

Current initiative and issues for stats and trends of renewable energies in Japan

Hironao Matsubara

Institute for Sustainable Energy Policies, Tokyo, Japan 164-0001

Abstract: After Fukushima nuclear accident in 2011, status of renewable energy in Japan is about to change significantly. In 2012, introducing dramatic of renewable energy in the power sector, such as solar power is expected by the start of the feed-in tariffs. Other renewable energies such as wind, small-hydro, geothermal and biomass have several issues caused by excessive regulations or limitation of power system. Current status of renewable energy policy such as Feed-in tariffs in power sector of Japan is investigated proposing disclosure of the information from the Ministry of Economy, Trade and Industry (METI). At the same time, status of renewable energies such as solar, wind, small-hydro, geothermal and biomass are annually summarized in “Renewables Japan Status Report” as private initiative by ISEP in the same way as Global Status Report by REN21. On the other hand, the development of the system for the statistics of renewable energy in Japan is delayed in comparison of the system in European countries such as AGEE-stat in Germany. For developing countries, IRENA is starting to support renewable energy database framework, REDAF. In contrast, along with the current situation and challenges of renewable energy in Japan, current initiative and issues for statistics and trends of renewable energies are investigated in this paper. Moreover, as indicators for sustainability of each region, prefecture and municipality level in Japan, renewable energy ratio is annually estimated using statistics data of power and heat supply by renewable energies compared with energy demand. The region of 100% renewable energy is called “sustainable zone” in this study.

Key Words: renewable energy, statistics, indicator, feed-in tariffs

Paper:

INTRODUCTION

The severe nuclear disaster at Fukushima Daiichi nuclear power plant, caused by the huge earthquake and the massive tsunami in March 11th, 2011, brought about controversies over the safety of nuclear power plants. Uncertainty about the safety of nuclear power, as well as energy security issues have caused widespread reconsideration of demand-side management, energy efficiency, renewable energy, electrical liberalization and unbundling transmission from power production. Fig.1 shows trends of power generation in Japan from FY1990 to FY2012. The portfolio of power generation was drastically changed after the Fukushima Nuclear accidents.

The development of the system for the statistics of renewable energy in Japan is delayed in comparison of the system in European countries such as AGEE-stat [1] in Germany. For developing countries, IRENA is starting to support renewable energy database framework, REDAF [2]. In contrast, along with the current situation and challenges of renewable energy in Japan, current initiative and issues for statistics and trends of renewable energies are investigated

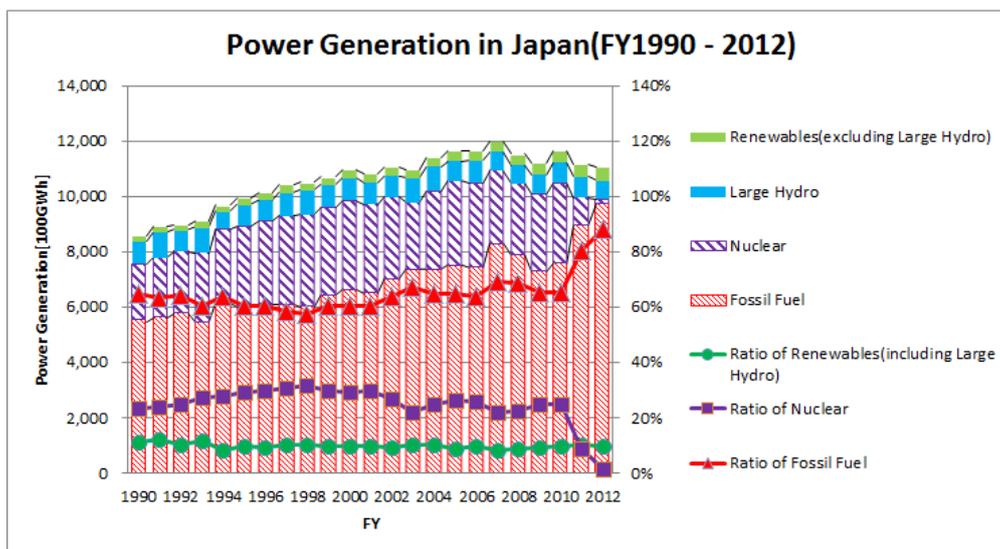


Fig.1 Trends of power generation in Japan(Source : ISEP)

Renewable energy trends in Japan

In 2012, introducing dramatic of renewable energy in the power sector, such as solar power is expected by the start of the feed-in tariffs. Other renewable energies such as wind, small-hydro, geothermal and biomass have several issues caused by excessive regulations or limitation of power system. Additionally, current status of renewable energy policy such as Feed-in tariffs in power sector of Japan is investigated proposing disclosure of the information from the Ministry of Economy, Trade and Industry (METI). At the same time, status of renewable energies such as solar, wind, small-hydro, geothermal and biomass are annually summarized in “Renewables Japan Status Report”[3] as private initiative by ISEP in the same way as Global Status Report by REN21 [4].

In that estimate in 2012, Japan's cumulative installed capacity of facilities generating renewable energy was estimated to be approximately 17 GW as shown in Fig.2 (over 10MW large hydropower facilities are excluded.). The total installed capacity of both wind power and solar power accounted for more than half of the overall installed capacity, and this exceeds total installed capacity of geothermal, small hydro, and biomass (including waste power generation) power generation capacity.

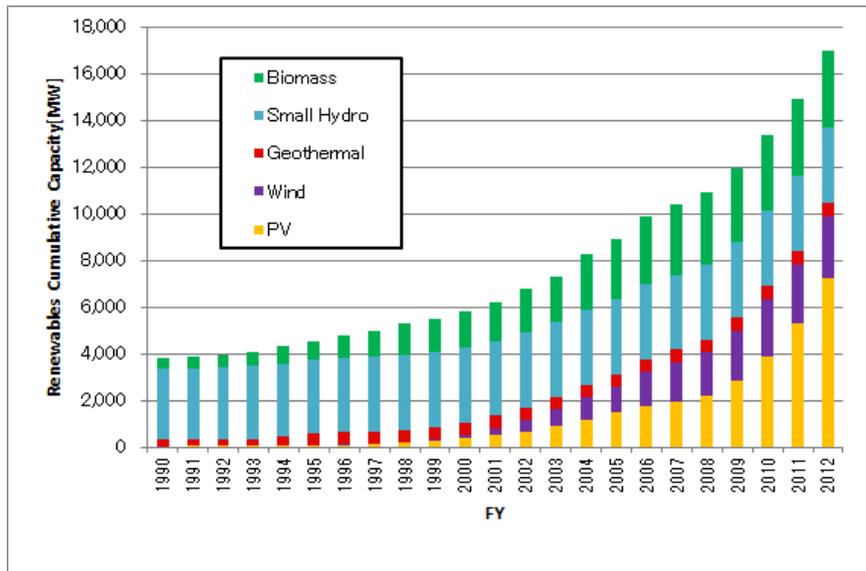


Fig.2 Renewables Cumulative Capacity in Japan (Source: ISEP)

While the total installed capacity of wind power was 2.64 GW at the end of FY2012, its annual installation capacity was still sluggish, which was about 86 MW as shown in Fig.3. Although the number of installed wind power capacity had rapidly increased by the growth rate of 30 percent until around 2006, since 2007 the rate of its annual installation capacity has slowed down due to various constraints, including the matter of environmental assessment and of grid connection systems. However, fig.4 shows potential of onshore wind power capacity in each region of Japan. Region of Hokkaido and Tohoku have far more potential of offshore wind power than installed total power capacity of each regional utility.

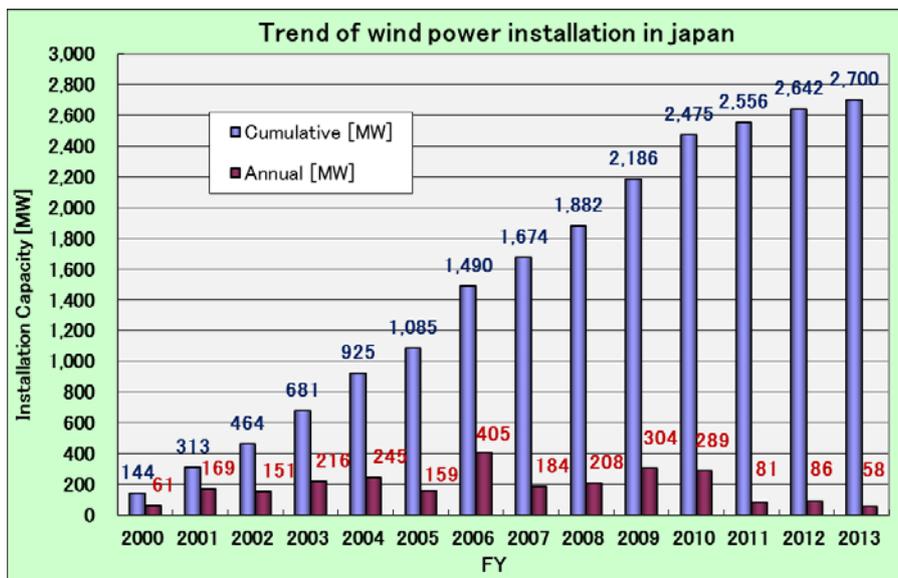


Fig.3 Trend of wind power installation in Japan (Source: JWPA)

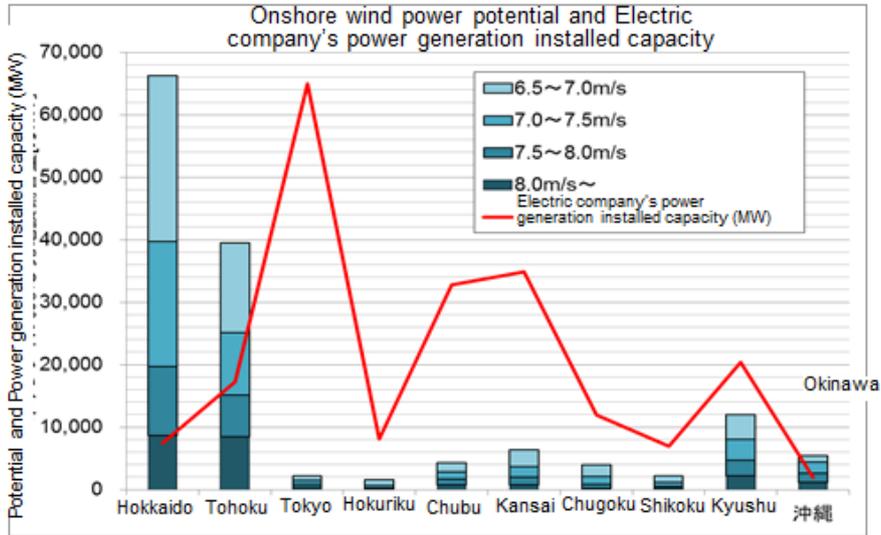


Fig.4 Potential of onshore wind power capacity in each region of Japan (Source : JWPA)

Fig.5 shows additional and cumulative installation of PV solar power comparing Germany and Japan. Japan gave away its world's top ranking to Germany in 2004 as single fiscal year and in 2005 as cumulative capacity. And, its gap further expanded in subsequent years and Japan stays world's 4rd ranking in cumulative capacity at the end of 2012. However, in 2013, PV solar market is dramatically changed in Japan and Germany because of policy change of renewable energy regarding FIT scheme. Fig.6 shows annual volume of domestic shipments of PV cell & modules in Japan. In FY 2012, industrial and business based shipments of PV dramatically increased because of FIT scheme started in July 2012.

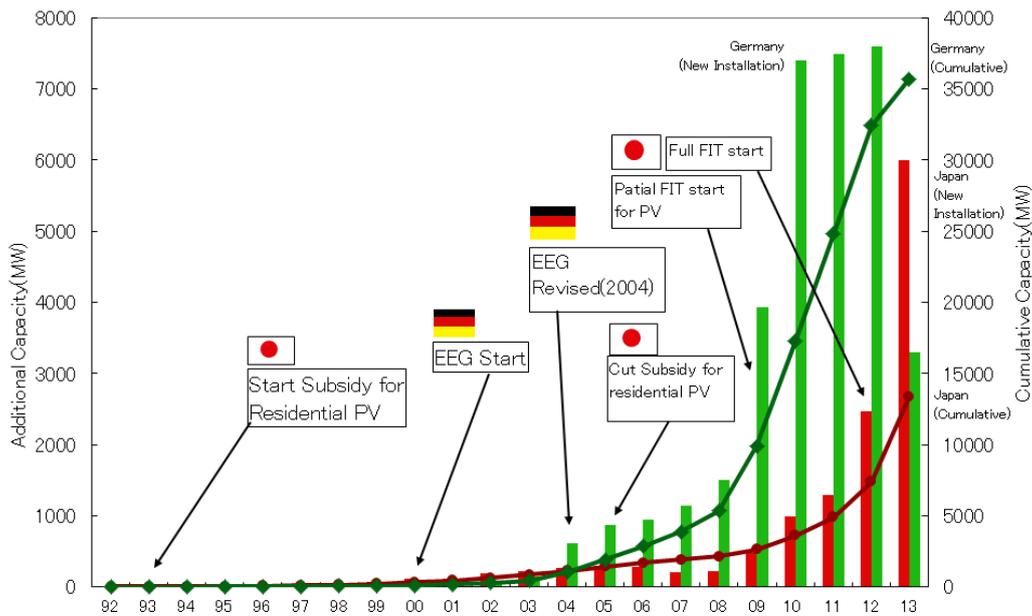


Fig.5 Additional and cumulative capacity of PV solar comparing Germany and Japan (Source: ISEP)

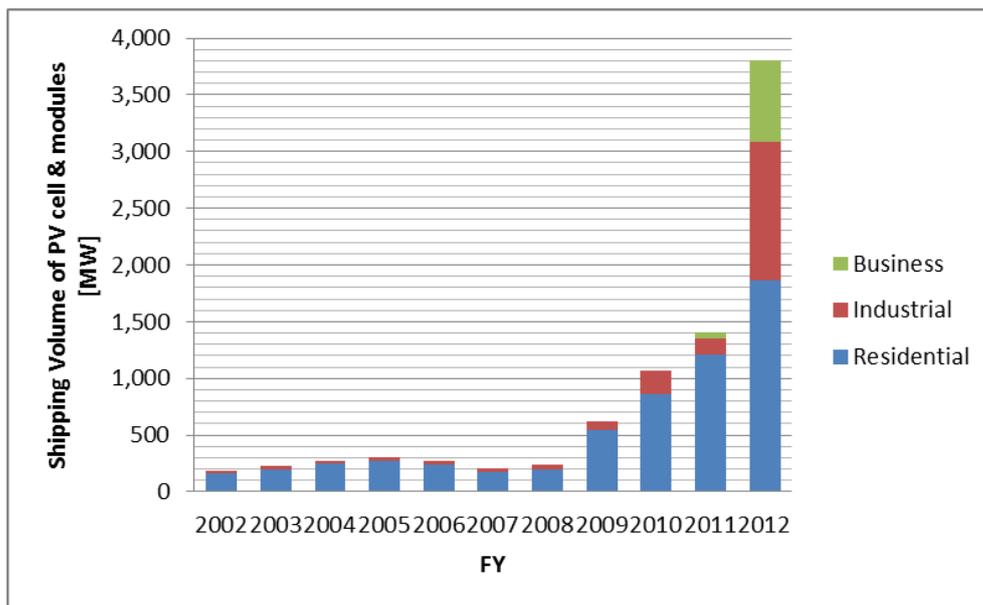


Fig.6 Annual volume of domestic shipments of PV cell & modules in Japan (Source: JPEA)

The situation of geothermal power has been facing the absence of newly installed facilities since 2000, although renovation has been carried out to some facilities. Its installed capacity remained 540 MW at the end of FY2012.

For small hydroelectric power (less than 10MW output), the number of new installed equipment has been low, and its growth has only increased by about 197 MW in 23 years, but in recent years installation of less than 1MW power output equipment has been developing. Biomass power generation has been growing with the spread of power generation making use of general waste and industrial waste, but in recent years particularly installation of wood biomass power generation, has seen a fairly large increase.

Fig.7 shows annual power generation by renewables of each year, which was partly estimated from cumulative installed capacity and capacity factor of each renewable energy source excluding large hydro. However, power generation of geothermal has real data of each power station. And power generation of wind is related to RPS data until FY2011. Fig.8 shows ratio of power generation including all kinds of energy sources including private electric generation in Japan. Ratio of thermal power generation by fossil fuel reaches 88% in FY2012 contrasted with under 2% of nuclear power generation and 10% of renewable energy including large hydro.

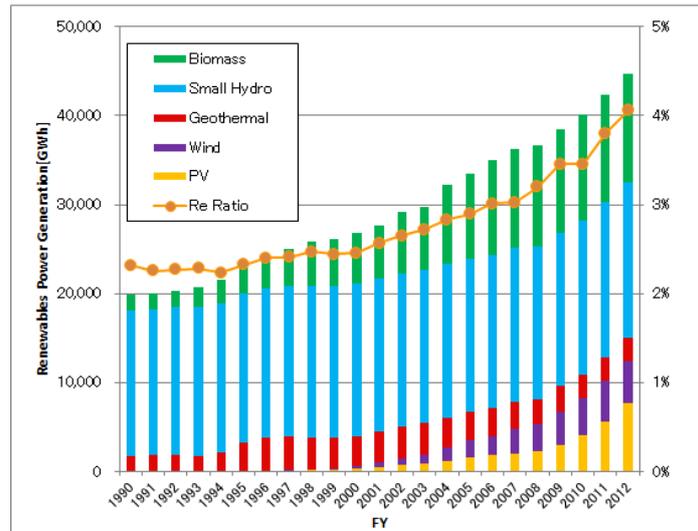


Fig.7 Renewables Power Generation in Japan (Source: ISEP)

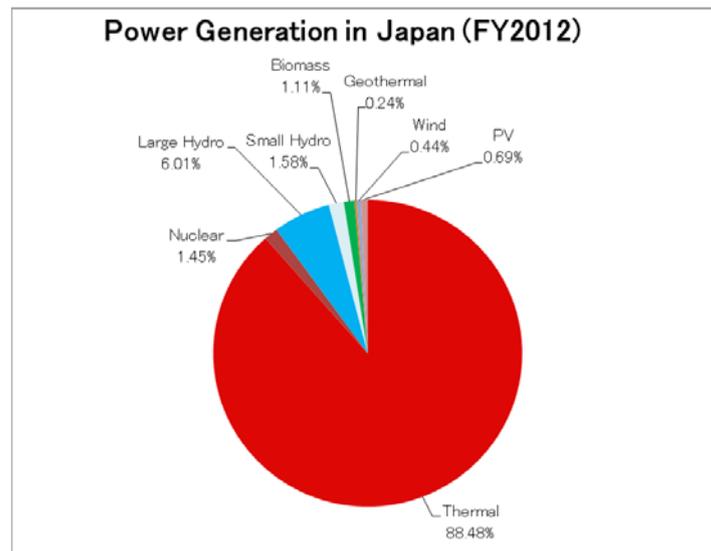


Fig.8 Ratio of power generation in Japan (Source: ISEP)

While FIT policy, which started in July 2012, is expected to encourage installation capacity and increase considerably renewable energy, especially solar power, in 2013, these trends focuses on the situation of renewable energy sector until the end of FY2012. At the end of October 2013, the Capacity of certified power equipment had exceeded 26.2 GW (24.5 GW is from solar power) and 5.9 GW (5.7GW is from solar power) has already started to operate as shown in Fig.9 [5].

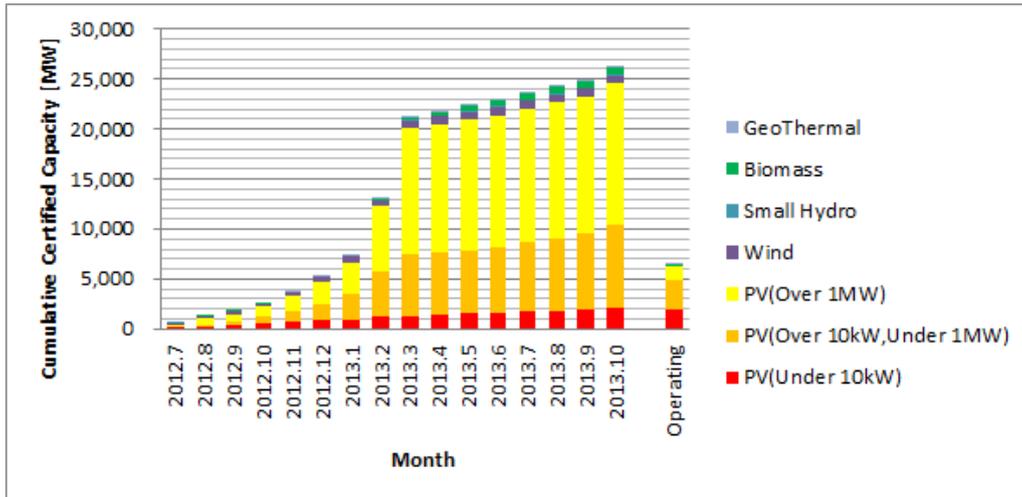


Fig.9 Cumulative certified and operating capacity by FIT scheme in Japan

Indicator for Renewable Energy based on sustainable regions

Renewable energy accounts for only 4% of the total domestic primary energy supply in Japan. It is important that the nation will continuously increase the number of regions where sustainable development by renewable energy is possible. The first step is to evaluate each region at both a municipal and prefectural level in order to discover sustainable regions with large amount of renewable energy.

A study of “Sustainable Zone” has revealed the trends and current status of renewable energy supply by region in Japan every year since 2007[6]. The proportion of renewable energy in the region is an effective indicator of the sustainability of the region. By evaluating past records of utilizing a variety of renewable energy including solar, wind, small-scale hydro, geothermal, and biomass as an indicator, it will become possible to evaluate and further develop the sustainability of the region, which could not have been grasped well solely by economic indicators. Fig.10 shows self-sufficiency in electricity by renewable energy in each prefecture of Japan. 10% of electricity supply is covered by renewable energy in 10 prefectures of Japan. And, in the regions of about 50 municipalities, 100% or more renewable energy is supplied by comparison with their municipal energy demand (both power and heat, excluding industrial energy).

