



This 8.5 MW solar PV power plant in Shiga Prefecture is just one of the many large-scale solar projects completed in Japan over the past 24 months. Will impending policy changes serve to speed up the rate of installation?

A platform for reform

Japan has made it again: For the second year running, Japan was one of the world's leading PV nations, adding some 10 GW of new solar PV capacity in 2015. This year will prove crucial due to the anticipated liberalization of Japan's retail electricity market and other policy changes that the energy ministry is planning specifically for the PV sector. So what will 2016 and beyond look like for Japan's solar landscape?

Japan's cumulative solar PV capacity at the end of 2015 is likely to reach somewhere between 33 GW to 36 GW. According to information gleaned from Japan's Ministry of Economy, Trade and Industry (METI), and reported by Bloomberg, the country installed 23.3 GW of solar PV capacity by the end of 2014. In 2015, Bloomberg estimates that Japan added a further 12.6 GW of PV, although the PV Market Alliance, which groups multiple regional PV experts from various geo-

graphic regions, reported in January that Japan's figure for last year was closer to 10 GW of new capacity.

The December issue of **pv magazine** published an analysis by Izumi Kaizuka, of the Tokyo-based RTS Corporation, which detailed the number and types of PV project approvals awarded by METI since July 2012, when Japan first introduced its feed-in tariff (FIT) scheme. In short, a total of 1,701,141 PV projects totaling 82.5 GW of solar capacity have been

approved, and the two dominant categories of projects are those of 2 MW or more (30.746 GW of awarded capacity) and between 10 kW to 50 kW (25.387 GW of approved capacity).

Furthermore, Kaizuka explained the main policy issues concerning Japan's PV industry, which is something that the METI is seeking to address as soon as possible. According to Kaizuka, the so-called "subcommittee for reforming systems related to the introduction of renew-

able energy,” held under the METI, has met and discussed the revision of the country’s FIT program, including – most significantly – changes in the approval system of PV project applications and the purchase of renewable power.

Mercom Capital’s Raj Prabhu also told **pv magazine** that the deregulation of the retail electricity market is an additionally important event set to shape Japan’s power market in 2016.

Liberalization of the market

Yarime Masaru, a project associate professor of science technology and innovation governance at the University of Tokyo, told **pv magazine** that Japan’s energy system is set to undergo a complete transformation, including not only market structure reforms but also the general energy mix and even people’s perception of the landscape.

The debate over Japan’s electricity market liberalization has rumbled on for a few years but will reach a head in 2016, Masaru said. The wholesale market was deregulated a few years ago, and this year the retail market opens up to new players.

So while today the norm is for regional markets to be dominated by single utilities, post-April 2016 new players will be permitted to enter the regional markets. The unbundling of the transmission and distribution grid infrastructure from the power supply companies is also likely to be completed by 2020.

Japan’s energy mix was transformed fundamentally following the Fukushima disaster in 2011 and the immediate closure of all of the country’s nuclear plants. So where nuclear energy accounted for approximately 30% of the country’s energy mix before the Fukushima disaster, today only one nuclear plant is in operation. According to the national plan submitted at the COP21 summit in Paris last December, Japan is aiming for 20% of nuclear energy in its mix by 2030. The goal for renewable energy, meanwhile, is 24% (up from around 3% currently). Masaru thinks this is absolutely viable.

Even if the government changes this plan, or the pro-nuclear community pushes for higher nuclear power targets, it is currently very difficult to build new nuclear plants in Japan, and the public

would have very little appetite to support such proposals, Masaru added.

Grid congestion

Hence, the fundamental reasons driving Japan’s renewable energy sector development will remain firmly in place. The biggest hurdle to wider renewable adoption is grid congestion.

“The Japanese grid is among the best

AT A GLANCE

- Japan’s FIT has driven a dramatic rise in the number of PV installations in the country over the past 24 months.
- The impending liberalization of the electricity market ostensibly delivers more opportunities for solar growth.
- However, liberalization may usher in a return of nuclear power, which was scaled right back in 2011 following the Fukushima disaster.
- Issues pertaining to grid connection remain a challenge for solar, as would questions over a possible auction process.
- Appetite for smart cities, driven by Japan’s industrial giants, could present new opportunities for PV applications, however.

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globally; we have one of the lowest rates of blackout incident in the world,” said Masaru. The congestion problems arose due to fluctuations inherent when adding large amounts of generated renewable power. In order to solve this problem, Japan needs to upgrade the grid infrastructure. “But the question is: who will pay for such investments? Utilities are suffering losses following the closure of their nuclear plants, and many have turned to natural gas imports,” Masaru noted.

Another problem concerning the grid, the professor added, is the lack of regional and international grid interconnections. On the one hand, due to historical reasons, the eastern and western parts of Japan have different network frequencies, which pose additional boundaries. On the other hand, Japan is an island nation with no interconnection at all to neighboring countries. There have been some talks regarding an Asian grid that would connect multiple countries and boost cooperation, but these plans, if they ever materialize, are very much long-term in the planning.

Hideki Gakumazawa, communications general manager at Solar Frontier, the Tokyo-headquartered company that is the world’s largest provider of CIS thin-film solar cells, told **pv magazine** that Solar Frontier “would like to see improvements regarding the curtailment rules for investors and project owners. In Germany, for example, in cases of curtailment, the grid operator must compensate part of the lost income.”

To auction or not?

Kaizuka’s recent analysis for **pv magazine** explored the fact that one of the topics being considered by the subcommittee at the METI was the flow of electricity. Specifically, three options are up for discussion, wrote Kaizuka: “1. transfer of electricity via the wholesale electricity market; 2. negotiation-based transactions; and 3. allocation to retailing.”

pv magazine asked several stakeholders for their thoughts on abandoning the current FIT model for large-scale plants and moving towards an auction-style remuneration policy. Solar Frontier’s Gakumazawa replied that although it was too early to comment accurately, “we are, however, confident that there will continue to be strong demand for solar energy in Japan [following such a devel-

opment]. Japan aims to reduce its greenhouse gas emissions by 26% by 2030 compared to 2013. It hopes to achieve this by significantly boosting energy efficiency and increasing the share of clean and renewable energies. In total, it is targeting power generation of approximately 1,065 billion kilowatt-hours, of which 7% will come from solar energy. That number in itself represents significant growth.”

For Gakumazawa, Japan’s future solar PV growth will stem from the fact that it is unclear when nuclear power can come back online, and also because solar technology is becoming much more competitive. “At Solar Frontier, for example, we are aiming to provide residential systems at grid parity levels from 2016, although this also depends on the margins of our sales agents,” he added. Masaru remarked that although moving towards auction-

Italian company with an office in Japan, told **pv magazine**. Infrastrutture began the construction of its inaugural 1.2 MW PV plant in Japan at the end of 2015 and expects to enter it into operation in March 2016. The generated power will be purchased by Tepco, a Japanese utility, and the contract that is about to be signed in the following weeks has been discussed with Tepco for several months. This is a characteristic example of how power stakeholders had to acquire new knowledge, said Rimbotti. “The process of signing a purchase agreement with a utility is much faster today, but when we started our business in Japan a few years ago, utilities had limited experience with the legal standards of such contracts,” he pointed out.

On the other hand, Rimbotti added, the overall licensing process when applying for a new PV plant is not straight-



Photo: Solar Frontier

Solar’s success has come at the expense of nuclear, but that balance could soon tilt once more.

style remuneration for large-scale PV plants could alleviate the renewable energy budget, Japanese energy sector players are not used to such auction mechanisms. “The market was, until recently, heavily regulated compared to other sectors of our economy. Thus, players are on a learning curve,” Masaru commented.

Learning curve

Indeed, players at all levels of the Japanese market have learned a lot in a very short space of time, Pier Francesco Rimbotti, CEO of Infrastrutture S.p.A., an

forward. There are a lot of written and unwritten standards and procedures, and the environmental process is often rather cumbersome.

“Due to the complicated nature of the licensing system, it also takes a lot of time for a business to be confident that its approval process is complete and it can stand the tests of the many different administrative bodies,” Rimbotti said.

“And there were many things we, as a foreign player, needed to learn as well, with the most important being to build communication channels between our staff in the Italian HQ and our staff and

partners in Japan.” The latter is the reason why Infrastrutture plans to remain in Japan and continue investing. “Our learning curve as a player in the Japanese market has increased, our partnerships are established [Infrastrutture has also set up a joint O&M venture with a Japanese company], and we have a pipeline of PV projects totaling approximately 30 MW [the initial pipeline was 70 MW but the Italian company had to sell some of these ready-to-build projects because the administrative process took longer than initially anticipated], Rimbotti explained.

“Should the remuneration scheme for large-scale PV plants become auction-based, we will also examine the specifics of the scheme and decide, but in that case the market is going to become very competitive. Bear in mind that Japanese banks and often also suppliers apply pre-

power consumption) and even smart cities, explained Masaru. There are numerous reasons for this.

Firstly, technological progress makes it easier to produce and consume power from renewable sources whenever a customer needs it. Secondly, the liberalization of the energy market will bring new players and new start-ups that will want to apply their innovative ideas and invest in the sector. Thirdly, the METI is very active in promoting smart solutions either by funding R&D programs or developing specific trial projects.

For example, over the last five years the METI has undertaken four large studies of smart city projects and, following the publication of its findings, has asked the industry to take ownership of this work to advance it further. Another reason why smart business will boom is Japan’s industrial geography, noted Masaru.

is the business model required to deploy them. The private sector is now examining how to better turn their technology and ideas into a profitable business. The sale of smart meters alone is not considered enough, Masaru told **pv magazine**, adding that the companies seek to combine many smart services that can also benefit from the Internet of Things.

A further indication of how much the government and the domestic industry are interested in the smart energy market is that the METI’s funding agency, the NEDO, is currently funding smart city projects in Malaga, Spain; Lyon, France; and the U.S. state of New Mexico so that Japanese industry can produce sellable and marketable products fit for foreign markets.

“Smart technologies are one area where solar energy stands apart from other energy technologies,” said Gakumazawa. “As an easy-to-implement, low CAPEX form of microgeneration, it can be easily integrated into smart energy systems. When the FIT-style subsidy for many residential users ends from 2019, a lot of existing users may also look for ways to manage their solar energy to offset the cost of electricity during peak times,” Gakumazawa concluded.

Attracting foreign investors

By liberalizing its electricity market, Japan’s government aims to attract foreign investors, said Masaru. Many foreign firms are present today in Japan’s PV market, Infrastrutture’s CEO told **pv magazine**. However, this is still a tiny fraction compared with the foreign firms active in Germany or Italy, for example. Most of the foreign firms come to Japan as financial investors, Rimbotti said. “Japan’s government should do more to incentivize and welcome foreign firms, specifically those that build and operate plants. This way the country will be able to meet a lot of its future challenges.”

Japanese firms too have invested heavily abroad, added Rimbotti. But although they have gained plenty of skills from their international experience, many have only just begun to transfer these skills to the Japanese reality. Most of Japanese lending is done on a corporate balance sheets basis, and they have now begun applying non-recourse financing too. “I strongly feel that Japan needs to open up,” Rimbotti concluded. ♦

Ilias Tsagas

Photo: Kyocera



Due to land space constraints, Japan has been a pioneer in floating solar techniques and deployment.

miums to foreign firms, making business for non-national companies in Japan more expensive than for domestic firms,” added Rimbotti. The METI’s subcommittee has opened discussions on reforming several aspects of the licensing procedure, and these were explained by Kaizuka in the December issue of **pv magazine**.

Smart cities: the emerging trend

A leading trend evident across the Japanese energy sector landscape is without doubt the emergence of smart communities (e.g. connected buildings in a particular region that coordinate their

The aforementioned four projects were developed in coordination with Nissan, Toyota, Mitsubishi and Nippon Steel Ltd. The Japanese automotive industry is keen to see these smart city plans flourishing as a means of boosting the sales of their plug-in electric vehicles. In the case of Nippon Steel, Masaru said, the key catalyst is for the group to diversify its business. Therefore, Japan already has many leading industrial players that can enter and boost this smart market.

Dissemination of the research findings has shown that smart energy cities are technically viable. The problem