

Entrusted Work Concerning the Development and Disclosure of Basic Zoning Information Concerning Renewable Energies and Study on Actual Performance Pertaining to the Introduction of Renewable Energy Systems (FY 2016)

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, in an effort to create basic data for the introduction and spread of renewable energies in the coming years, the Ministry of the Environment (MoE) conducted the Study on the Potential for the Introduction of Renewable Energies in FY 2009 and FY 2010 and the Development of Basic Zoning Information in FY 2011 through FY 2015, thereby estimating the abundance as well as introduction potential of renewable energies (non-residential use of PV power, use of PV for individual buildings, wind power, small and medium-scale hydropower, geothermal heat, solar heat and underground heat) and their possible introduction amounts by different scenarios and developing basic zoning information.

In this work, the information so far developed regarding renewable energies is rearranged for its disclosure on the MoE Home Page. The study also examined a method to study the actual performance pertaining to the introduction of renewable energy systems so that the information obtained by such a survey can be effectively used in the future. By doing so, the study aims at enhancing the understanding and convenience of people, local public entities, business operators, etc. regarding the use and introduction potential of renewable energies, promoting the introduction of renewable energies and contributing to countermeasures for global warming.

1. Development of Basic Zoning Information on the Use of Underground Heat (Heat Pump)

“Information on a method to use deep underground heat”, “information related to a hydrological environment map” and “information related to the study on abundance of underground water in FY 2009” was sorted to provide reference data for examination of the introduction of a heat pump to use underground heat. In regard to “information on a method to use deep underground heat”, GIS data was arranged featuring “the scope of applicability of a method to use deep underground heat” and “the relevant depth to the deep underground”. In addition, information on projects to which a method to use deep underground heat would be applicable was sorted. For “a hydrological environment map”, GIS data was arranged featuring “the plan by depth of hydrological head” and “the planar distribution of underground temperature”. In regard to “information related to the study on abundance of underground water in FY 2009”, GIS data was arranged featuring “the estimated underground table by 1 km mesh (Excel data)” along with PDF data for “a report for the optimization of underground water utilization”.

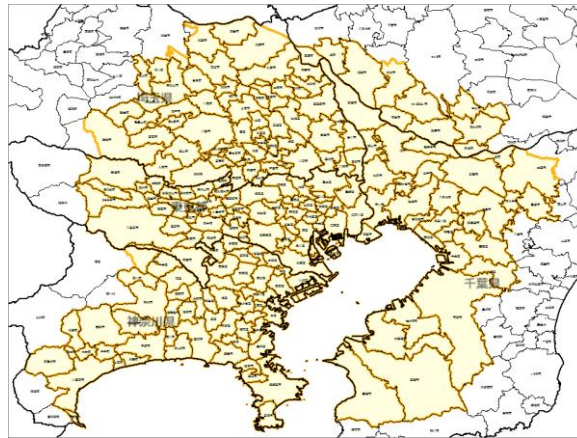


Fig. 1 GIS data for the subject area for a method to use the deep underground heat (Article 3) (Tokyo Metropolitan Area)

2. Design and Construction of a Potential Analysis Tool Pertaining to Small and Medium Hydropower Generation

(1) Definition of Requirements

The role required of a potential analysis tool pertaining to small and medium hydropower generation (hereinafter referred to as “an analytical tool”) was examined and the functional requirements (Table 1) and non-functional requirements were defined.

Table 1 Functional Requirements of Examined Analytical Tool

Category	Functional Requirements
Data Read	Reading of data which is necessary for the analytical tool
Transfer/Enlargement/Reduction	Display of an arbitrary range on an electronic map by means of transferring, enlarging and reducing the map
Display/Non-Display	Switching between data display and non-display
Search	Search and display of basic zoning information for small and medium hydropower from the electronic map using arbitrary search criteria
Browsing of Attribute Data	Browsing of information on the attributes at an arbitrary site in relation to basic zoning information for small and medium hydropower
Measurement	Measuring of a distance or difference in elevation (head) between several points
Estimation	Estimation of the potential introduction value (installed capacity) when an intake point and discharge point are set at arbitrary positions on a river and small hydropower generation is developed between these two points based on the discharge and head between them
Printing	Printing of basic zoning information and results of the estimation of a potential introduction value
Storage	Storage and calling up of the state of work in progress

(2) Examination of the Specifications of Analytical Tool

Based on the definition of the requirements, the ① software configuration, ② selection of the software, ③ functional specifications, ④ data configuration and ⑤ distribution method were examined and the basic specifications were finalized.

(3) Design and Development of Analytical Tool

Based on the examination results of the necessary specifications, an analytical tool was designed and developed.

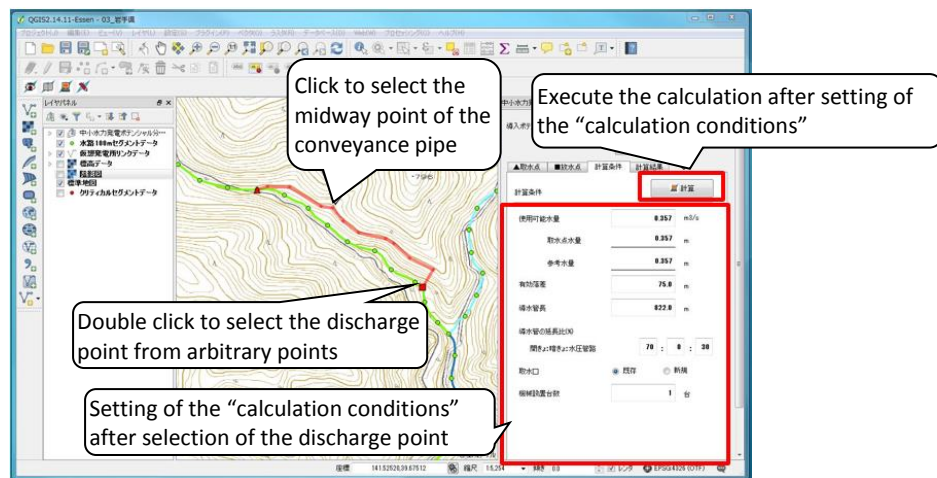


Fig. 2 Display of an introduction potential simulation exercise (selection of the discharge point and calculation)

(4) Evaluation of Relevance of Analytical Tool

A series of interviews was conducted with knowledgeable persons for the purpose of evaluating the relevance of the analytical tool and the results were reflected on the analytical tool as required.

3. Disclosure of Basic Zoning Information, etc. Concerning Renewable Energies

(1) Examination of Disclosure Method

While incorporating the latest data to the information disclosure pages prepared in FY 2015, work was conducted to review the configuration of individual pages and menu items from the viewpoint of ensuring "easy access to map display pages" and "improvement of the visibility of each menu". The file formats of the data providing information (Shape, KML and PDF) were examined to match the ability of users to utilize the provided information and data based on each format was developed.

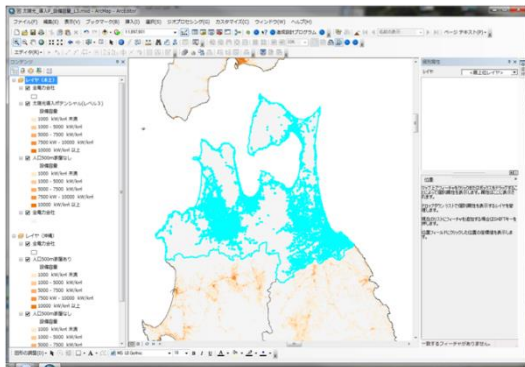


Fig. 3 Developed data based on the Shape format

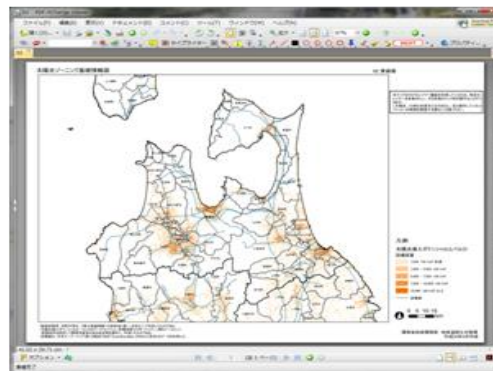


Fig. 4 Developed data based on the PDF format

(2) GIS Data and Preparation of Spreadsheet

Based on the Shape format files prepared in the past, a spreadsheet by type of renewable energy and by municipality was prepared in the form of Excel file (Table 2). In addition, a data list (PDF format) was prepared, sorting out the method to use the zoning information and other matters.

Table 2 Spreadsheet for Potential by Type of Renewable Energy and by Municipality (Excerpt)

市町村 コード	市町村	太陽光			陸上風力		中小水力(河川部)		地熱						太陽熱			地中熱	
		導入ポテンシャル	導入ポテンシャル	導入ポテンシャル	賦存量	導入ポテンシャル	賦存量	導入ポテンシャル	地熱資源量 蒸気フラッシュ 基本 150以上	地熱資源量 バイナリー/ 基本 120~150	地熱資源量 バイナリー/ 基本 120~180	導入ポテンシャル 蒸気フラッシュ/ 基本 150以上	導入ポテンシャル バイナリー/ 基本 120~150	導入ポテンシャル バイナリー/ 基本 120~180	導入ポテンシャル	導入ポテンシャル	導入ポテンシャル	導入ポテンシャル	
		千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW	千kW
北海道																			
1101	札幌市	600	1,746	2,268	9,195	542	18	15	123	3	7	122	3	7	39	45	46	551	
1202	函館市	151	444	579	4,246	494	16	16	0	0	0	0	0	9	11	11	97		
1203	小樽市	71	206	268	2,110	105	3	3	0	0	0	0	0	4	5	5	48		
1204	旭川市	195	574	748	2,151	164	5	5	0	0	0	0	0	13	15	15	123		
1205	室蘭市	53	157	204	599	22	0	0	4	0	1	0	0	3	4	4	38		
1206	釧路市	105	309	403	8,012	2,805	8	7	540	19	46	36	4	7	7	8	8	70	
1207	帯広市	103	300	391	1,077	27	30	29	0	0	0	0	0	7	8	8	71		
1208	北見市	82	241	314	7,661	3,067	4	4	0	0	0	0	0	5	6	6	55		
1209	夕張市	10	30	39	2,972	63	1	1	0	0	0	0	0	1	1	1	7		

(3) Preparation of GIS Data and Spreadsheet Download Pages

Both the PDF format file and Shape format file were made downloadable from the corresponding maps using the same mechanism applied to the KML format file. For the spreadsheet, a new page dedicated to downloading was created and the information on this spreadsheet was tidied. A feature was built in to enable the downloading of the Excel format spreadsheet by clicking on the link on the relevant page.

4. Study on Actual Performance of Introducing Renewable Energies

(1) Examination of Basic Principles for Study on Actual Performance of Introducing Renewable Energies and Study Method

The basic principles for the study on the actual performance of introducing renewable energies and the study method were examined, taking the opinions expressed by advisors at the general meeting into consideration.

(2) Examination of Measures, etc. to Utilize the Study Results

Measures (tentative) to utilize the results of the study on the actual performance of introducing renewable energies were examined from the viewpoint of the central government, prefectural governments, municipal authorities, business operators and people as well as from the viewpoint of the medium and long-term utilization of the said results.

Table 3 Utilization Measures (Tentative) of Results of the Study on the Actual Performance of Introducing Renewable Energies

Subject Body	Short-Term Utilization	Medium and Long-Term Utilization
Central Government (MoE, etc.)	<ul style="list-style-type: none"> • Establishment of the actual performance of renewable energies in total (FIT + self-consumption) • Dissemination and enlightenment by means of transmitting information on the state of introduction • Policy review • Transmission of information regarding sites, building conditions, etc. suitable for introduction 	<ul style="list-style-type: none"> • Setting of long-term target figures for introduction • Setting of a target introduction level by prefecture • Examination of incentives for the introduction of renewable energies for private power generation and heat utilization • Preparation of guidelines for the introduction of private power generation
Prefectural Governments; Municipal Authorities	<ul style="list-style-type: none"> • Establishment of the state of private power generation and heat utilization using renewable energies in the area of jurisdiction • Policy review 	<ul style="list-style-type: none"> • Formulation of a plan for private power generation and heat utilization using renewable energy • Planning of dissemination measures • Dissemination and enlightenment on private power generation and heat utilization using renewable energy by means of transmitting information on the state of introduction
Business Operators	• Utilization as cases for reference; utilization for a marketing strategy	
People	• Utilization for environmental education	

(3) Examination of Renewable Energy Systems Subject to the Study

Self-consumption type renewable energy systems which were involved in private power generation and utilization, the subject matters of the main study, were defined and the system requirements were set.

(4) Research on Existing Literature

The existing literature pertaining to the actual introduction of various renewable energy systems was obtained and sorted to determine how much of such information could be obtained. In addition, the volume of introduction of renewable energy systems utilizing a feed-in-tariff (FIT) was sorted by municipality. Following comments in interviews with knowledgeable persons that a list of delivery destinations could be obtained from private business operators selling products pertaining to self-consumption type renewable energy systems, a list was created containing information on business operators dealing with various renewable energies.

(5) Implementation of a Preliminary Study

In preparation for the main study scheduled to be conducted in the next fiscal year onwards, a study method was examined and planned. A preliminary study (questionnaire survey) was then conducted targeting prefectural governments and municipal authorities (total of 282 local public entities) for the purpose of verifying the relevance and effectiveness of the study method and study contents. Having discovered certain issues through this questionnaire survey, possible remedial measures to be adopted in the main study were examined.

(6) Understanding of Actual State of Introduction and Conditions for Introduction of Renewable Energies for Private Power Generation and Heat Utilization

Knowledgeable persons were interviewed on self-consumption type renewable energy systems used for photovoltaic power generation or the utilization of wood-based biomass heat so that geographical areas and building types offering strong potential for the dissemination of self-consumption type renewable energy systems in the coming years could be identified and visualized. Information pertaining to the actual state of introduction and conditions for the introduction of these systems was then sorted.