre operations.

⁴⁰ <https://cloud.google.com/blog/products/infrastructure/using-demand-response-to-reduce-data-center-power-consumption>

⁴¹ <https://doi.org/10.4324/9781003433163>

⁴² <https://doi.org/10.4324/9781003433163>

⁴³ <https://doi.org/10.4324/9781003433163>

⁴⁴ <https://www.eea.europa.eu/publications/cross-border-cooperation-on-renewable-energy>

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