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Power Companies in Japan Move to Restrict Solar

Half of Japan's electric utilities have blocked additional solar for fear of destabilizing the grid

ClimateWire

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Japan's electric utilities are putting the brakes on the country's fast-growing renewable energy sector as concerns mount that the addition of large amounts of solar power is creating oversupply problems for some regions while stressing the country's decentralized power grid.

Solar power installation in Japan.
Credit: CoCreatr via flickr

In the last week, half the country's 10 general electricity utilities have announced that they would suspend reviews of proposals for new generation from renewable energy producers or take measures to ensure that the addition of that energy does not compromise their transmission and distribution networks.

The utilities implementing the new restrictions are Kyushu Electric Power, Shikoku Electric Power and Okinawa Electric Power in the western part of the country, and Hokkaido Electric Power and Tohoku Electric Power in the northeast. Together the five utilities serve roughly half of Japan's geographic area, including the largest island prefectures, and have peak demand load of roughly 50,000 megawatts.

The utilities' decision to curtail new renewable energy projects stems from Japan's efforts to reform its electrical generation and delivery system following the March 2011 tsunami and subsequent nuclear radiation release at the Fukushima Daiichi power complex, generally considered the worst nuclear accident since 1986's Chernobyl accident in Ukraine.

As part of those reforms, Japan chose to shut down all its nuclear plants and replace much of that generation with other resources—including fossil fuels and large infusions of solar, wind, biomass and geothermal energy.

To encourage investment in the emerging renewables sector, Japan's government in 2012 adopted a generous feed-in tariff program for new renewable energy projects, the result of which has been a glut of new mostly solar photovoltaic (PV) arrays coming online over the last 24 months, helping to increase the country's nonhydropower renewable energy portfolio to 2.2 percent of total consumption this year, according to government estimates.

Feed-in tariff starts solar boom

Current feed-in tariff rates, excluding taxes, were 32 yen (29 cents) per kilowatt-hour for solar PV for large customers and 37 yen per kWh for household consumers, according to tables published by Japan's Ministry of Economy, Trade and Industry (METI). Rates for offshore wind power generation, meanwhile, were 36 yen per kWh.

Those kinds of prices, guaranteed for between 10 and 20 years, have helped fuel a surge in renewable energy development in Japan, leading to the addition of nearly 11,000 MW of solar capacity since 2012 while an additional 72,000 MW remains in the development pipeline, according to METI estimates.

According to the Japan Renewable Energy Foundation, only China exceeded Japan over the last 12 months in adding new solar capacity, with much of the new generation coming from rooftop solar systems.

In a recent published statement, Tomas Kaberger, JREF's executive board chairman, said Japan's renewable energy expansion has provided "a bright future" for the island nation of 127 million people and world's third-largest stand-alone economy.

"As long as the world was dependent on fossil and uranium fuels for energy supply, Japan was a resource-poor country," Kaberger said. "On the other hand, when technologies are economically available to harvest renewable energy, Japan can become one of the energy-rich countries in the world using the large resources of wind, solar, biomass and geothermal energies available among the Japanese islands."

Shocks to the grid

But that pace of growth has placed a severe strain on the country's vertically integrated utilities, according to Japanese energy experts, who say the surge in solar power threatens to overwhelm the country's transmission and distribution systems, which since the 1950s have been organized to serve each of the 10 distinct distribution areas and are not bound together by a robust transmission system.

In fact, the country's electricity grid is effectively severed between east and west because utilities in the two regions move power using distinct frequencies—50 hertz in the east and 60 hertz in the west—with limited conversion between the two parts of the country.

These factors, combined with financial and operational pressures on utilities to meet an ambitious reform agenda, have created a deep distaste for Japan's renewable energy push, experts say, especially in regions where new solar capacity exceeds customer demand and where integration of those resources has created headaches for utility grid managers.

"This problem stems from the fact that renewables are not a reliable or constant source of power, and sudden dips or spikes in energy could stress the grids, potentially leading to damage and power loss," Clint Richards, an analyst and associate editor of *The Diplomat*, a Tokyo-based magazine covering Asian affairs, wrote yesterday.

Tomoaki Ikenaga, a partner and chairman of the energy practice group at the Tokyo law firm Anderson Mori & Tomotsune, said in an email exchange that Japan's regulated utilities are also required to maintain grid stability, while developers of new renewable energy projects are not subject to any requirements.

So "while there is a strong demand for the additional power," Japan's electricity providers must integrate the new generation in a way that doesn't compromise their ability to deliver reliable power or drive up prices for consumers, he said.

At the same time, he added, the government's feed-in tariff, the costs of which are shared by the government and electricity customers, has resulted in "more and more consumers hav[ing] to pay higher electricity charges to utilities."

Shocks to ratepayers

In fact, Japan's electricity prices are now among the highest in Asia, a condition created partly by high-priced renewables, but also by its heavy reliance on imported energy fuels following the closure of its nuclear plants, which provided 26 percent of the country's power before 2011. Last year alone, Japan spent more than 7 trillion yen ($64.2 billion) on LNG imports, creating a huge drain on its economy, according to experts.

Ali Izadi-Najafabadi, head of Japan analysis for Bloomberg New Energy Finance, said in an email that expanding the country's solar and other renewable energy projects, while expensive, can help restore balance in Japan's energy sector. But current policies are not working as intended.

"Unfortunately, the existing feed-in tariff rules are too simple," with pricing based only on the energy technology developed rather than accounting for local and regional electricity needs, he said. "This means project developers have rushed to develop projects where they can get maximum returns instead of where Japan really needs them."

Meanwhile, the country is preparing to resume operation at as many as 48 nuclear reactors over the coming years, but that process is slow and expensive, and there are no guarantees that Japan will be able to meet its future energy demand with nuclear power alone.

"We are far away from the best mix situation," said Ikenaga, the energy-sector lawyer.

The restoration of nuclear power also won't solve Japan's long-standing transmission problems, which continue to hamstring the ability of power generators and utilities to move power from where it's produced to where it is most needed, experts say.

As part of its reforms, Japan is expected to vest new authority over transmission to an independent system operator by 2016, along with other measures to dismantle the old utility monopolies.

"Long term, these steps will help with having a better grid infrastructure as well as market environment for integration of renewable energy," he added. "But for now, there are some significant challenges."

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