

Summary

Study of Basic Zoning Information Concerning Renewable Energies (FY2012)

The introduction of renewable energies is important not only as a countermeasure for global warming but also from such viewpoints as establishing energy security, developing autonomous and scattered energy systems and creating new industries and jobs. For this reason, the Ministry of the Environment (MoE) conducted the Study on the Potential for the Introduction of Renewable Energies (hereinafter referred to as the “Potential Study”) in FY 2009 and FY 2010 to estimate the abundance as well as introduction potential of various types of renewable energies (non-residential use of PV power, individual buildings, etc. of PV power, wind power, small and medium-scale hydropower and geothermal power) and their possible introduction amount by different scenarios with a view to developing basic data for the examination of viable measures to introduce and spread the use of renewable energies in the coming years as well as preparing basic zoning information.

The present work involved the refinement, re-estimation and updating of the basic information on introduction potential and zoning in the preceding two years. In addition, it entailed survey of the introduction potential of solar heat and geo-heat, etc., and appropriate presentation of the results in order to promote the understanding and convenience of using and introducing renewable energy among citizens, public authorities and businesses, etc.

1. Re-estimation, etc. of the Introduction Potential of Each Type of Energy

Upon rearranging the concepts of such terms as “reserves,” “introduction potential” and “possible introduction amount by scenario,” re-estimation was conducted on the introduction potential, etc. Also, methods were examined with a view to refinement concerning small and medium hydropower and geothermal power generation.

(1) Re-estimation of the Introduction Potential of PV Power Generation for Residential Use, etc.

Based on data from past surveys, building classifications were partially reviewed and the introduction potential was re-estimated. As a result, the introduction potential was estimated as 185.18 million kW. As for the possible introduction amount by scenario, this was estimated for the scenarios indicated in Table 1 using the reviewed panel prices and area-separate generating coefficient. As a result, the possible introduction amount by scenario was estimated as 6.17~38.96 million kW.

Table 1 Setting of Scenarios, etc. in Re-estimation of the Introduction Potential of PV Power Generation

Category	Output capacity and panel price	Scenario 1	Scenario 2	Scenario 3	Remarks
1. Detached housing and small commercial facilities (※1)	Less than 10kW 427,000 yen/kW	30 yen/kWh 10 years	35 yen/kWh 10 years	40 yen/kWh 10 years	Last year the price was set at 350,000 yen/kW.
2. Categories other than the above(※2)	10kW or more 280,000 yen/kW	30 yen/kWh 20 years	35 yen/kWh 20 years	40 yen/kWh 20 years	

※1 The project condition in category 1 has been set at PIRR $\geq 0\%$. Concerning the used electricity, it is assumed that the regular electricity tariff is applied. Concerning the power that is left over following the excess purchasing period, project feasibility has been set at 20 years upon assuming that it has value equivalent to the avoidable cost.

※2 The project condition in category 2 has been set at pre-tax PIRR $\geq 4\%$.

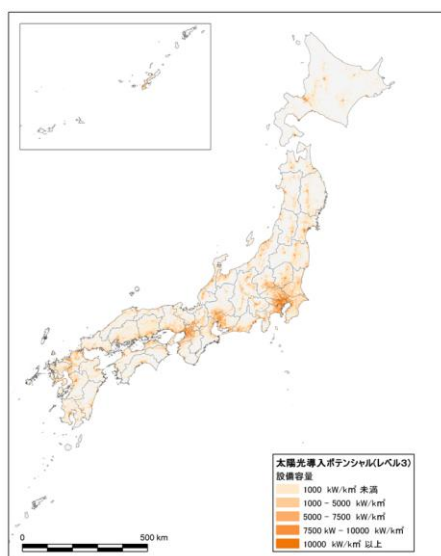


Figure 1 Results of Re-estimating the Introduction Potential of PV Power Generation for Residential Use, etc.

(2) Re-estimation of the Introduction Potential of PV Power Generation for Public Use, etc.

The category of “public buildings” was added to “Non-residential PV power generation” from past surveys, thereby giving a new category of “PV power generation for public use, etc.” The introduction potential was estimated using the power generation coefficient in each area. As a result, introduction potential of 146.89 million kW was estimated. Concerning the possible introduction amount by scenario, as a result of conducting estimation upon setting the area-separate generation coefficient and cost of using building roof space, it was estimated as 11.31~105.53 million kW.

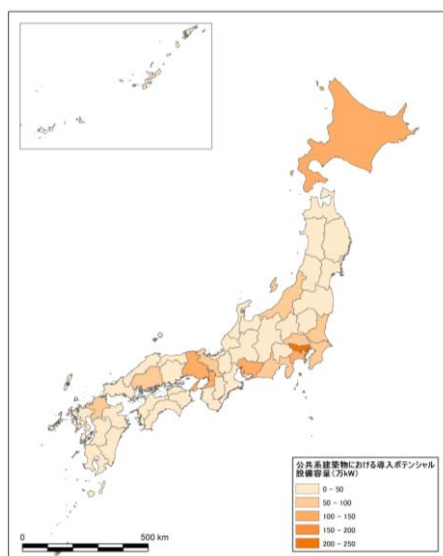


Figure 2 Results of Re-estimating the Introduction Potential of PV Power Generation for Public Use, etc.

(3) Re-estimation of the Introduction Potential of Onshore Wind Power Generation

The reserves of wind power were estimated in reflection of the Tohoku region wind conditions maps compiled by the Ministry of Environment in fiscal 2011 (as opposed to the wind conditions map used in past surveys). As a result, reserves were estimated as 1,343.10 million kW. The introduction potential was estimated as 267.56 million kW upon altering altitude (1,000m or more →1,200m or more), setting the aboveground opening (less than 75°) and updating regulatory data (natural parks, etc.) with respect to the conditions of development unfeasibility. Because wind power generation facilities became eligible for environmental impact evaluation from October 2012, the possible introduction amount by scenario was estimated as 47.81~203.42 million kW upon adding the environmental impact evaluation cost.

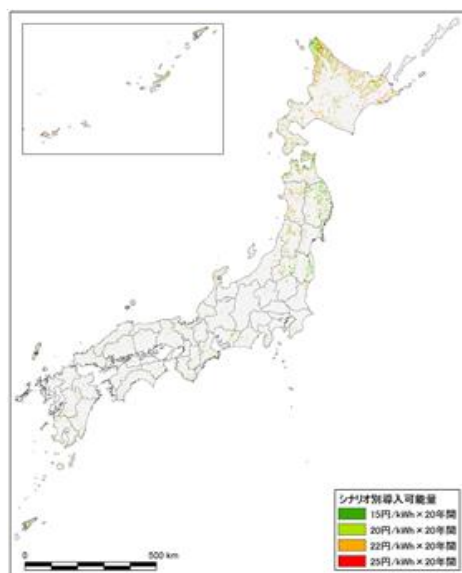


Figure 3 Results of Re-estimating the Introduction Potential of Onshore Wind Power Generation

Table 2 Setting of Scenarios, etc. in Re-estimation of the Introduction Potential of Wind Power Generation

Category	Installation Cost (※1)	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Onshore Wind Power Generation	250,000 yen/kW	15yen/kWh 20 years	20yen/kWh 20 years	25yen/kWh 20 years	30yen/kWh 20 years
Marine Wind Power Generation	600,000 or 800,000 yen/kW	22yen/kWh 20 years	25yen/kWh 20 years	30yen/kWh 20 years	35yen/kWh 20 years

※1 : Installation cost for Onshore Wind Power Generation includes initial expenses , road construction and installation of transmission lines. For Marine Wind Power Generation, it includes all expenses for projects (Floating Type equivalent) .

(4) Re-estimation of the Introduction Potential of Marine Wind Power Generation

As for the introduction potential, the basic introduction potential is defined as ‘wind velocity 6.5m/s more and non exclusion of islands’ and the conditional introduction potential is defined as ‘wind velocity 6.5m/s more and exclusion of islands’ and ‘wind velocity 6.0m/s more and exclusion of islands’, and then they were estimated. As a result, the conditional introduction potential of each 1,062.89 million kW, 1,303.33 million kW were estimated. Assuming two scenarios of the possible introduction amount, the project unit costs (Floating Type equivalent) were set as 600,000 yen/kW and 800,000 yen/kW. As a result, the possible introduction amount by scenario was estimated as 14.92 to 791.96 million kW in 600,000 yen/kW case.



Figure 4 Result of Re-estimating the Introduction Potential of Marine Wind Power Generation (the Basic Introduction Potential)

(5) Re-estimation of the Introduction Potential of Geothermal Power Generation

The basic introduction potential and the conditional introduction potential were set as shown below and were estimated. As a result, the basic introduction potential was estimated as 2.33 million kW, and the conditional introduction potential 1 was estimated as 5.34 million kW, and the conditional introduction potential 2 was estimated as 8.48 million kW.

- the Basic Introduction Potential : Non National / Quasi-National Park, Non Slant Drilling
- the Conditional Introduction Potential 1 : Non National / Quasi-National Park, Slant Drilling
- the Conditional Introduction Potential 2 : National / Quasi-National Park, Non Slant Drilling



Figure 5 Result of Re-estimating the Introduction Potential of Geothermal Power Generation
(Over 150°C,the Basic Introduction Potential)

2. Examination Geared to Refinement of the Introduction Potential

As for Small and Medium-Scale Hydropower and Geothermal power, methods were examined with a view point to refining issues from past surveys.

(1) Examination Geared to Refinement of the Introduction Potential of Small and Medium-Scale Hydropower Generation

Methods were examined with a view to arranging and refining issues from past surveys. Specifically, the following activities were conducted: 1) analysis and review of equipment capacity in a virtual power plant, 2) verification of the calculated values obtained up to last year (calculation of correction coefficient), 3) examination for explaining the feasibility of micro hydropower in the local area, and 4) examination for identifying “promising sites.”

(2) Examination Geared to Refinement of the Introduction Potential of Geothermal Power Generation

Methods were examined with a view refining the geothermal power generation resources density map. Specifically, the following activities were conducted: 1) arrangement of issues from past surveys, 2) examination of methods with a view to refining the geothermal power generation resources density map, 3) collection and arrangement of related data, 4) examination of analytical algorithm, and 5) examination on analysis and verification in specific areas. As a result, in estimating the introduction potential of geothermal power generation, the impact of the gravity base depth was found to be great.

3. Estimation of Introduction Potential for Solar Heat and Geo-Heat

In this study, the heat demand map was compiled from the data set for individual buildings, etc. and the introduction potential for solar heat and geo-heat was estimated while taking care not to make an excessive estimate in consideration of the supply and demand characteristics for heat.

(1) Compilation of a Nationwide Heat Demand Map

Utilizing the corrected data sets for individual buildings, etc. and the base units of heat demand by area and use, the heat demand was calculated and the nationwide heat demand map was compiled.

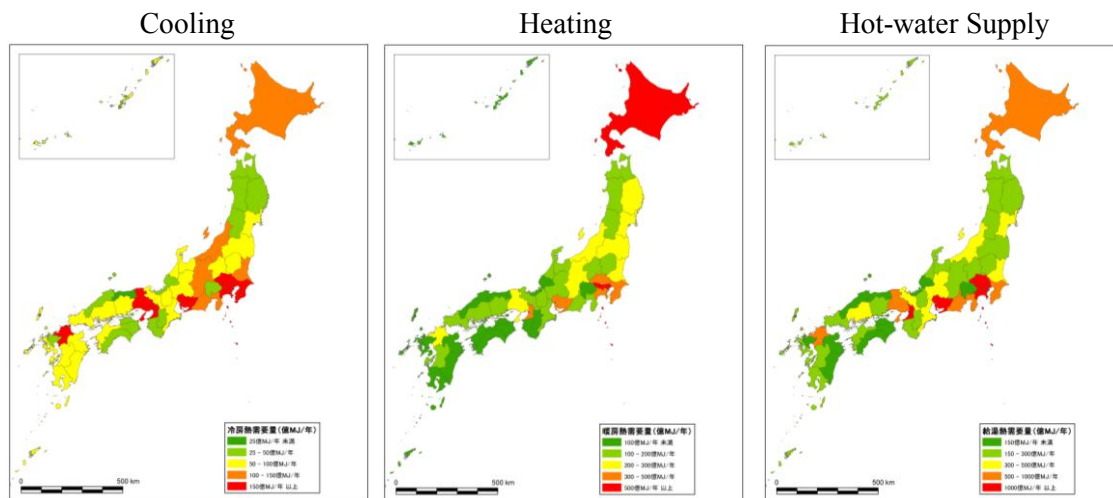


Figure 6 Nationwide Heat Demand Map

(2) Estimation of Introduction Potential for Solar Heat

The estimation preconditions (installation coefficient, etc.) were set and the introduction potential map for solar heat was compiled.

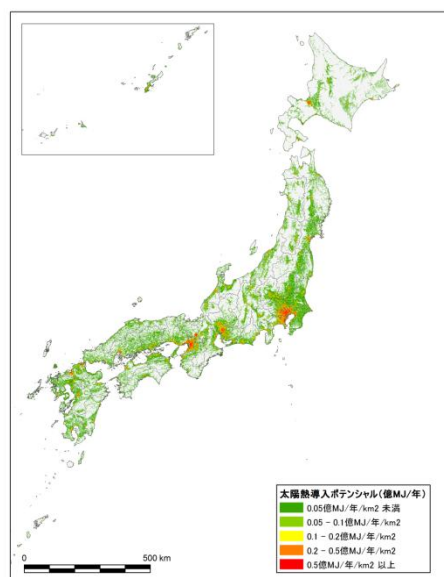


Figure 7 Introduction Potential Map for Solar Heat

(3) Estimation of Introduction Potential for Geo-Heat

The estimation preconditions (feasible heat acquisition area, etc.) were set and the introduction potential map for geothermal power generation was compiled.

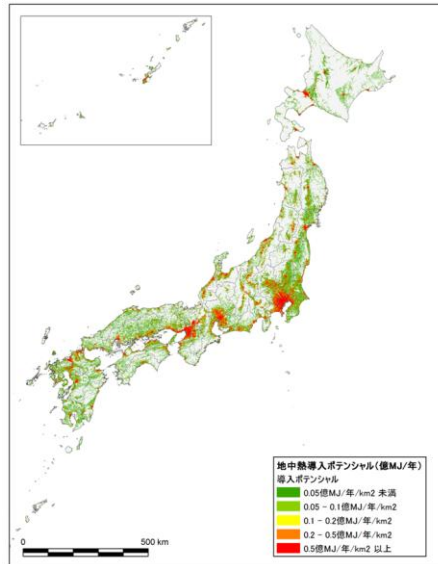


Figure 8 Introduction Potential Map for Geothermal Power Generation

4. Other Work

As for other work, the results of past potential surveys were arranged, renewable energy introduction potential maps (GE version) were compiled and updated, basic zoning information maps (PDF version) were updated, and prefectural maps and spreadsheets in units of municipalities were compiled. Also, a window for responding to inquiries concerning this study was established and operated and a list of FAQs was compiled.