

Japan battles solar gridlock on path to parity



Credit: Kyocera

Policy and regulation | Grid constraints, feed-in tariff fears and the spectre of a nuclear resurgence have all threatened to derail solar's astonishing rise to prominence in Japan, but the country still looks on course to be 2014's second largest PV market. Andy Colthorpe reports on the state of Japanese solar as it begins its five-year countdown to grid parity

Japan's solar feed-in tariff has catapulted the nation to being second largest solar end market after China for the past two years. With over 10GW installed in just under two and a half years, the support solar has enjoyed, both from the public and in policy incentives, has been unrivalled, so much so that all solar of over a megawatt generation capacity has gained the typically Japanese-sounding nickname "megasolar" in the country's popular parlance.

However, the picture has become ever more complex as the market has matured, with a number of recent issues unsettling the industry. Concerns have mounted over a variety of issues: the possible impact of widespread solar deployment on the country's grid network; a review of the feed-in tariff programme, which has set stringent new rules for developers, a lack of suitable land for large-scale projects, and the pressure on electricity bill-payers to foot the cost of renewable energy

programmes. Add to the mix the prospect of a limited restart of Japan's shuttered nuclear power stations, and the result is that there now seems to be a growing consensus that the days of the 'megasolar' rush are already fading for Japan.

Nevertheless, as the solar feed-in tariff programme enters the last five years of its intended lifespan, there is a determination among industry players and advocacy groups to weather the current challenges and nurture the evolution of Japan's PV market into a sustainable facet of the economy – and of Japanese energy security.

Grid concerns

The most widely documented aspect of Japan's recent solar troubles is the decision last year by five of its 10 regional utility companies – which are also responsible for grid infrastructure in their respective areas – to suspend the approval of grid connection applications for utility-scale

Japan has seen a proliferation of 'megasolar' plants being planned and build since its feed-in tariff was launched.

solar projects. Beginning first in September 2014 with Kyushu Electric company, which is responsible for electricity supplies on Kyushu, the most southern of the four main Japanese islands, utilities in the regions of Tohoku, Shikoku, Hokkaido and Okinawa all followed suit.

It is thought that grid disturbances become more commonplace when PV penetration exceeds 10% and while none of Japan's utilities had reached that point by last September, Kyushu Electric was closer to that point than the others. Keiji Kimura, senior researcher with advocacy group Japan Renewable Energy Foundation (JREF), says the decision by Kyushu Electric was perhaps fair, but questions why the four others also stopped accepting applications when their capacity was nothing like as acute a situation as Kyushu's.

"Five utilities put solar applications on hold. Of these, the only one you could definitely say had concrete issues with

capacity addition was Kyushu Electric. It's the most southern of the main electric utilities, where solar capacity has greatly increased. If PV-generated power was to continue to be added to the grid at the rate at which projects were being accredited, it would soon have become more than it could handle, I think that's true. It hasn't actually come to pass yet, but in the case of Kyushu Electric you could say it would genuinely become a problem before long," Kimura says.

"At the other four electric companies in question, their situation may not have been so acute but they must have seen Kyushu step forward and also seen it as an opportunity to confront the issue. It's fair to say that the issue of grid connection merited and needed further study. However, the way utility companies announced that they would suspend approvals and followed through on that threat the very next day was pretty bad."

RTS PV, the Tokyo-headquartered PV market research and analysis firm, was invited to act as an independent observer of the deliberations of a working group set up in October by Japan's Ministry of Economy, Trade and Industry (METI) to examine the grid issue. RTS PV's Hiroshi Matsukawa believes the group, which concluded its deliberations in December, appeared to arrive at reasonable conclusions given the available data. Yet when asked if the working group was effective, Matsukawa points out that the working group made all of its calculations using data provided by the electric companies in the first place.

The rush to build 'megasolar' power plants in Japan has led to claims of a grid bottleneck.

"That's a difficult question to answer," Matsukawa says. "I'm sure the deliberations of the working group are correct, but when it comes to that complex and detailed data, only the electric companies have it. So in truth, it's very hard to know whether the conclusions on grid capacity are entirely correct."

Keiji Hidaka, deputy director of the Agency for New and Renewable Energy at METI, bats away Matsukawa's concerns. According to Hidaka, his department was satisfied that data submitted was accurate, following extensive discussions with the utilities.

However, JREF's Kimura has further criticisms of the process, including one linked to the question of the nuclear restart.

"All of Japan's reactors are currently shuttered, yet the data used for the study of available grid connection was conducted with nuclear power capacity from all of Japan's reactors factored in, as if they were all restarted as part of the load on the grid," he says. "Quite aside from concerns over the nuclear restart itself (see box), the predicted amount of available capacity for renewable energy is greatly reduced as a result of this methodology being used."

METI's Hidaka confirms to *PV Tech Power* that "two or three" of Japan's nuclear reactors are expected to come back online this year, but in conversation did not account for the entire fleet of reactors being included in the calculations of the working group.

The working group made its calculations nonetheless and, as Matsukawa reports, the five utilities were found to

have received around 17.3GW of applications more than could be accommodated – according to the electric company data – meaning some disappointments are unavoidable. But despite the situation being portrayed in mainstream media as severe, this still leaves over 50GW of approved utility-scale solar projects in development.

Negative impacts

So what impact have these grid connection issues had on Japan's solar industry? While it is too early to say, JREF has conducted a survey of solar companies, with over 130 respondents, which it intends to publish during the first quarter of this year.

Kimura says that around 60% of the companies that responded nationwide said they were directly negatively affected by both the grid connection issue and its attempted resolution. Respondents attributed three separate negative effects to the grid problem, Kimura says. The first was that some companies have had to cancel certain projects and plans, as customers that they were working with have given up on the idea that utilities will buy their PV-generated electricity.

The second is that would-be developers are starting to fear that utilities could turn their backs on solar and will no longer buy from solar power producers. There is a belief that even well-developed projects will not have the chance to connect to the grid, Kimura says. The third and final reason, possibly the most damaging of all, is that developers, their partners and customers are finding it increasingly difficult to plan ahead in such uncertain circumstances.

"Many companies in solar are used to making three- or five-year business plans, yet there is a feeling that electric companies could again announce that they cannot accept more solar or pay for existing output capacity," Kimura says.

"There's also a belief that the other five utilities not involved in the original grid connection issue could suddenly do something similar at some point in the future. So it's hard for companies in the solar industry to know how much business they will be able to do over a number of years."

FiT review

It is of course a fact of life that adding large amounts of variable generation from solar (and wind) can present challenges for





Credit: Solar Frontier.

transmission and distribution networks. There is also recognition that an attempted pipeline of more than 70GW of projects, over double Germany's entire installed PV capacity to date, would not be a path to fostering sustainable development and deployment.

As well as setting up the working group on grid connection, the government also recently undertook a review of the FIT rules as a response to the bottleneck of project approvals that many feared would lead to a possible boom-and-bust or 'bubble' scenario.

On this point JREF's Kimura, RTS PV's Matsukawa and government representative Hidaka all agree a review was needed. In Japan, projects are put to the Ministry of Economy, Trade and Industry (METI) for equipment accreditation to qualify for the FIT and get a grid connection. If the equipment registered to be used on a project was from a government-sanctioned list of suppliers, equipment accreditation was not refused, explaining why so many projects had been accepted; Matsukawa says that 24GW of projects were given equipment accreditation for the FIT in March 2014 alone. Fears had persisted of developers

Distributed PV arrays on rooftops are expected to become more common as the pipeline of utility-scale projects runs dry.

or investors scrambling to secure high FIT rates for their projects and waiting for equipment and other costs to fall before actually applying for grid connection. Other forms of speculation, such as the trading of projects, are also coming in the line of fire of the rule revisions.

Kimura, while critical of some of the details, says the review could help take some of the rising cost of the FIT away from the public purse.

"We don't know yet what the effect [of the review] will be, but as a whole we think it will probably take things in the right direction. The purchase price is now decided at the time of grid connection rather than at the equipment accreditation stage, so that only companies that really want to do business will have the benefit of the high FIT rate," Kimura says. "Committed and serious companies should still be able to get grid connection in future so overall this is probably a good thing."

However, RTS PV's Matsukawa describes some of the new rules as "very strict". To ease possible strain on the network, utilities will now have the right to make decisions hourly on whether to purchase the output from solar plants for the

equivalent of 30 days a year, rather than informing PV plant operators with a day's notice as before. It is also compulsory for new PV plants to be fitted with remote output controls on inverters.

One rule that will present a challenge for foreign firms looking to do business in Japan is that once equipment accreditation has been granted, a project's developers can no longer change components from those registered, without seeking METI approval – even if the project itself has changed hands since. With the exception of PV module manufacturers from abroad, mainly from China, for foreign companies the interest in Japan remains primarily the more lucrative project development side of the business. The new rule presents a challenge for companies such as Conergy, which recently completed its first Japan project as an engineering, procurement and construction (EPC) firm.

"Many project rights were traded and if people like us or other investors would buy these projects, the first thing you'd do is change to components you would normally use, in order to guarantee quality and make it bankable," the company's head of Asia operations, Alexander Lenz, says.

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"After January, it's not possible any more to change your components, or if you want to do that you have to go down to the current or actual FIT."

But Lenz says he agrees with the Japanese government and others that the rule changes were largely positive in that they will make it more difficult for speculators to enter the market and buy projects as investments. Another positive highlighted by Lenz and others is that none of the measures are to be retroactively applied to existing plants.

Government answers critics

METI's Hidaka says the government understands that the FIT review's results present some challenges for the solar industry. However, he says it would be a question of serious companies weathering the storm and realising that the priority should be the Japanese public.

"It is true that there are some companies for whom making business plans will become more difficult, yes. Having said that, prices for solar in Japan are very high compared to places like much of Europe and this leads to a situation where some are able to make a lot of money from it. We want participants to think about why are they are involved in the solar energy business here in Japan and do their best to keep lowering the cost of renewable energy," Hidaka says.

While the rules are tough, Hidaka says, committed companies would still manage to do good business – a point with which Hiroshi Matsukawa of RTS PV seems broadly to agree.

"It's a very strict set of rules, and even for many serious industry participants, it's considered a nuisance. However this bubble situation is really growing excessive and not eradicating it would lead to problems even for those sincere and committed industry players," he says.

Targeting a sustainable future

In the context of the bigger picture, Japan is reaching the last five years of its FIT, due to expire in 2020. As with every other country to have used support schemes to foster the growth of solar, the race to grid parity is becoming more and more of a priority. However, as the Japanese government will launch its first set of concrete targets for the national energy mix since 2010 this year, solar will be guaranteed at least some support from the top level.

Therefore the view from the ground in Japan is that the next two, three

Land matters

Another issue currently being addressed, both at a policy level and by private companies in Japan, is the lack of available land for solar.

While it will not prove to be a miracle cure, the government has begun offering extra subsidies for PV projects developed on landfill sites. It was reported in August last year that around 7.4GW of extra solar capacity could be added across 3,600 such sites.

Developers themselves are also actively looking for new ways to site their projects. The use of land reclaimed from the sea for commercial and residential purposes is an existing tradition in the Japanese construction industry. The international airport at Kansai in the south west is one such example and a 70MW PV project in Kagoshima, Kyushu, is another.

Not unique to Japan, but expected to proliferate quickly, are the floating PV plants on reservoirs and other bodies of water, with Kyocera planning to develop over 60MW of PV on such sites. Other sites where space has been freed up include a number of PV plants being built on defunct golf courses, of which Japan has many.



Floating PV plants, such as this one built by Kyocera, are seen as a solution to land shortages in Japan.

Credit: Kyocera.

The nuclear question

According to Keiji Kimura's colleague Mika Ohbayashi, director of JREF, support for solar among the Japanese public remains at a high level while popular sentiment against nuclear energy remains strong.

Arguably, no country in the world could be expected to be more wary of nuclear power than Japan. However, as one Japanese source who works in the renewable energy industry and did not wish to be named said, the need for energy security was a pressing enough concern that many Japanese were accepting reluctantly that nuclear return is inevitable, the only caveat being that the falling or fluctuating price of oil could yet have an unknown impact on energy economics in Japan.



Credit: Hoshu, Wikimedia Commons.

For many Japanese, accepting that economics and Japan's lack of natural resources is driving the country back towards a pact with the nuclear restart – or 'sai kadou' – will be a bitter pill to swallow.

The possible restart of some of Japan's nuclear fleet is a source of controversy.

and perhaps five years will see several gigawatts of solar installed annually, much of it large scale and the vast majority taken from the existing pipeline of some 70GW-plus of approved projects. A spokesman from Japanese vertically integrated thin-film manufacturer and developer, Solar Frontier, tells *PV Tech Power* his firm expects to see "6GW to 8GW of installations per year over the coming three to four years".

Beyond that, many in the industry largely see a move toward more distributed models of generation, which would necessitate a shift to more rooftop PV plants and for long-awaited, long-promised reform of the electricity market to finally begin in earnest.

While Japan's utilities have regional

monopolies over their service areas, controlling generation as well as transmission and electricity sales, as well as stifling competition, there is also little interconnection between each region's grid. While the parameters of a unified or partially unified grid network will be discussed this year, it is hoped that liberalisation of retail electricity sales will happen in 2016 ahead of the unbundling of electricity transmission and distribution at some unspecified point in the future.

Many have expressed doubts that this will happen on schedule, citing a lack of evidence that talks have made any real progress, but according to JREF director Mika Ohbayashi, if successfully followed through, EMR could change the picture once again for Japan. ■