

Renewable Energy/Secondary Battery

Overview

Renewable energy drawing attention as energy issues become apparent after 2011 Tohoku earthquake and tsunami

As a measure against global warming, various actions have been taken to promote renewable energy on a global scale. Since the Tohoku earthquake and tsunami occurred on March 11, 2011, energy issues have become more and more prominent in Japan because of earthquake-stricken thermal power plants and unprecedentedly large-scale and long-term damage to the nuclear power plant of Tokyo Electric Power in Fukushima. In order to solve those issues, renewable energy is drawing further attention in Japan.

Increasing the share of renewable energy in power generation

According to the forecast on power generation released by the Japanese government in June 2012, the share of renewable energy is expected to increase greatly from 11% in FY 2010 to 25%–35% in FY 2030. The government recognizes the rising importance of renewable energy and states that it will accelerate the development and use of renewable energy in order to acquire energy security.

Specific measures include the widening of system operations, maintenance and improvement of power grids, reformation of regulations on location, acceleration of technical development, acquirement of backup power, and improvement of systems that enable us to live in harmony with the community.

The market size will greatly expand by 2020

The government estimates that the market size of renewable energy in Japan will greatly expand by 2020. The market size of solar power generation devices is expected to grow up to 1,287,600 million yen, which is 8 times larger than the 2008 figure. The market size of wind power generation plants is expected to grow up to 249,000 million yen, which is 4 times larger than the 2008 figure, and the growth expectation of lithium-ion batteries is up to 600,600 million yen, which is 14 times larger than the 2008 figure. With regards to charging stations and geothermal power generation plants, their market sizes were small in 2008 but they are predicted to grow up to 148,000 million yen and 78,400 million yen, respectively, by 2020. New energy business is expected to grow up to 2,431,100 million yen, which is 32 times larger than in 2008.

Chart 1 Forecast on Power Generation in FY 2030 (General Overview)

	Nuclear Power	Renewable Energy	Thermal Power	Cogeneration	Energy Saving (Power Saving)
FY 2010	26%	11%	60%	3%	—
Scenario 1: 0% Nuclear Power		35%	50%	15%	[Compared with FY 2010] Energy Saving: 20% down (Power Saving: 10% down) □ 1 trillion kWh
Scenario 2: 15% Nuclear Power		30%	40%	15%	
Scenario 3: 20 - 25% Nuclear Power		25%-30%	35%	15%	

Source of chart 1 "On the Draft of Energy Mix Options" (June 2012) by Ministry of Economy, Trade and Industry

Chart 2 Markets against Global Warming
—Expected Market Size of New Energy

Market	2008	2020	(Unit: Million Yen) Compared with 2008
Solar power generation device	164,800	1,287,600	781%
Wind power generation plant	63,000	249,000	395%
Lithium battery	42,900	600,600	1,400%
Charging station	0	148,000	—
Geothermal power generation plant	0	78,400	—
New-energy business	75,200	2,431,100	3,233%

Source of chart 2 "Research on Japan's Environmental Business in 2020," by Ministry of Economy, Trade and Industry

Governmental Efforts

Japan is advancing a number of initiatives to bolster the renewable energy and secondary battery markets through the following efforts: “feed-in tariffs (FITs)” for renewable energy and introduction of the “fund to introduce and promote renewable energy (green new deal fund)” .

Expanding facility investment by “feed-in tariffs (FITs)” for renewable energy

In order to promote the use of renewable energy, feed-in tariffs (FITs) took effect in July 2012. Electric power suppliers are now required to procure electricity generated by renewable energy (solar power, wind power, hydraulic power, geothermal power, and biomass) at a fixed cost for a certain period of time determined by the government. The system has made it easier for the installer of the renewable energy generation facilities to forecast the cost recovery. The government announced that the capacity of the facilities that have been certified by the end of February 2013 reached approximately 13,059,000 kW.

Expanding public investment through a fund to introduce and promote renewable energy

The projects to introduce and promote renewable energy through a “fund to introduce and promote renewable energy (Green New Deal Fund)” promote the introduction of renewable energy to disaster prevention centers of local authorities with a view to introduce independent and distributed energy by using renewable energy and promote the development of a region that is environmentally friendly and robust in the event of disasters. The implementation period is the 5 years from 2012 to 2017. It is predicted that the fund will promote the introduction of renewable energy and electricity storage systems to private and public facilities such as government agencies, hospitals, police stations, and fire stations.

Chart 3 FY 2012 Status of Introducing Renewable Energy Generation Facilities (as of the end of February)

(Unit: 1,000 kW)

	Cumulative Introduction Volume at the End of FY 2011	Facility Capacity Started Operating between Apr 2012 and Feb 2013	<Reference> Facility Capacity Certified by Feb 2013
Solar power (residential)	Approx. 4,400	1,137	1,246
Solar power (nonresidential)	Approx. 900	422	11,012
Wind power	Approx. 2,600	63	622
Medium and small hydropower generation (1,000 kW or more)	Approx. 9,400	1	23
Medium and small hydropower generation (1,000 kW or less)	Approx. 200	2	5
Biomass	Approx. 2,300	36	147
Geothermal power	Approx. 500	1	4
Total	Approx. 20,000	1,662	13,059

Source of chart 3 Ministry of Economy, Trade and Industry

Attractive Markets

In this report, the markets to the right are featured as attractive sectors for renewable energy and secondary batteries:

(1) Solar power systems

Expanding the market share of products by overseas manufacturers

The market size for solar power systems in Japan in FY 2012 was 1,624,763 million yen. The amount for residential systems was 869,071 million yen (53.5%) and the amount for nonresidential systems was 755,692 million yen (46.5%). The government's subsidy system for the introduction and the feed-in tariff program for surplus power will continue and the system price is likely to drop. Therefore, the market is predicted to continue to grow after FY 2013.

As for residential systems, the percentage of adopting solar power systems to new houses by large home builders was over 50% in FY 2010, and the percentage is also rising among medium-sized and small home builders. The number of cases where the systems are introduced to existing houses is also increasing as various subsidy programs are available and the introduction cost is dropping. According to the estimation by Yano Research Institute, the four major companies of Sharp Corporation, KYOCERA Corporation, Panasonic Corporation, and Mitsubishi Electric Corporation accounted for 70% or more of the market in FY 2010. However, the technology for solar cells made by overseas companies is approaching the level of Japanese manufacturers in terms of conversion efficiency and other qualities. It is expected that the market share of overseas manufacturers will increase as the competitiveness grows with regard to the production scale and the price.

As for systems for public and industrial use, the market suddenly expanded after FY 2009 because the government introduced solar power systems to educational facilities. Since FY 2011, however, the market size has been shrinking because the installation at educational facilities settled and major subsidy

Solar power generation system

Wind power generation system

Lithium-ion battery for stationary electrical energy storage

Other new energies (methane hydrate)

Chart 4 Home Solar Power Systems - Market Size Transition



Chart 5 Non-Residential Solar Power Systems - Market Size Transition



Source of chart 4+5

"Capacity" is based on the shipment of photovoltaic cells by Japan Photovoltaic Energy Association.
"Monetary amount" is based on the estimation by Yano Research Institute.

programs for public and industrial use were discontinued, although more solar power systems have been introduced for large-scale power businesses led by power companies. Nevertheless, after FY 2012, due to the introduction of the feed-in tariffs for renewable energy, the number of mega solar projects for power businesses has sharply increased, and the market is expanding significantly.

(2) Wind power systems

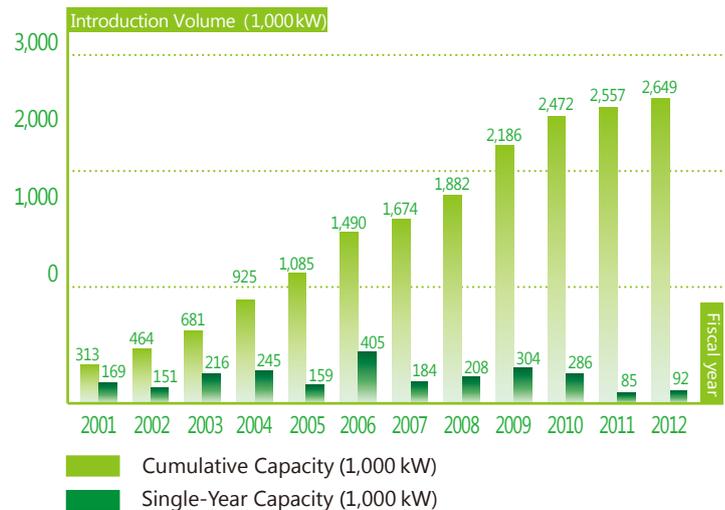
Products by overseas manufacturers account for 70% of the wind power market in Japan

The wind power introduction volume (cumulative) in Japan in FY 2012 was 2,649,000 kW, and the single-year capacity was 92,000 kW. The market size was 73,800 million yen in FY 2010. The volume of new introductions to the wind power business decreased after 2010 because of the cancellation of subsidies for the construction of new businesses in anticipation of the feed-in tariff program, in addition to the confusion caused when power companies limited the capacity required and the Building Standards Act was revised, but the market has been improving since the feed-in tariff program started in July 2012. Because wind power generation became applicable to the environmental assessment in FY 2012, the introduction volume is not increasing at the moment, but the introduction volume is expected to increase sharply from now on.

According to reference material provided by the Japan Wind Power Association, more wind power has been introduced to windy regions such as Hokkaido, Tohoku, and Kyushu. Aomori has remained number one in terms of the volume of introduction since 2008. With regards to the newly introduced facilities with 10,000 kW or more, Aomori Prefecture had 22,000 kW, Kagoshima Prefecture had 20,000 kW, Ibaraki Prefecture had 16,000 kW, and Akita and Hyogo prefectures had 12,000 kW, in FY 2012.

The major Japanese companies in this sector are Japan Steel Works Ltd., Hitachi Ltd., and Mitsubishi Heavy Industries Ltd. Foreign-affiliated companies based in a subsidiary or a branch in Japan that are developing businesses in Japan are Vestas Wind Technology Japan Co., Ltd., GE Japan Corporation, and Enercon Industries Corporation. Compared with the world market, the Japanese market for wind power systems is delayed in some areas. According to the results so far, more than 70% of the products are manufactured by overseas manufacturers, which shows that the barrier to entry is low for foreign-affiliated companies.

Chart 6 Wind Power Introduction Volume



Source of chart 6 "Renewable Energy White Paper (Wind Power) 2013," by Japan Wind Power Association

Chart 7 Wind Power System - Market Size Transition in Japan



Source of chart 7 "Wind Power Generation Systems Market 2011," by Yano Research Institute (the above market size includes the equipment and installation cost)

(3) The market for lithium-ion battery for stationary electrical energy storage

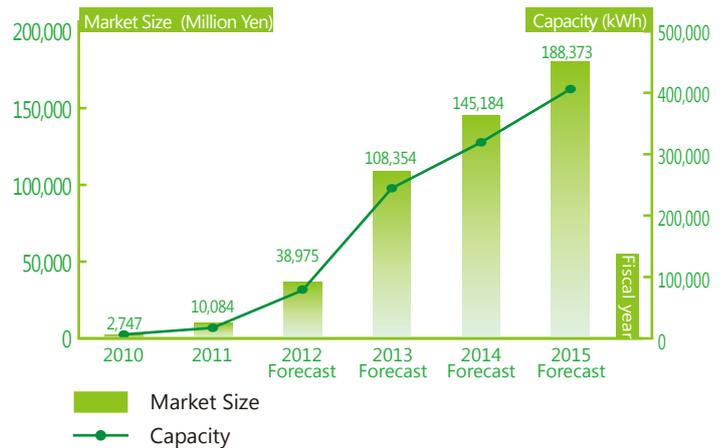
Demand for electricity storage devices rose sharply after the 2011 Tohoku earthquake and tsunami

Lithium-ion batteries for stationary electrical energy storage have been used and promoted in demonstration experiments and professional backups in order to standardize the electric power and stabilize the power system. However, due to power issues after the Tohoku earthquake and tsunami, various companies started to sell electricity storage devices in succession for home and professional use.

The market size for lithium-ion battery for stationary electrical energy storage in FY 2011 was 10,084 million yen, an increase of 367.1% from the previous year, and the peak shift/peak cut backup power storage market accounts for 80%. House builders have been enhancing the sales of "smart houses" since FY 2012, and the market size is expected to grow sharply to 188,373 million yen in FY 2015, which is about 20 times larger than the market size in FY 2011. The power storage market of peak shift/peak cut backup for home use is predicted to grow to 93,995 million yen and account for 49.9% (estimated by Yano Research Institute) in FY 2015. Furthermore, with the "Green Growth Strategy," the government is planning to put 5,000 rapid chargers in place for electric cars by 2020, which suggests that the number of charging systems with lithium-ion batteries that can also function as an infrastructure for emergency will increase in public facilities.

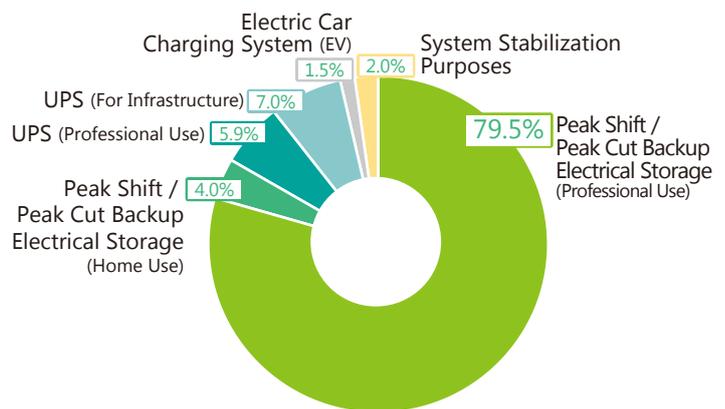
A number of starting manufacturers not only produce cells of lithium-ion battery by themselves but also cover the aspect of the power storage system. Some companies source the cells of a lithium-ion battery from an external company and produce their products by combining them with BMS (Battery Management System) and PCS (Power Conditioning System), while others develop their products through a joint development with another company, which allows foreign-affiliated companies to enter the market. Because the issue is to reduce the price of the products, competitively priced components are more and more required. For the purpose of stabilizing the system, high-quality materials will be required, as battery capacity is large and safety is important.

Chart 8 (Japanese Market for) Lithium-ion Battery for Stationary Electrical Energy Storage



Source of chart 8 "Stationary ESS (Energy Storage Systems) Market 2012," by Yano Research Institute

Chart 9 Lithium-ion Battery for Stationary Electrical Energy Storage Demand Breakdown



Source of chart 9 "Stationary ESS (Energy Storage Systems) Market 2012," by Yano Research Institute
*FY2011 Market Size 10,084 million yen

(4) Other new energies

The new market of methane hydrate

Since March 2013, when natural gas was successfully extracted from the methane hydrate layer that is 1,000 meter deep and 80 kilometers off the coast of Atsumi Peninsula in Aichi Prefecture, the Japanese government announced policies to accelerate the development of marine resources and put technologies in place in FY 2018 toward the commercialization of "methane hydrate," which is the energy resource for the future generation. As the technology advances and develops, foreign-affiliated companies having the knowledge and technology of natural gas extraction are expected to play a key part.