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ENERGY POLICY IN JAPAN; INTRODUCTION OF FEED IN TARIFF SYSTEM FOR ENHANCING RENEWABLES AND CONSIDERATION OF TOTAL ENERGY BALANCE

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Overview

Every country in the world, policies to introduce renewable energy are commenced and the existing generation plants and transmission systems should be reinforced or renovated depending on the degree of introduction of renewable energy. Of course, new investment becomes necessary and demand-side measures on electricity utilization should be introduced depending on each country's condition. When the preferential system for generation of renewables such called "Merit system" is introduced, then unstable condition of energy supply will inevitably appear. Especially on existing generation plants, which use fuels of coal, natural gas, oil or the plans of nuclear power, the profitability should be reduced. Therefore, the optimal composition of generation powers' share of fuels should be considered on each country including Japan. At the same time, political guidance and future target should be announced by the government, when substantial amount of renewable energy supply is prepared and available.

In Japan, for enhancing the introduction of renewable energy, Feed in Tariff system had been introduced since 2012. After introduction of this FIT system, remarkable increase of renewable generation, especially on PV, was emerged. Generation amount on PV increased 8.5 times more from 2012 to 2017. The ranking of PV generation in the world countries became on 6th in 2012 to 3rd in 2017. Japan's PV generation in 2017 is following the ranking of China and US, which occupy large unproductive land.

The world pioneering countries of introduction of renewable energies, such as Germany, Spain and Italy, are all far less PV generation compared with Japan. But the introduction of rapid expansion of PV is causing a lot of issues.

At first, power purchasing price under FIT system in Japan can continue maximum 20 years. Power purchasing cost on each year starting is accumulated and coming to the burden of power consumers. At present FIT cost is coming to almost 10% addition to ordinary monthly payment and the cost charged to all citizens. So, all power consumers have to pay additionally on each month and the payment is still increasing yearly.

In Japan, government introduced as the FIT systems, five different types of renewables such as PV, Wind, Small Hydro, Biomass, and Geothermal and fixed price payment system was prepared on each of them. But people who hope to participate on renewable energy business concentrated on PV which investment cost is lower and possibility of prompt and easier instalment of generation systems is high. Introduction of PV is the most preferable system for the investors of renewables. So, the concentration of investment on PV happened and more than 90% of introduction of renewables had been on PV. But the time of PV generation concentrated on daytime and generation amount depends on climate condition. The diversification of renewables generation hour is impossible especially on PV. In some areas in Japan, to stop the transmission of generated power by PV happened, because during day time, generated amount surpassed the power consumption.

Considering the burden of power consumers' FIT payment, government decided substantial reduction of FIT purchasing price, especially on PV. FIT purchasing price on PV in 2012 was at per KWh 40 yen, and in 2018 reduced to 18 yen on above 10 kW to 2,000 kW system. Above 2,000 kW PV generation, bidding system was introduced in year 2017. Those trends of FIT purchasing price reduction and modification of regulations are commonly happened same as in European countries.

Only considering the introduction of PV, there are so many issues to be discussed. The amount of introduction of renewables are heavily depending on the design of regulations and also incentives or amount of subsidy for renewables. Therefore, it is very important to precisely consider the condition and possibility of renewables introduction comparing with the existing generation systems. And also, the view from technology progress, possibility of cost reduction, innovation, international economic and political condition, cost of existing conventional power plants and so on.

Methods

The data of generation on each FIT system in Japan are collected and analysed. Those data on FIT system are compared with the data of existing power plants, such as coal, natural gas, and oil and nuclear. Historical generation data are analysed from the view of total generation power in Japan. And also, the generation trends under FIT system must be evaluated and impacts not only on generation but also on the view of total energy consumption in Japan should be examined. This analysis relates to the studies how to prepare the regulation and systems of introduction of PV, wind, geothermal, biomass and so on. Those Japan's data analyses can be compared with the data in Europe and other countries. Optimal total energy balance in Japan and other countries are also discussed based on the analysis of above-mentioned data analysis.

Results

Several forecasts published from the organizations or companies, such as OECD IEA, US DOE EIA, BP, Shell, ExxonMobil, and so on. There are several possibilities of introduction of renewables, and this means the possibility of utilization are considerably depend on the introduction of renewables. If priority of generation is distributed to renewables, then the possibility of utilisation of conventional power plants which use coal, natural gas, oil and nuclear are limited utilization. What is discussed in Japan about possibility to introduce renewable energy can be evaluated and mentioned in this report.

It is very clear that depending on the conditions and locations, possibility of utilization of renewables can be decided. The conditions mean the differences of weather, climate, temperature, geographical location, condition of natural resources reserves, population, density of population, geological conditions such as mountainous, and enough water supply, windy and so on. The size of country is considered to be very important factor to decide the amount of renewable energy introduction. It is definitely difficult for Japan to do same as US and China, and also it is not easy to do same as Denmark, because the size of electricity consumption in Denmark is less than 5% of Japan.

Conclusions

FIT system's success and fail in Japan are analysed and mentioned and the implication of introduction of FIT system is mentioned in this report. On PV introduction, due to possibility of quick installation of PV panels, if there are enough space to install, so the expansion of areas of PV generation can be rather easily expanded. As for wind power, it depends on the wind blowing condition, so in the offshore wind installation is targeted in several countries. But in Japan, areas of shallow beach are very limited, almost all offshore wind are depending on the floating system. Cost of offshore floating systems is very high. So, compared with the countries facing to the shallow water of North Sea, such as Germany, UK, Norway, Japan's possibility to install offshore wind is limited. As for biomass, Japan's forest resources are rich and covering the area of over 60 percent of total land in Japan by the woods, but utilization of woods are sometimes not easy task, because of steep slope of mountain areas. About the geothermal, compared with the Philippines, Indonesia and other countries which have rich resources of geothermal energy, possibility to utilize Japan's geothermal resources are limited, especially due to shortage of ground water supply. As for small sized hydropower, compared with large size hydropower, contribution to increase generation amount is limited.

The important thing what people should understand is, consideration of the volume and amount of energy consumption in one country. There is the necessity to understand the size of power generation and also contribution of conventional generation plants using coal, natural gas and oil. To substitute the role of those conventional plants by renewables will take a lot of time. Therefore, based on the projections targeting 2030 or 2050, evaluation of the potential of possibility of renewable energy utilization under the time frame will become the key to future prospect estimation not only in Japan but also other countries.

References

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