Redesigning Japan's Renewables Policy

The government's launch in July 2012 of a feed-in tariff (FIT) scheme to foster the development of renewable energy has spurred the rapid growth of photovoltaic (PV) power generation in Japan. **Professor Yamaguchi Mitsutsune** however identifies some problems with Japan's renewables policy and proposes a number of measures to improve the FIT scheme, focusing on PV.

Japan adopted a renewable portfolio standard (RPS) in 2003 as a measure to promote renewable energy, but renewable energy began spreading in earnest only with the launch of the feed-in tariff (FIT) scheme in July of 2012. In particular, the growth of photovoltaic (PV) generation has been significant. Non-residential PV generation (with a capacity of at least 10 kW) for example has grown 5.4-fold to 4,829 MW in the eighteen months since initiation of the scheme, compared to a cumulative capacity of 900 MW prior to the launch of the FIT scheme. Moreover, capacity accredited at this point in time has reached 26,124 MW (**Figure 1**). This has happened because, as noted below, special treatment has been given to PV by setting a tariff which is very high by international standards, with the obligatory purchase period at twenty years. As a result, anyone can invest in PV with virtually no risk to generate high returns, and investment has consequently flooded in. But problems are also emerging. For the above reasons, the following discussion will focus on non-residential PV, including its present status and suggestions on how to re-design the scheme.

Japan's High PV Purchase Price By International Standards

Since the FIT scheme was launched in July of 2012, the purchase price (tariff) of electricity generated by PV has been reviewed twice, in April of 2012 and 2013. The tariff for non-residential PV generation has been cut from 42 yen to 37.8 yen and to 34.56 yen, reflecting the decline in costs. (These prices include the consumption tax of 5% for the first two prices and 8% for the last price, as the consumption tax was raised from April 1, 2014. Net prices before tax were 40 yen, 36 yen and 32 yen, respectively.) Even when taking into account the high price of land in Japan and other factors, these prices are still clearly high by international standards, as seen in **Table 1**, and no cap is imposed on the volume of purchase.

Comments regarding the situation in Europe may be relevant here. Germany adopted the FIT scheme in 2000. As a result, renewable energy accounted for some 25% of the country's electric power generation as of 2013. On the other hand, German household surcharges for FIT have since continued to rise and as of this year reached 6.24 euro cents/kWh. (When expressed in terms of the benchmark household case, this amounts to an additional expense of 218 euros per year.) For this reason, FIT tariffs for PV have been slashed. In the case of mega-solar systems, for example, the purchase price fell from 0.33 euros/kWh in 2009 to 0.09 euros/kWh in 2014, a decline of as much as 73 percent. Spain has implemented policies to promote renewable energy through subsidies mainly for the FIT regime, but these efforts have become unmanageable. Spain therefore halted its program for PV in 2012 and for wind power in 2013.

Problems with Incentives to Promote Solar Power

These lessons from Europe illustrate that the FIT framework can be very effective in promoting renewable energy through artificial subsidies (setting a high purchase price over the long term). However, if the subsidies are too high, it leads to very large increases in power prices, rendering the system itself unsustainable. This fact is relevant for Japan when seen from the following four perspectives.

The first issue relates to future increases in electricity prices (and resulting social inefficiency). Of the 21 GW in renewable energy capacity accredited by the government in the first fiscal year of the system (July 2012 through end of March 2013), nearly 19 GW was concentrated in PV generation for commercial use. Of this amount, only 0.7 GW of capacity actually started to be operated in the initial fiscal year. Once a project has been approved, that is, once a project is entitled to enjoy a very high first-year tariff, there is no limit relating to the time at which it must start operation. Among 19 GW of accredited projects, owing to problems such as those relating to preparation of land and funding, it is anticipated that 6 GW at least will have difficulty in starting operation. Since purchases at this tariff are guaranteed for a period of twenty years, the total subsidy (or the gap between the total purchase price paid by utility companies and the total cost avoided by not generating the electricity by themselves) will reach a total of nearly 9 trillion yen in nominal terms. (Calculated on the assumption that the average avoided cost is 12 yen/kWh.) From next and subsequent fiscal years the subsidies are expected to gradually decrease owing to cuts in purchase prices, but the subsidies will continue for a period of twenty years from that point, precipitating increases in electricity bills and impacting the sustainability of the scheme itself.

The second issue is that the purchase price in the case of PV generation is very high in the initial fiscal year. As a result, many projects only for the purpose of obtaining the rights have been accredited without the preparation of land and funding necessary for generating the power. This means that the same sort of solar bubble has emerged in Japan as occurred in Spain in 2007.

The third issue deals with the relationship between the increase in renewable energy and fossil fuel power generation. If electric power demand remains stable, the increase in renewable power generation will lead directly to a decline in fossil fuel generation, undermining profitability for fossil fuel generation and in turn leading to a reduction in investment in the field. On the other hand, one disadvantage of PV and wind power generation is intermittency. Thus as these forms of power generation increase, there will be greater need for fossil fuel generation as a backup. In other words, the more renewable energy is promoted through subsidies, the greater will be the need to support fossil fuels with subsidies as well, giving rise to widening distortions in the market. Indeed, the Capacity Market which the British decided to adopt is a framework which provides for subsidies to maintain fossil fuel generation capacity.

The fourth issue is the high cost of renewable energy as a means of combating global warming. Britain is relying mainly on wind power, but the cost of reducing CO_2 in 2011–2012 for Britain was extremely high at 96.61 pounds/tCO_2 (16,400 yen/tCO_2). In the case of mega-solar systems in Germany, the cost has fallen sharply to 45 euros/tCO_2 (6,300 yen/tCO_2) with the application of tariffs in April of 2014. In Japan, however, the cost at that same point in time was high at about 40,000 yen/tCO_2, which represents a very inefficient means of combating global warming.

Toward Future Improvements

Despite the above problems, Japan lacks its own resources and must therefore promote renewable energy from a long-term perspective. The question, however, is how to do this sustainably and effectively. I propose that the following actions be taken to improve Japan's FIT system.

The first step should be to lower the PV purchase tariff to international levels. Simple comparisons can sometimes be problematic, but as indicated in **Table 1**, the present gap is very large indeed.

The second is to place a cap on amount of the renewable energy either by cumulative capacity or the subsidies (**Table 1**). Introduction of unlimited renewable capacity would mean a commitment to unlimited subsidies, which could in turn precipitate a collapse of the scheme itself owing to rising electricity prices.

Third, while purchase prices are presently set by type of technology, namely wind, geothermal, PV or other type of power generation, this distinction should be eliminated, and tariffs should be made uniform as quickly as possible. Present tariffs ensure that profits can be made with any of these technologies, an approach which undermines efficiency. Making tariffs uniform would yield even greater renewable energy generation at the same cost.

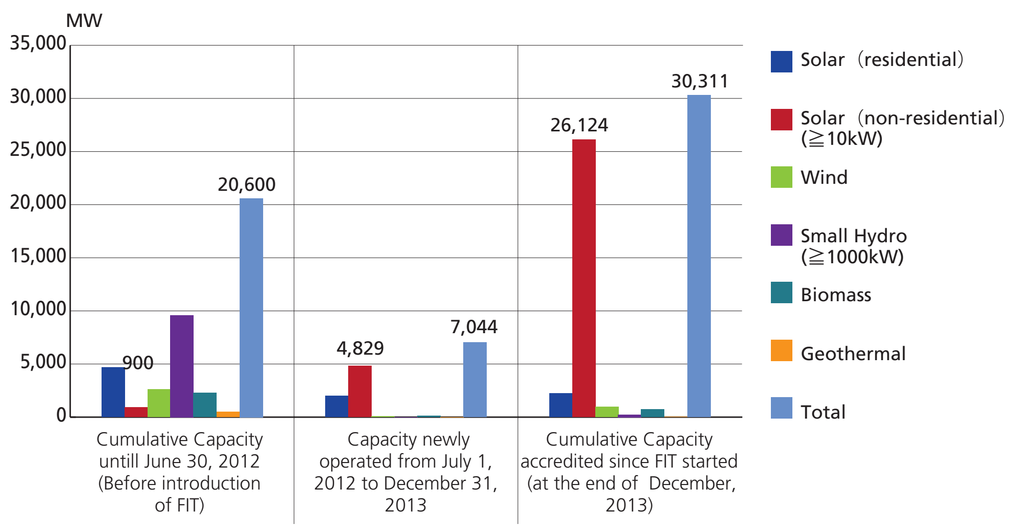
A fourth improvement would be, after the lapse of some time, to introduce an auction instead of the government setting the tariff. This would result in greater efficiency.

Fifth is technological development. Focus should be not just on greater promotion of generation technology per se but also on development of innovative technologies, such as battery systems, to solve bottlenecks in the grid system.

A sixth point relates to strict adherence to free trade. Adopting protectionist trading methods in order to protect domestic products would have a negative impact on the economy as a whole.

What is necessary before adopting any of the above is to establish a consensus on the best energy mix for Japan, including renewable energy, fossil fuels and nuclear. The key considerations relevant to that effort will be economic efficiency, stability of energy supplies and environmental protection.

Figure 1: Trend in Renewable Energy Capacity, before and after adoption of the FIT scheme (As of December 2013, Unit: MW)



Source: Author, based on Ministry of Economy, Trade and Industry data.

Table 1: Comparison of Mega-Solar Purchase Prices (as of 1 April 2014)

	Capacity	Purchase price/kWh	Purchase period	Cap
Japan	≥10kW	34.56 yen	20 years	None
U.K.	>5MW	20.4 yen (12 p)	15 years	Subsidy £7.6 billion (2020)
Germany	>1MW ≤10MW	12.6 yen (€c 9)	20 years	Cumulative capacity 52 million kW

Conversion rates: 170 yen per British pound, 140 yen per euro. Figures for Britain are based on the "Feed-in Tariff Contract for Difference" (FiTCfD) launched in April, 2014

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