

Photon

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From screen printers and pastes to plating
Market surveys show suppliers supporting advanced cell technologies as they try to cut on pricey silver

More PV for Japan

Former solar leader prepares new post-Fukushima subsidy scheme

Global feed-in tariffs

A worldwide concept for irradiance-based PV incentives

Illegal guarantee clauses

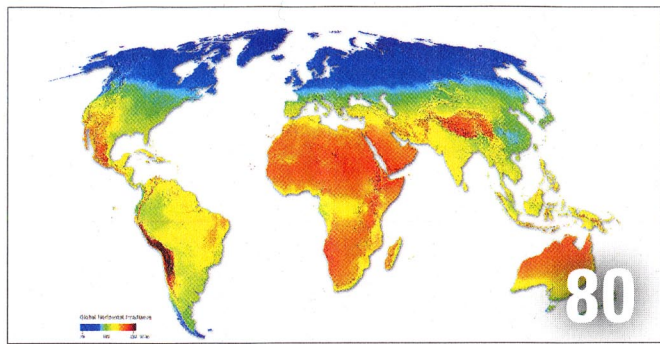
German consumer advocates to sue module makers over misleading wording

Inverter cost analysis

Why the market leader's top product is very expensive to manufacture



▲ In post-Fukushima Japan, PV may once again be getting the respect of its pioneering days as the government prepares a feed-in tariff scheme.



▲ PHOTON publisher Philippe Welter argues for global feed-in tariffs, with all countries encouraged to adopt similar rates based on irradiance.

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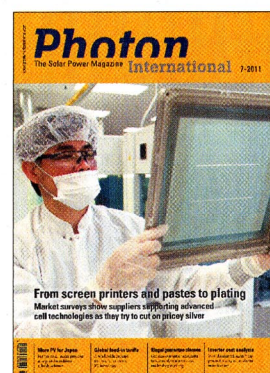
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Screen used in a screen printer to produce selective-emitter cells at Innovalight's facility in Sunnyvale, California

Photo

Ronald Frommann / photon-pictures.com



► Dr. Sunshine: Retired professor Kosuke Kurokawa, one of the forces behind Japan's earlier solar programs, has now designed a plan to reach 100 GW of installed capacity by 2030. But given the need for power now, easily deployable PV could be able to do that by 2020, especially with module prices at record lows.



Rolf Schulten / photon-pictures.com

Just like starting over

In post-Fukushima Japan, PV may once more be getting the respect of its pioneering days as the government prepares a feed-in tariff scheme

Text: William P. Hirshman,
Matthias B. Krause

Highlights

- A government ministry is proposing a new category for large-scale PV systems
- New feed-in tariffs, while good for larger systems, could be a downer for homeowners
- Foreign PV companies are waiting for the final word before committing to Japan
- A high-level government PV fact-finding visit to Europe is possible

The devastation that visited Japan in March with a force that seemed like the end of the world could also mark a new beginning. »At last,« says Tetsunari Iida, »there is a crack in the feudal system that is so characteristic of the energy industry in Japan.«

Iida, the CEO of the Tokyo-based Institute for Sustainable Energy Policies (ISEP), is referring to the shockwaves of what is now known as the Great East Japan Earthquake. The magnitude 9 seismic reading not only shook Japan, but vibrated to the core of Tokyo Electric Power Company (TEPCO), the world's fourth largest energy provider.

As the ensuing tsunami brought TEPCO's nuclear reactors at Fukushima to the brink of a meltdown, the utility proved less than forthcoming concerning the real danger. And of the nuclear power station capacities, normally responsible for 30 percent of Japan's electricity production, half ceased to be available, leading to the introduction of scheduled rolling black-outs. The fallout? On May 20, TEPCO president Masataka Shimizu resigned, as the utility found itself driven into de facto insolvency.

Feeding the Diet

The disaster has also driven politicians to take action. According to one energy poli-

cymaker, a high-ranking delegation from the Diet, Japan's parliament, is planning a mid-July trip to several European countries – including Germany – on a PV fact-finding mission. This comes as the Diet is preparing to revise Japan's current PV feed-in tariff scheme. The discussions could last through August, followed by a consultation period and a legislative vote possibly at the end of the year for introducing adjusted tariffs at the start of FY 2012 on April 1, probably to decrease annually. While this had been on the agenda for months, without the Fukushima nightmare, the notion that a high-level government delegation could make a PV-motivated visit to the West would have been unthinkable.

Even before Fukushima, the unthinkable was starting to happen. On March 11 – two hours before the earthquake hit – the Ministry of Economy, Trade and Industry (METI), the national department charged with setting the amount of government support, announced a first draft on those revisions (see PI 4/2011, p. 34). The proposal was to simplify support by removing subsidies and adjusting feed-in tariffs accordingly. But it also included one big surprise. For the first time, Japan said it was planning to incentivize PV systems – including on the ground – larger than 500 kW

with payments guaranteed on all generated electricity for 15 years. Amazingly, no limit was placed on the size allowed.

Boon for big deals, bad for small?

The original proposal did not include any information on the exact tariff payments. But according to an updated METI draft that PHOTON International has obtained, the discussion for all sizes is between ¥35 and ¥39 (43¢ and 48¢) per kWh. This could be a downer for homeowners thinking of installing a residential system below 10 kW since the guaranteed payments – sans subsidies – would only be for 10 years on excess electricity (and possibly leading to a run on tariffs to beat out the FY 2012 revision). But for all non-residential system sizes, the 15-year payments on all generated electricity could be enough to open up the market for large commercial rooftop and ground-mounted systems with their economies of scale.

But even if this happens, questions remain. One concerns the funding for the feed-in tariff, raised via surcharges on electricity bills. Given the disaster's damage to infrastructure, manufacturers, with their large loads of electricity use, will certainly be able to make a good argument that they should be exempted from such

Japan's PV tariffs – then, now and maybe

	Type of installation	Feed-in tariff (per kWh)	Size	Payment	Generation covered	Subsidy costs covered
Until March 31, 2011	Residential	¥48 (59¢)	≤ 10 kW	10 years	Excess	¥70,000 (\$861) per kW up to ¥650,000 (\$7,994)
	Non-residential	¥24 (29.5¢)	≤ 500 kW	10 years	Excess or all	NPOs receive half; commercial receive one-third
As of April 1, 2011	Residential	¥42 (51.6¢)	≤ 10 kW	10 years	Excess	¥48,000 (\$590) per kW up to ¥600,000 (\$7,379)
	Non-residential	¥40 (49.2¢)	≤ 500 kW	10 years	Excess or all	None
As of April 1, 2012 (draft)	Residential	¥35 (43¢) - ¥39 (48¢)* ¹	≤ 10 kW	10 years	Excess	None
	Non-residential (public sector)		≤ 500 kW	15 years	All	
	Non-residential (commercial)		> 500 kW** ²			
NPO non-profit organization, *1 possible range, final amount not yet decided, **2 no upper limit on size given						

NPO non-profit organization, *¹ possible range, final amount not yet decided, *² no upper limit on size given

source: Ministry of Economy, Trade and Industry

▲ Breaking news: According to a government document obtained by PHOTON International, a proposed range of FY 2012 tariffs – not yet finalized – would be bad news for householders but good for big investors.

payments. But if those exemption cut-offs are set too low, making them available to too many businesses, then the burden of incentive funding would be shifted largely to residential rate-payers, raising their monthly costs and perhaps curbing their passion for PV.

Then there is the question of targets. The government currently has a 2030 goal of 30 GW, covering all forms of renewable energy. But now the government's energy strategy, the Basic Energy Plan, is up for revision – and that could open up the floodgates wide for solar, while nuclear almost certainly will lose out. When last approved by Japan's cabinet in June 2010, the plan called for nuclear electricity generation to more than double to 52.6 percent by 2030 compared to 2007. In post-Fukushima Japan, such high atomic numbers are not likely to be repeated when the new strategy is revealed in mid-2012.

The politics of PV

Even Japanese Prime Minister Naoto Kan, the leader of the Democratic Party of Japan (DPJ), seems to have been slowing shifting away from nuclear advocacy and toward renewables. At the beginning of May, Kan announced that the country would cancel its 2030 plans to build 14 new nuclear reactors (it currently has 54 reactors), declaring it was time for the country to rethink its energy policy and »start anew.« Then at the G8 summit of developed nations held in France on May 27, while Kan did not call for solar on all new buildings, as had been speculated the week before in a Nikkei online report, he didn't leave solar empty-handed. The prime minister announced he would tie a goal of bringing down the cost of solar power generation to one sixth of current costs by 2030, while installing solar panels on 10 million residential roofs. As Japan's houses have typical PV rooftop system sizes of 3.5 to 4 kW, this could result in 35 to 40 GW.

A question of survival

But whether Kan will be around to follow through on such statements is doubtful. On June 2, he barely survived a no-confidence motion called by the opposition – and with the backing of many members of his own DPJ party – only by promising to step down once the current crises in Japan were under control.

Political survival also seems to be a top concern of candidates in communal elections, where the future of nuclear power has become a central issue. Since Fukushima, it has been difficult, if not impossible, to find a single local politician who advocates its expansion. One of the strongest public declarations was made by Yuji Kuroiwa in his April bid to become governor of Kanagawa prefecture southwest of Tokyo. In the midst of the election campaign, he held a solar module before the cameras, promising that during his legislative period he would have 2 million households equipped with solar systems. Kuroiwa won the election, garnering twice as many votes as his closest competitor.

Other colleagues and regions have been following his lead. Heita Kawakatsu, governor of the Shizuoka prefecture, where 80 percent of the electricity supply up to now has been sourced from nuclear power, wants to dramatically reduce this dependence through the rapid expansion of solar. And according to Resources Total Systems (RTS), the leading Japanese PV consulting firm, at least 12 additional prefectures have come up with subsidy funding schemes of their own to support residential PV.

The levels of confidence

Will all of the rhetoric turn into deeds? Izumi Kaizuka, a manager at RTS, has put her expectations on hold. »We have not heard about any concrete measures or budget allo-

cation,« she says. With so much of the budget understandably being directed at aiding the damaged areas and with the feed-in tariff still not officially announced, PV growth will be limited for now. While RTS estimated about 990 MW of PV was installed in 2010 – which would put the cumulative at about 3.6 GW – Kaizuka is expecting the 2011 level to stay flat at around 1 GW. »Investors,« she says, »require confidence.«

But confidence is one thing the Macquarie Group does not seem to lack. On June 23, the investment research unit of the international financial firm predicted a PV installed growth of 28 percent this year to 1.27 GW. While expecting residential systems to remain the base of that capacity – perhaps hampered by continuing high average selling prices, cited as ¥621 (\$5.31) per W – almost all of the 2011 increase would come from the commercial, industrial and public sectors. Macquarie, referring to »anecdotal evidence,« says that many firms are procuring PV systems to help cut their peak-time power draw from the grid due to electricity rationing.

Hard to judge large-scale plans

Anecdotal details via news accounts, however, could be exaggerated. A June 14 Bloomberg article reported that the CEO of Softbank Corp., Masayoshi Son, headlined as »Japan's richest man,« was looking at building 10 solar farms. Each, the article said, would be 20 MW in size, funded through investments of about ¥80 billion (\$984 million or a rather high \$4.92 per W). However, Makiko Ariyama, the spokeswoman of the information technology company, told PHOTON International that Son's plans would not be restricted to solar, that no timeline had been set, and that before any project financing was raised, the setting of new feed-in tariffs would be »very important.« The Bloomberg



▲ Going up: While a 25-percent electricity cutback has left many of Tokyo’s subway escalators sporadically out of action, PV’s installed-capacity escalator may soon be switched back on.

account also reported that Son was requesting land regulations on 540,000 hectares (1.3 million acres) of unused farmland be modified to allow solar. »It is just one of Softbank’s suggestions for Japan,« said Ariyama.

But there may be more reality in the suggestion than evident – at least for other terrain. According to the RTS monthly newsletter, PV Activities in Japan, on April 8 – less than 1 month after the disaster – the Japanese cabinet approved two Ministry of Land, Infrastructure, Transport and Tourism (MLIT) policy amendments. One would ease municipal application requirements for PV on green spaces, and the other would allow PV systems to be installed along roads and highways.

Outsiders waiting for certainty

Large-scale PV certainly would be a good fit for Japan, especially to shave peak power at midday during the hot summers when air conditioners are running full blast. It could also be a good fit for PV Chinese cell manufacturing giant Suntech Power Holdings Co. Ltd., the worldwide leader in cell manufac-

turing. It took over Japanese module manufacturer and systems integrator MSK Corp. in 2006 (see PI 9/2006, p. 140), putting it in a good position. The expected changes to the country's PV feed-in tariff, says Yutaka Yamamoto, president of Suntech's Japanese branch, clears the way for multi-megawatt power plants. »I'm 120 percent certain that this new feed-in remuneration will be introduced,« he says.

That possibility is also attracting other big players. Both Germany's Q-Cells SE and inverter manufacturer SMA Solar Technology AG have already announced that they want to penetrate the Japanese market this year. However, neither is expected to commit fully until there is more certainty about the legislation and the new numbers.

The good old days

But the fact that Japan's role in driving the PV sector remains up in the air is surprising given the pioneering role it has played. In 1974, still suffering from the effects of the oil crisis a year earlier, Japan decided to re-

duce its dependency on oil imports as quickly as possible. A year later, the government launched the Sunshine Project, a research program for the development of renewable energy sources, most notably PV. Three research programs and 20 years later, the government in Tokyo initiated the New Sunshine Project and set a target that, at the time, was unheard of – 4.6 GW of solar capacity in Japan by 2010. That was 75 times the annual capacity worldwide in 1994.

As a young engineer, Kosuke Kurokawa, now retired from his position as a professor at the Tokyo Institute of Technology, had worked on the development of high-voltage direct current transmission. He later became one of those who had formulated the growth scenario for solar and convinced METI of the plan's worthiness. With that program, Japan rose to become the largest solar power market worldwide. If the country had not fallen into a deflationary spiral in the 1990s, and the promotion of solar energy from 2005 to 2008 had not been completely canceled, Japan would no doubt have exceeded its expansion targets.

Only a few weeks after the first bad news from Fukushima, the retired professor devised a new plan to expand PV capacity to 100 GW by 2030. »Many people are now calling for the same things that I've been pushing,« says Kurokawa.

The question is actually why aren't they calling for more. Last year, 7.4 GW was installed in Germany. And in Japan, with a population of electricity-starved inhabitants that is more than 50 percent greater, at least 10 GW annually of PV could – and should – be installed, especially as module prices are hitting record lows.

In a country where the battle for power is happening now, an army of installers is ready to heed to the call to put in easily deployable PV. With so many reactors offline, nuclear's tarnished image, TEPCO's fall from grace, a political tsunami of growing support for solar, and pro-PV policy changes tantalizingly close, aiming at 100 GW by 2030 is taking the slow road. What is needed is a rapid response to hit that by 2020 – or earlier. In the face of nuclear meltdowns, it's time for PV's role in Japan to heat up. ●

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Solar cum laude

Die Nachfrage nach Photovoltaik-Studienplätzen steigt ebenso wie das Angebot

Wechselrichter

Was die Nachrüstung Hundertausender Geräte kostet

First Solar

Keine Garantieleistung, wenn Module durch Schnee zerbrechen

EEG-Novelle

Die Eckpunkte für die künftige Einspeisevergütung liegen vor

Japan

Photovoltaik wird neuerdings groß geschrieben

über 1.500 Händleradressen • Solarstrahlungsatlas • Praktika





Kurokawas Geheimnis

**Oder: Warum man in Japan Brause braucht,
um mehr als zehn Kilowatt Solarstrom ans Netz zu bringen**

Früher als alle anderen dachte Japan über Solarstrom in Gigawatt-Dimensionen nach. Doch dann stützte sich das Land mehr und mehr auf die Atomkraft.

Nach dem schweren Erdbeben im März, dem verheerenden Tsunami und dem nicht enden wollenden Atomnotstand deutet sich eine Renaissance der erneuerbaren Energien an, allen voran der Photovoltaik. Damit die auch wirklich Fahrt aufnimmt, muss die Regierung jedoch ihre schützende Hand über der heimischen Energiewirtschaft heben und Wettbewerb zulassen.

Sonnen bedecken die bürograue Wand, unzählige Sonnen. Mit langen Strahlen, mit bunten Gesichtern, aus Holz, Ton, Kunststoff, aus allen Ecken der Welt. Unvermittelt fangen sie im Takt an zu zittern. Kosuke Kurokawa blickt kurz auf und stößt ein kicherndes Bubenlachen aus, das so gar nicht zu seinen in Würde ergrauten Haaren und den tiefen Falten um die Augen passen