

Priority Subjects — **Establishment of Optimal Risk Management**

# Analysis for Energy Saving and Environmental Policy – A Harmonized View of Economic Rationality and Energy Security

### Background and Objective

Electricity saving activities were eagerly enhanced when Japan experienced serious electricity shortages after the Great East Japan Earthquake in 2011, and there is high expectations for the popularization of renewable energy through the introduction of the feed-in tariff. However, the continuity of electricity saving activities and cost effectiveness of FIT have not yet been fully investigated. As for global warming

countermeasures, there will be discussions on voluntary and sustained improvements by the Federation of Economic Organizations and others, and on introduction of emissions trading. This research project aims to provide empirical findings on electricity saving, renewable energy and global warming countermeasures in view of economic rationality and energy security, and to contribute to the establishment of appropriate policies.

### Main results

#### 1 Surveys on electricity saving activities after the Great East Japan Earthquake

In order to analyze the electricity saving activities after the Great East Japan Earthquake, we conducted questionnaire surveys targeting households and firms in the summers of 2011 and 2012 (Y12023) (Y12026). In the Kansai region, where a governmental target electricity demand target reduction was introduced, the actual

reduction rate and implementation rates of saving measures rose, while in the Tokyo region, where the Electricity Saving Order was abolished, those rates decreased (Fig. 1). In general, however, electricity saving activities are persisting to a large extent. The intention of companies to save electricity in the future was also strong (Fig. 2).

#### 2 Estimation of additional costs for Japan's renewable electricity support policies

This study examined purchased output and total output from 2003 to 2012 under the renewable energy support policies—RPS, photovoltaic (PV) FIT, and FIT—that have been implemented in Japan (Y12034). Additional costs are the costs derived by subtracting variable costs (such as fuel expenses of power-generation departments made redundant due to purchasing) from total purchases of renewable energy. Comparing

2012, around the time when FIT began to recover costs, and 2010, we see that while total purchased output only doubled, additional costs swelled more than five-fold (Fig. 3). This is due to the fact that implementing PV-FIT and FIT has raised the purchase price of PV and expanded purchase targets to include existing facilities.

#### 3 Case studies on Voluntary Action Plans (VAPs) conducted by comprehensive Japanese business associations

According to interviews with relevant individuals in selected business associations, we verified the role of VAPs and their substantial impacts. Through activities based on the VAPs, industrial associations underwent periodic reviews, which are useful to obtain in-depth information on energy use, the replacement of facilities, and other business activities across the whole industry. Such information was not merely collected, but also distributed among

member companies and utilized to improve individual activities, especially for those of large enterprises. Our interview data also suggested that VAP have at least modest impacts in terms of facilitating the behavior of small and medium-sized enterprises, who, in general, face difficulties improving energy efficiency due to lack of both capital and labor resources. Our major findings are reported in a book titled “Voluntary Actions for Mitigating Climate Change”.

#### 4 Post-2020 international regime for addressing climate change

COP17 decided that, by 2015, parties shall decide on a new climate regime applicable from 2020. We have examined preceding studies on long-term mitigation scenarios and new frameworks the parties proposed (Y12012). We found that some recent studies show scenarios which have a higher range of emissions levels for the first half of the century but

still contain the temperature increase beyond pre-industrial level within approximately two degrees Celsius. We also find parties have divergent views, which we categorized as international obligation, pledge and review, and historical responsibility, and we consider convergence of these into one as being difficult (Table 1).

Other reports: (Y12035)

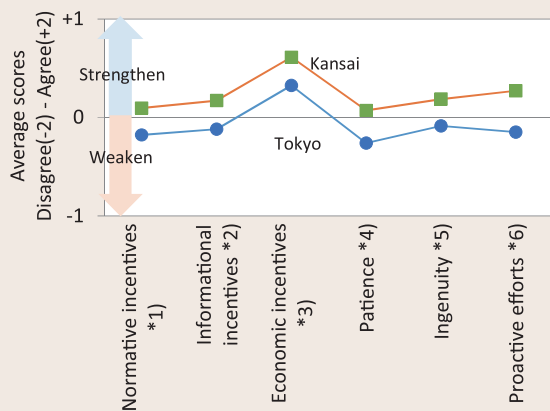


Fig. 1: Change of electricity saving activities in household from summer 2011 to summer 2012

In the Kansai region, motivation and activities for electricity saving in households intensified in summer 2012 compared with 2011. On the other hand, in the Tokyo region, only economic incentives increased due to the rise in electricity rates, while normative and informational incentives decreased. Patience in summer 2012 was either less intensified or around the same as in 2011.

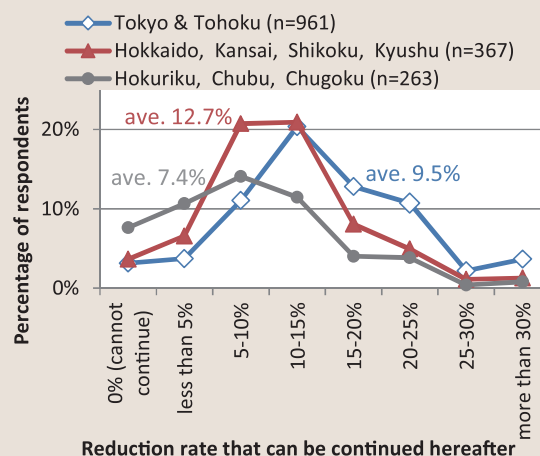


Fig. 2: Intention of companies to continue saving electricity

We asked companies how much reduction of electricity could be continued if saving electricity was required, but without numerical targets set by the government. Responses varied by region. Maintaining a 7% to 12% reduction was considered to be possible. Note that activities and reduction rate of electricity saving can be affected by requests from the government and utilities, thus the result here does not necessarily show a reduction rate that is likely to be achieved in the future.

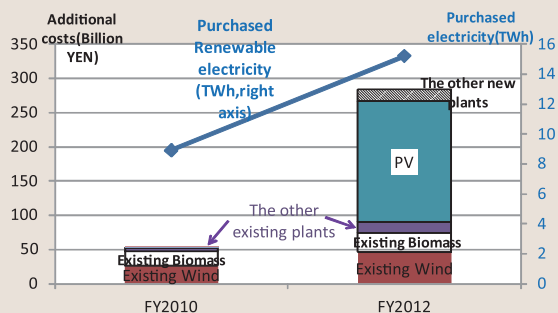


Fig. 3: Comparison of total purchased electricity and additional costs in FY2010 and FY2012

Parties have divergent views that we categorized as international obligation, pledge and review and historical responsibility. We analyzed conflicting points of (1) whether the dichotomy of developed and developing countries should be maintained or revised and (2) whether parties' mitigation efforts should be determined internationally or domestically, indicating that convergence is difficult.

Table 1: Three typical views addressing the Post-2020 international framework on climate change

With the launch of a feed-in tariff (FIT - July, 2012), together with a renewable portfolio standard (RPS-2003) and a photovoltaic FIT (November, 2009), three renewable electricity support policies have temporarily coexisted in Japan. Total purchases and additional costs in 2010 when only RPS was in effect were 8.9TWh and ¥52.0 billion, respectively. Meanwhile, PV-FIT began in 2011 and FIT in 2012. Purchased output and total additional costs in 2012 were 15.2TWh and approximately ¥280.0 billion. In short, comparing 2010, when only RPS recovered costs, and 2012, when both PV-FIT and FIT were in effect, purchased output doubled while additional costs swelled more than five-fold.

Category	View
International Obligation (EU, small island Developing States, etc.)	Cap each countries' emission so that global temperature does not increase more than 2 degrees Celsius. Revise the dichotomy of developed and developing countries, and allocate caps according to each countries' capability and politics.
Pledge and Review (US, Japan, Russia, etc.)	Voluntary pledge targets/approaches and review them internationally. Revise the dichotomy of developed and developing countries, and allocate caps according to each countries' capability and politics.
Historical Responsibility (China, India, Saudi, etc.)	Emphasize on emission after the industrial revolution and stricter cap on developed countries. Developing countries lower emission with assistance of developed countries. Maintain the dichotomy of developed and developing countries.