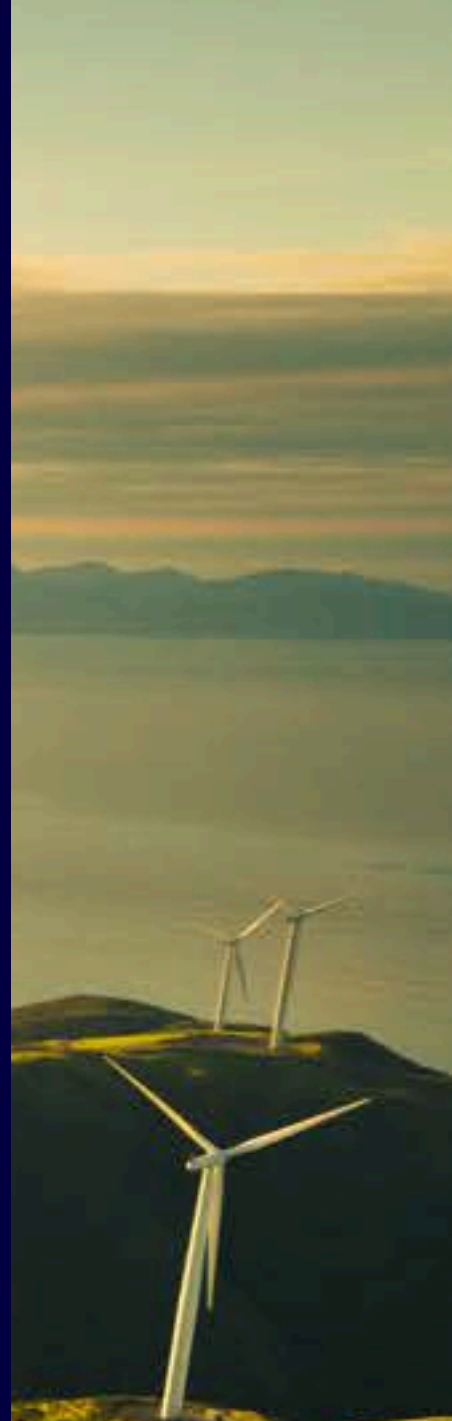




Japan Renewable Energy Outlook



2025

Market Report

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Background

8th Strategic Energy Plan, new Prime Minister and Renewables Volumes behind target.

Over the last 12 years, Japan has witnessed a rapid expansion of its renewable energy sector. The government's policy shift post Fukushima, coupled with attractive incentives, has attracted significant investment and spurred the growth of clean energy projects. Today, renewables contribute about 25% to Japan's energy mix, with over 75 GW of installed capacity.

According to Japan's current Strategic Energy Plan, renewables were targeted to make up 36~38% of the electricity mix by 2030. Due to various factors, including a slowdown in the development and construction of new large-scale solar plants, and an increase in overall electricity demand, as opposed to the predicted decrease, Japan still trends towards being under 30% renewables by the 2030 deadline. On a more positive note, as nuclear plants restart, renewables increase and aging thermal plants are decommissioned, emissions from the power sector are down almost 5% from 2023 to the lowest level since 2015.

The 8th Strategic Energy Plan is currently being formulated in METI and will be announced by the end of FY2024. Increased focus on hard to abate sectors and a widening of decarbonised fuel targets including SAF and synthetic fuels are expected, as well as expansion of energy-saving technologies. Renewable energy volume targets expected to increase as well as continued nuclear restarts and potentially further investment. Critically, this plan is strongly expected to change the forecast from lower power demand over time to an increase, largely due to the expansion of AI/data centres as well as the manufacturing of energy-intensive goods such as semiconductors.

October sees a new Prime Minister, Shigeru Ishiba ushered into Power. Ishiba has long been a supporter of renewable energies, decarbonisation and in his first speech has doubled down on this stance, also addressing the fact that energy consumption will rise due to AI/digitalisation demands even before the 8th Strategic Energy Plan is announced. As Ishiba was previously Minister of Agriculture, Forestry and Fisheries, it is curious as to how he will tackle the issue of co-locating renewable generation with agricultural land, long seen as a key to unlocking a next wave of solar growth in Japan.

New Routes to Revenue

CPPAs, Tolling Agreements and LTDA.

Corporate Power Purchase Agreements (CPPAs) are becoming more commonplace, with strong demand from the private sector for green electrons. Japan's Shizen Energy have inked deals over 30MW each with tech giants Microsoft and Google, and Invenergy recently finalised a 60MW VPPA with Honda for power generated from their onshore wind farm in Hokkaido coming online in 2025. In a Japan industry first, a tolling agreement was signed with Tokyo Gas by UK's Eku Energy for a 30MW BESS project in Kyushu.

Beyond corporate demand, developers and investors willing to take on merchant risk are increasing following early success cases of full merchant BESS projects by the likes of Pacifico Energy. Future large-scale projects that have a merchant component are set to increase as sophisticated players from more mature power markets such as Australia, UK and US enter the Japanese energy storage market.

A 'safer' route to market is the Long Term Decarbonisation Auction, where the Government covers fixed CAPEX costs however requires a payback of 90% of merchant profits. The inaugural auction results were announced in May 2024, including 30 BESS projects and over 1.6GW in the storage sector overall, a number which is expected to increase to over 2GW in the upcoming auction, with bids due late October and announced mid-2025.

Demand Growth

Digital Revolution is Power Hungry.

Based on the assumption of decreasing demand, for years political opinion has been divided between renewables and nuclear as Japan's preferred route to decarbonisation. With the rise of energy-hungry AI data centres, as well as semiconductor manufacturing and the promotion of large-scale industrial zones, the renewables/nuclear conversation has switched from an or to an and topic. To put the scale of this increase into perspective, Yuriy Group's GxxD reports share that Japan's Ministry of Communications predicts a 550x increase in power consumption from data centres and related networks by 2050 to 20,000 TWh (as compared to 2018 levels).

This has also been a major trigger for the Government to announce plans for more than \$10bn investment into upgrading the grid infrastructure, including new HVDC lines and increasing BESS capacity to balance supply and demand.

Power Markets

Increased Liquidity and Growth.

Japan is the third largest power market globally, behind the EU and US. The leading futures marketplace, European Energy Exchange (EEX) has seen a 4x increase in volumes traded this year alone. This has led to a high level of market entries from global players such as InCommodities, Citadel, Engie and also domestic giant MUFG. More players are trading physical power on JEPX as well with increase in spot trading, imbalance trading on the rise via sophisticated global players and algo-trading. Japan is still not as attractive as markets such as Australia which employs negative pricing when supply outstrips demand, however Japan has a much larger capacity by volume and is seen as one of the most attractive growth markets globally.

As tracking and scrutiny on non-fossil certificates increase, stricter demands from offtakers have led to 280% increase in fully tracked, measurable “renewable energy designated” certificates in 2024. This should in turn lead to an increase in virtual power purchase agreements and trading of NFCs to feed the growing industrial demand.

BESS Boom

Curtailement, LTDA amid bottlenecks.

Summer has proven frustration for renewable generators, especially in Kyushu and Chugoku with high curtailment rates of generation assets of up to 50% in some months in the hardest hit areas. This has been a key driver of development of BESS assets to soak up the excess power, as well as innovative solutions such as bitcoin mining by local startup, Agile Energy X.

As pure merchant BESS projects are difficult to gain project financing, and tolling agreements to secure revenues are still in their infancy, the LTDA is driving short-term BESS growth with 30 projects granted subsidies in 2024, split evenly between Japanese and foreign developers, and the BESS allocation under LTDA to double for 2025.

Easier land acquisition than large-scale wind or solar and secure LTDA revenues have spurred early-stage BESS development, with over 120 projects submitted in this year's auction alone. Grid connection however is the main bottleneck, with slow response times, opaque costs to be borne by the operator and in some cases 3-4 year waits for connection.

Offshore Maturity

Challenges and Opportunities.

After an industry-wide uproar following the Round 1 offshore wind tender results, Round 2 was delayed for a year while auction guidelines were rewritten. Results came out earlier this year for 4 new projects totalling around 1.8GW of capacity, with a wider spread of winners including large trading houses Mitsui and Sumitomo, EPCOs TEPCO, Tohoku Electric, JERA etc. and for the first time, foreign firms RWE and also Iberdrola. Round 3 submissions have been made, with 2 consortiums bidding in Aomori and 4 in Yamagata, with results expected to be announced at the end of 2024. German WTG manufacturer Siemens Gamesa also increased their presence in the latest auction round after a pause following Round 1.

Also on a positive note, new promotion and preparation zones have been announced, with Akita and Hokkaido continuing to be leaders, and Wakayama progressing with a first large-scale floating zone. Floating offshore wind, long seen to be the key to unlocking Japan's true potential in the sector is making progress on lawmaking to unlock the use of Japan's expansive EEZ, which has estimated potential of hundreds of GW of offshore wind power.

The news is not all rosy on the offshore wind front though, global increased raw material and supply chain costs continue to make economic cases difficult for many developers, which has led to high-profile market exits of Orsted and Northland Power, as well as a slowdown on development and cancelled bids by many domestic and global players.

Solar

No more Shaving Mountains, Distributed is the Future.

In the FiT boom of the mid 2010s, fat subsidies led to dubious large-scale solar projects which were built on mountainsides, displaced thousands of trees and local habitats and incurred high costs for the necessary complex civil engineering. With FiT prices for solar now under 8JPY/KwH, and CPPA prices driven by a free market mechanism, these are no longer economically viable, nor seen as environmentally acceptable.

Distributed solar is on the rise. Aggregating a large number of low or high voltage plants (<2MW), building on-site solar installations for commercial and industrial customers have been increasing strongly over the past few years.

Agri-solar, sharing agricultural land and solar generation has long been seen as the next boom area. The Japan Photovoltaic Energy Association said in a solar outlook report in July that Japan has a total of 2,380 GW (dc) of solar potential, of which 1,593 GW (67%) is on agricultural land, both in use and abandoned. Japan's Ministry of Environment's estimates are more conservative at 1,465 GW, however both dwarf the current level of 74 GW of installed capacity. The largest challenge facing developers has been laws surrounding temporary land use of 10 years, which has been a bottleneck to project financing. Recently though, a number of local developers, such as Shizuoka's Tea Energy have been working closely with farmers, local banks and have been successful to secure project financing for large-scale aggregations of agri-solar projects. Aging farmers looking to secure new revenue streams and increase in aggregation of small projects into PPAs as well as crop shifts into those requiring less sunlight are contributing factors expected to increase as the industry matures and business models become accepted.

Hydrogen, Ammonia & SAF

Japan Continues to Bet Big.

Earlier this year, the Government announced plans to provide 3 trillion JPY for development of the hydrogen supply chain, which will include a cost for difference mechanism (CfD) for low carbon hydrogen to subsidise difference between actual production and market prices, which is similar to UK's system designed to scale up new technologies which are currently costly. In Japan, low carbon hydrogen is classified both as green (derived via electrolysis from renewable power) and blue (carbon capture from thermal power plant emissions).

The private sector is behind this drive as well, with Japan's Advantage Partners Hydrogen Fund first close at 412 million USD, including TotalEnergies and dozens of Japanese investors including long term hydrogen supporters Toyota and Iwatani Corporation- LT supporters. This fund will broadly invest in hydrogen and ammonia projects on a global scale across the value chain, from generation, transportation, to downstream infrastructure closer to demand centres.

Sustainable Aviation Fuel (SAF) increases production and also use beyond aviation in construction - a major commercial development from Mitsubishi, Torch Tower are using SAF for heavy machinery used in construction of the project, with Euglena as the supplier. This follows the trend from METI to expand their interest beyond H2 and NH3 and look at other decarbonised fuels such as SAF or synthetic biofuels to be used in combustion / thermal processes as stated by the agency in Sept.

GX Fund

Expecting Increased Support with New Prime Minister.

Finally, with Ishiba as Japan's new Prime Minister, support for GX funding and initiatives, instigated by PM Suga and continued by PM Kishida are expected to continue, and likely increase based on Ishiba's long standing stance on decarbonisation.

Areas to watch will be:

- **Batteries & EV Charging:** Japan was once home of battery technology before the rise of China. Currently, we are seeing some benefit in global EV demand, Panasonic inking new deals with Tesla, Mazda, Subaru, Envision AESC with Nissan and Power X building out a charging network in partnership with Audi. Japanese-American next-gen battery manufacturer TeraWatt was named in Forbes 100 to watch.
- **Investment into technologies to decarbonise hard to abate industrial sectors** such as steelmaking, chemicals and other heavy manufacturing are also a major target. This plays clearly into Japan's hydrogen and ammonia strategy, and desire to develop new industrial technologies that can then be exported.
- **Floating wind technologies** as developed by Toda Corporation and also floating vertical axis wind turbines are being developed by Albatross and other players, with Japan again looking to develop exportable technology that can be designed and produced at scale.

Summary

Despite rising raw material costs and nuclear gaining traction, the renewable energy market is not going anywhere. With already massive and rapidly increasing corporate demand, a supportive Government and an increasingly healthy blend of Japanese and foreign investment, our outlook for the sector is bullish.

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Titan Greentech's annual market outlook report on the industry comes from our own research, thousands of conversations with the energy sector leaders in both private and public sectors as well as market research partnership with Japan's leading market news publication, Japan NRG.



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