

# A COMPARATIVE ANALYSIS ON THREE DIFFERENT SUPPORTING METHODS TO EXPAND RENEWABLE ENERGIES IN JAPAN

Yoshiki Ogawa, Toyo University, Phone +81-3-3945-4736, email: y-ogawa@toyo.jp

## Overview

After the adoption of Kyoto protocol in 1997, in Japan, the expansion of renewable electricity has been focused to a great extent by using the supporting systems such as the green certificate system (started from 2001), the RPS (renewable portfolio standard) system (started from 2003) and the FIT (feed-in tariff) system (started from 2012). The partial FIT system for surplus solar electricity in the residential sector also introduced from 2009 in addition to the RPS system. In the past 20 years, we have experienced so many happenings and troubles related to the introduction and expansion of renewable energies.

In December 2015, the Paris agreement on post Kyoto GHGs reduction was finally approved by many countries including various developing countries. In May 2016, Japanese Government has authorized the new target of GHGs reduction to achieve 26% reduction from the emission level in 2013 up to 2030. In addition, Japan need to intensify her GHGs reduction measures, because she already agreed 50% (or 80%) reduction of GHGs in 2050 in the long-run.

Thus, the reasonable increases of electricity by renewable energies will be one of quite important options as an effective GHGs reduction measure. In this paper, we would like to arrange merits and demerits by making a comparative analysis on three different supporting methods adopted in Japan for the sake of expanding renewable energies furthermore.

## Methods

First, we would like to survey historical changes in the increases of electricity generated by renewable energies and developments on three above-mentioned supporting methods, after entering in the 2000's. We especially would like to discuss what kinds of renewable energies were expanded by three different supporting methods, respectively.

Second, we would like to check the players' structure in the activities to expand renewable electricity by using three different supporting methods, respectively. We would like to classify merits and demerits of these supporting methods. We also would like to discuss what kind of system is suitable from the viewpoint of increasing renewable electricity and what kind of system is suitable from the view point of PPP (public and private partnerships).

Finally, we would like to summarize several conclusions of this paper.

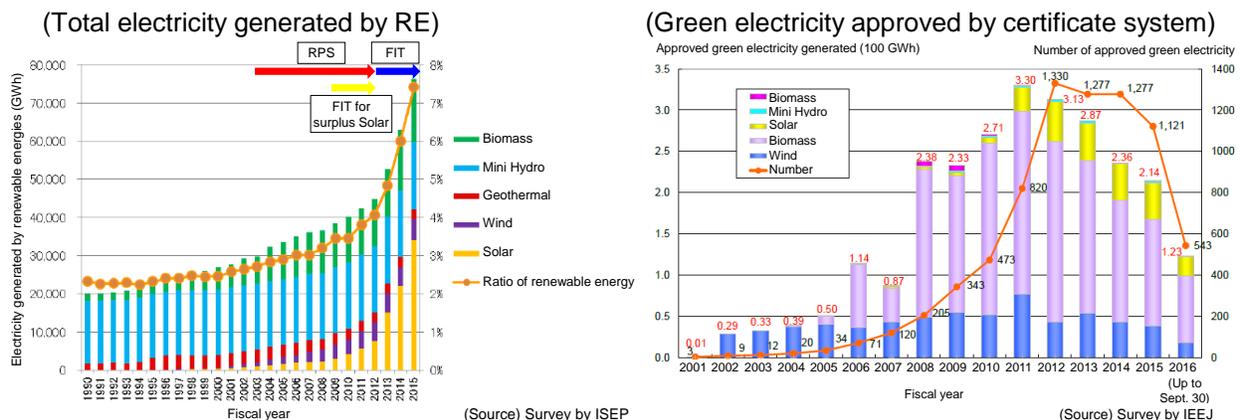


Fig. 1 Increases of electricity generated by renewable energies through RPS, FIT and green certificate

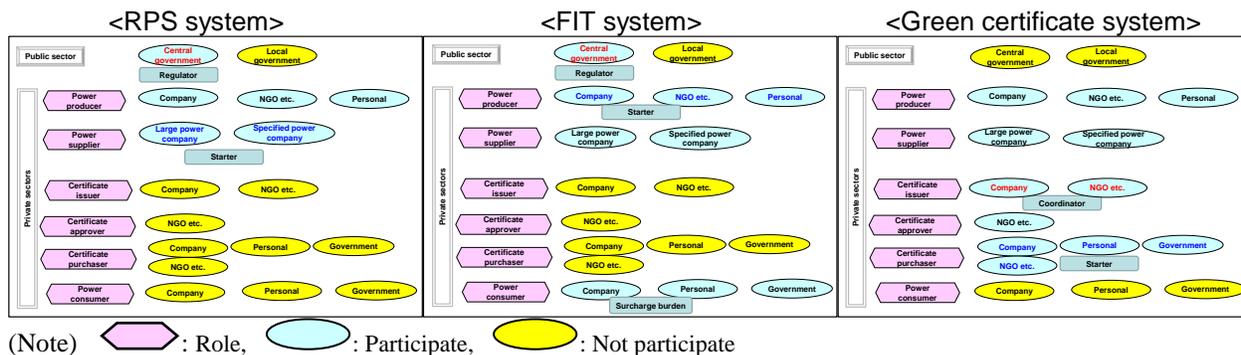


Fig. 2 Players' structure in the three different supporting systems of renewable electricity

## Results

The increases in renewable electricity in the past 25 years from 1990 are shown in the left-hand side of Fig. 1. Because of the starting of RPS system in 2003, the electricity generated by biomass and wind increased largely, but the electricity generated by solar was not always increased so much. After 2009 when the partial FIT system for surplus solar electricity was introduced, the electricity generated by solar was increased largely. Thereafter, by the starting of whole FIT system, the electricity generated by solar was rapidly increased in earnest.

On the other hand, the green certificate system was already introduced as early as 2001. This system is a kind of voluntary system in the private sector, and thus this system has no obligation by the government. The changes in approved green electricity generated by renewable energies are shown in the right-hand side of Fig. 1. The size of renewable electricity approved by the green certificate system is lower than one tenth of the size of that generated by the RPS or FIT system. The renewable electricity approved by the green certificate system increased up to 2011, but thereafter, they reduced largely because of the introduction of FIT system.

The players' structures of the activities to expand renewable electricity under the three different supporting methods are shown respectively in Figure 2. Though the regulator is the central government as for both of the RPS and FIT systems, the starter of renewable electricity activities is power supplying companies in the case of RPS and on the other hand it is power producing companies in the case of FIT. The players' structure of the activities under the green certificate system is quite different from that of two other systems. The participants under the green certificate system expand more widely and the advertisement effects are induced by using the green certificate.

## Conclusions

Considering from the viewpoint of rapid and drastic expansion of renewable electricity, it would be concluded that the FIT system is the most suitable. Considering from the viewpoint of gradual and systematic expansion of renewable electricity, it would be concluded that the RPS system is the most preferable.

On the other hand, considering from the viewpoint of PPP (public and private partnerships), participants widely expanded and induced advertisement effects, it would be concluded that the green certificate system is the most excellent. Three different supporting systems have individual merits and demerits discussed in this paper. We should pursue reasonable and effective improvements for the future by taking excellent merits of other systems.

## References

- (1) ISEP [2016], "Present status on natural energies in Japan observing from statistical data – Electricity part," the Institute for Sustainable Energy Policies, August 2016.
- (2) IEEJ [2016], "Historical changes in approved electricity by the green certificate system," the Institute of Energy Economics, November 2016.
- (3) METI [2016], "Detail system design for the revision of FIT system," Distributed material, the 16th Meeting of Committee for renewable energies, June 2016