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SEPA

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Policy Changes Trigger
Resurgence of Japan's Solar
Market

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Policy Changes Trigger Resurgence of Japan's Solar Market

*Insights from SEPA's Japan Solar Fact Finding Mission
for Utility Decision-Makers*

July 26 - 30, 2010

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Feedback

The Solar Electric Power Association would appreciate feedback on this and past reports, as well as new areas of research we should consider in the future. Please take a moment to provide comments and suggestions through an online survey:

<http://tinyurl.com/SepaReportFeedback>

Executive Summary

The U.S.-based Solar Electric Power Association (SEPA) annually leads a group of utility leaders on a fact-finding mission to learn how solar markets are developing in different parts of the world.

In July 2010, SEPA traveled to Japan to study the experience of Japanese utilities and industry in integrating large amounts of distributed¹ photovoltaics (PV) into the grid, to explore the solar research initiatives being undertaken by the Japanese government and its research bodies, and to investigate Japan's solar policies, and the effect of those policies on the commercialization of solar technologies.

Japan has a long and rich history in PV research and development, and from the mid-1990s to the mid-2000s, was the global leader in the deployment of PV. Federal policy drove the expansion of the PV market, centered around a residential subsidy program launched in 1994 and ended in 2006. At about the time that the Japanese incentive program was winding down, the markets in Europe were heating up, spurred by a new policy mechanism, the Feed-In Tariff (FIT). As a result, Europe (led by Germany and Spain) began to dominate the rapid global growth of PV. In 2009, the government of Japan renewed its commitment to PV with a series of new support policies intended to revitalize the country's solar market, including the launch of a FIT.

Some of the key takeaways from the SEPA fact finding mission that will be explored in this report include:

- The over-arching role of policy in shaping the size and nature of the solar market in Japan.
- The motivations behind Japan's renewed emphasis on aggressive solar development, including economic, environmental, energy security and resource diversity concerns.
- The unique emphasis on distributed PV, with a particular focus on residential rooftop deployments.
- The critical role for electric utilities in the successful implementation of federal policy and commercialization goals, which somewhat surprisingly includes relatively few utility-scale installations.
- The research underway on the technical impacts of concentrations of residential PV on the distribution grid.

Throughout the tour, government officials, PV manufacturers, home builders, and utilities all emphasized Japan's new national solar goals: 28,000 MW_{DC} of solar by 2020 (20 times the current capacity) and 53,000 MW_{DC} by 2030. Besides a goal of regaining world market leadership, other important motivations for the aggressive targets include increasing energy independence and addressing global environmental goals of reducing greenhouse gas emissions. Considerable emphasis is being placed on solar to fill a prominent role as a renewable energy resource, given limits on other forms of renewables such as wind and hydropower due to Japan's climate and geography.

According to government figures, nearly 90% of the grid-connected PV is residential (this is expected to drop to about 70% by 2020). Due to the nation's high retail residential electricity prices, and with the aggressive new subsidies in place, solar grid parity is expected to be reached in as little as seven years.

Utilities will play a major role in grid integrating customer PV systems, but in contrast to the situation in the U.S., utility-owned solar generation capacity is not a focus of Japanese utilities. As of today, they are planning to build just 140 MW of utility-scale solar by 2020 (out of the goal of a total of 28 GW of new solar capacity). By contrast, Japanese utilities are expected to add 12,300 MW of nuclear generation in nine new utility-owned nuclear power plants over the next eight years. (Japan currently has 53 nuclear power plants with a generating capacity of 48 GW.)

Ninety percent of the solar technology installed in Japan is manufactured in Japan, leading to a new and growing sector of the economy that Japan hopes will create thousands of well-paying jobs. However, by

¹ Less than 0.5% of Japan's cumulative installations are considered centralized generation. *Trends in photovoltaic applications. Survey report of selected IEA countries between 1992 and 2009, October 2010, www.iea-pvps.org*

severely limiting the imports of less-expensive foreign technology, the relative cost of solar remains higher than it might otherwise.

Overall, the Japanese are embracing increased electrification of their economy, to make use of more renewable resources and ease dependence on fossil sources. For example, the country is building homes with electric heating systems powered by rooftop photovoltaic systems. A new law on the *Promotion of the use of Nonfossil Energy Sources and Effective use of Fossil Energy source Materials by Energy Suppliers*, which was enacted in July 2009, reinforces the Japanese view of a symbiotic relationship between renewable energy and energy efficiency. The new program guarantees that electric utility companies purchase the surplus electricity produced by PV systems at a fixed price for 10 years. In FY 2009, this fixed price for surplus electricity generated by a PV system of less than 10 kW on a residential house is 48 ¥²/kWh (or US\$0.60/kWh). Currently, the average residential retail rate is 24 ¥/kWh (or US\$0.30/kWh). As a result, the more efficient a building is, the more effective the solar system in generating additional revenue above retail rates.

Outlook

The Tour Schedule and the Table of Contents of the full report follow as Appendix.

² ¥ = sign for Japanese Yen

Appendix A:

Tour Schedule

Throughout the five-day fact finding mission, the delegation met with numerous players in the Japanese electricity marketplace and visited multiple solar installations in Japan. Table 1 provides an overview of the agenda.

Table 1: Agenda of Fact Finding Mission to Japan

No	Agenda
1	Workshop with NEDO (New Energy and Industrial Technology Development Organization, Japan's equivalent of NREL), and METI (Ministry of Economy, Trade and Industry; Energy Conservation and Renewable Energy Department)
2	Technical visit with Sekisui Heim (Housing Division of Sekisui Chemical Company) Factory in Hasuda city, Saitama - Prefabricated modular houses and PV System for houses
3	Tour of Pal Town Jyosai-no-Mori, Ota City PV Demonstration Project - 2.13 MW roof mounted systems aggregated on 553 houses and deployed on a single feeder
4	Technical visit with Akagi Research Center of CRIEPI (Central Research Institute of Electric Power Industry) - Test facilities - This site has a PV technology/Microgrid lab where they can evaluate the operation of up to 30 inverters at the same time. A new controllable AC power supply is being commissioned to better simulate grid disturbances.
5	Technical visit with AIST Tsukuba Research Center for Photovoltaics, Ibaraki - PV Systems installed in AIST (Mega-Solar Town)
6	Tour of AEON Lake Town Koshigaya, Saitama - The largest PV system for Shopping Malls in Japan (total generation capacity: 487kW)
7	Workshop with Federation of Electric Power Companies (FEPC), and Japan Electrical Manufacturers' Association (JEMA)
8	Workshop with Japan Photovoltaic Energy Association (JPEA)
9	Technical visit to Green Front Sakai of Sharp, Osaka - Manufacturing complex of 10 th -generation glass substrates LCD panels and thin-film solar panels

Appendix B:

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SEPA Research Report Summaries

Distributed Photovoltaic Generation for Regulated Utilities (2009)

This analysis looks at both the regulatory and practical issues surrounding the installation of utility-owned distributed photovoltaics by investor-owned utilities.

Photovoltaic Incentive Programs Survey (2009)

In coordination with SEPA, an electronic survey was developed and distributed by U.S. utility and state PV incentive program managers to consumers who installed PV systems and received a rebate to offset the cost. The survey asked about the participants' satisfaction and experiences with the installation, incentive, interconnection, and ongoing maintenance of their systems. The resulting report analyzed the data across geographies to draw distinctions and parallels across the country

Top Ten Utility Solar Rankings 2009 (2010)

This report is the third of SEPA's annual survey of US utilities' grid connected solar. The results are top ten rankings of the most solar integrated utilities.

International Utility Survey: Utility Procurement Influences & Practices (2010)

Gartner and SEPA conducted a survey of 134 utilities in Europe and the United States to understand their requirements and objectives for implementing photovoltaic (PV) technologies in their energy generation portfolios. This telephone survey was complemented, in the U.S., by an online survey.

PV Technology Characterization Review (2010)

The PV market continues its explosive growth and simultaneously a wide array of commercially available PV technology and application options are emerging. This SEPA report provides a comparative understanding of the PV technologies along with pertinent metrics, from the manufacturing process through deployment in the field across a broad range of upstream and downstream metrics, including manufacturing processes, feedstock and materials availability, module physical and operating characteristics, market applications and environmental characteristics.

Utility Solar Business Models Phase II: Developing Value in Solar Markets (2010)

Utilities, regulators, and solar companies have been

thinking creatively about new Utility Solar Business Models (USBM) that better align utility interests with policies favoring solar development. USBMs are distinct in that they offer present or future value to utilities, as well as to utility customers and society, to support utility actions that advance larger renewables and carbon reduction goals. To help in the development of USBM strategies, SEPA has also developed a decision mapping tool that can be used as a complement to this report, or as a stand-alone thought exercise. The report and decision mapping tool represents the second phase of this project.

National Solar Jobs Census 2010 (2010)

The National Solar Jobs Census 2010, conducted by The Solar Foundation and Green LMW with technical guidance from SEPA, SEIA, and Cornell University, quantifies the current employment and projected growth of the United States solar industry, including utility jobs within the solar industry, which may grow by more than 20 percent over the next 24 months.