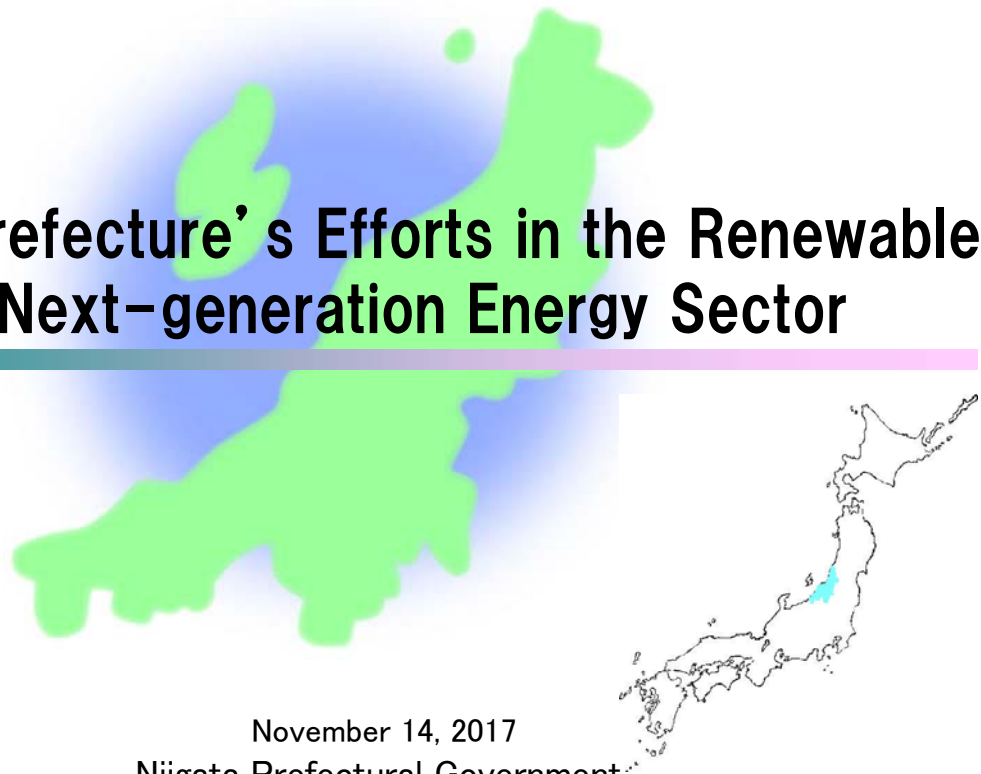


Niigata Prefecture's Efforts in the Renewable and Next-generation Energy Sector



November 14, 2017

Niigata Prefectural Government

Department of Industry, Labor and Tourism Industry Promotion

Promotion for Utilising Renewable, Next-generation Energy

Renewable energy-Electricity	Solar energy	<ul style="list-style-type: none"> • Able to produce the same volume of energy as the Pacific coast side 	<ul style="list-style-type: none"> ○ Prefecture-owned and operated Mega-solar ○ Privately owned Mega-solar site on prefectural publicly owned land ○ Promotion of the implementation of solar power for household use ○ Research of electricity stabilization measurements (EV reusable battery) 	<ul style="list-style-type: none"> ● Implementation of solar power energy for household use (¥22.6million in 2017, compared to ¥11.8million in 2016) ● Promotion of renewable energy such as solar power for Area Energy Network (¥5.3 million, new project) ● Continue to testify effect of electricity stabilization measure (¥650,000 in 2017, compared to 14.35 million yen in 2016) • Utilization of EV reusable battery
	Wind and Ocean energy	<ul style="list-style-type: none"> • Long coast line (suitable for ocean current and off-shore wind power generation) 	<ul style="list-style-type: none"> ○ Development and testing current power generation system ○ Awashima island was chosen as the nation's testing field ○ Testing of potential ocean current and off-shore power generation 	<ul style="list-style-type: none"> ● Promote of testing field use (¥40 million, new project) ● Holding a forum for wind power generation (including off-shore wind power) (¥500,000 in 2017, compared to ¥24.5 million in 2016)
	Geothermal power	<ul style="list-style-type: none"> • Nation's 3rd largest number of hot springs 	<ul style="list-style-type: none"> ○ Testing of potential geothermal power ○ Testing Binary geothermal power generation (Matsunoyama Hot springs) 	<ul style="list-style-type: none"> ● Promotion for the implementation of geothermal power generation • Testing Binary geothermal power generation (Itoigawa Hot springs)
	Hydro power, Micro hydro power	<ul style="list-style-type: none"> • Nation's 4th largest volume of hydraulic resources 	<ul style="list-style-type: none"> ○ Testing of potential micro hydro power ○ Prefecture-owned and operated hydro power generation (to secure and return the profit from selling electricity) 	<ul style="list-style-type: none"> ● Promotion for the implementation of micro hydro power generation • Agricultural water channels, dams, etc.
Renewable energy-heat	Snow Energy (Data center)	<ul style="list-style-type: none"> • Easy access from Metropolitan area to regions with heavy snowfall (in terms of location) 	<ul style="list-style-type: none"> ○ Data Center's survey for appropriate snowy regions ○ Land promotion project (Tsunan Town), Testing the effectiveness of snow energy 	<ul style="list-style-type: none"> ● Promote and educate on the effectiveness of snow energy (¥0 in 2017, compared to ¥10 million in 2016) ● Promote prospective sites for the Data Center
	Geothermal power	<ul style="list-style-type: none"> • Collection of related organizations and/or entities (products, excavation) 	<ul style="list-style-type: none"> ○ Support for education for related organizations and/or entities for diffusion of information ○ Promote for the implementation of geothermal energy system. 	<ul style="list-style-type: none"> ● Promote implementation of geothermal heating system (¥10.5 million in 2017, compared to ¥4.5 million in 2016) • Utilize the result from the monitoring

Research project for new energy

Development Direction as of 2017

- Promote efforts utilizing diverse local resources
- Promote area energy network of renewable energy
- Consider using next generation energy, **Hydrogen**
- Promote the use of next-generation energy, **methane hydrate**

- ◎ Support area energy network (¥5.3 million, new project)
- ◎ Testing the effectiveness of electricity stabilization (¥650,000 yen)
- ◎ Financial support for research and development (¥30.3 million, new project)
- ◎ Promotion of using testing field (¥4 million, new project)
- ◎ Formulate plan for diffusion of FCV (¥8.5 million, new project)
- ◎ Financial support for the development of Methane hydrate resources (5 million yen)

Solar energy <Promotion to use mega solar>

Niigata's Snow Country style Mega Solar [1MW]

- Operating since August 2010
- Niigata Prefecture and Showa Shell JV

The nation's first mega solar for commercial use



Proved that solar power generation can be used for business even in snow country

Directly owned and managed mega solar (Bureau of Public Enterprise) [21MW]

East Solar Power Plant

- System #1: 1MW (From October 2011)
- System #2: 1MW (From July 2012)
- System #3: 15MW (From July 2015)

Northern Niigata Solar Power Plant

- 4MW (From November, 2014)

Nation's first direct operation by Municipality and the largest scale!

Welcoming regional improvement



Utilization of prefecture owned land (Power generation business positions open to the public) [20MW]

Started operation in 2015

• Nakajo Chukaku Industrial Park : 10MW (From Sept. 2015)

Started operation in 2016

• 11 Choubu (Kita-ku, Niigata City) : 10MW (From Aug. 2016)

Notify the prospective sites for mega solar power generation system

As of August 2017, a total of 29 mega solar sites are in operation within the prefecture, generating 90MW (half [47MW] of which are operated or supported by the Prefecture)

Future Issues

● Stable electricity supply

● Solar energy systems are mostly on the Pacific side

● Buying price and assessment costs are uniformly set on the national-level

Make a suggestion to national government that how to keep the balance of implementation and discharging of liability of renewable energy

Utilization of EV reusable battery

Further research on reusable battery systems that reuse used batteries from Electric Vehicles, whose numbers are expected to increase.



Wind and Ocean Energy

Niigata's coastline is long: 330km



Ocean energy is highly valued as being one of the nation's high potential sources, and is actively promoted in Niigata as a local resource. This makes use of the prefecture's long coastline as one of its strengths.

2014 - 2015

Five parties agreement (November 2013)

Awashimaura Village

Niigata Prefectural Institute of Marine Energy

Awashimaura Fishery Assoc.

Nihon University

Niigata Prefecture

Selected as the nation's testing field in July 2014.



2014 - 2016

Development of ocean current generation system and field testing.

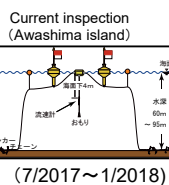


2014 (1st trial)
φ 0.5m variable pitch water mill



2016 (2nd trial)
Φ 1m variable pitch water mill

Testing Potential



(7/2017 ~ 1/2018)

Testing the Potential of off-shore wind power (2016)



Developed country in Off-shore wind power generation (Denmark)

2017

Promote to use the testing field

- PR for the testing field
- Process of attracting people to use the testing field.

Hold forum about wind power generation

National request for the strengthening of the system.

Snow Energy ▪ Geothermal Energy

Snow Energy

Up until now, snow has been thrown away in Niigata. Instead, the snow can become an energy resource used for cooling the data center. This allows us to undertake the establishment of the already cost competitive data center.

Niigata is one of the places with the heaviest snow fall in the nation

A survey/search for an appropriate area was conducted at 20 sites in 11 cities and towns. The 4 sites selected were: Uonuma City, Joetsu City, Tsunan Town, Tokamachi City

Project for the establishment of a Data Center which uses snow energy

The project to open up positions to the public in went ahead in 2015 (Tsunan Town)

[Project details (2015 to 2016)]

- Setting up snow energy supply system
- Provide data center with snow energy
- Consider the effectiveness of snow energy and its affordability.



[Ripple effect according to promote data center in Niigata]

- Good access from a metropolitan location to heavy snowfall areas
<Advanced in human resource training and easier DC Maintenance>
- Expecting more job opportunities and a population increase as a result of the establishment of the data center
 ⇒ As a step towards the future, realize the establishment of a data center that uses snow energy.
 (In parallel with the efforts made by the prefecture, setting up new data center using snow energy by private companies is underway in both Nagaoka City and Yuzawa Town.)

Geothermal Energy

- The number of geothermal heat energy pumps used in Niigata is the 7th greatest in the nation. (At the end of 2015)
- The price of the energy has been decreasing due to development of new technology, including those produced in Niigata.

Current issue: Initial cost is still quite high. New promotion measures were introduced in 2016.

Project details

- Partially subsidize expenses for household use of air-conditioning and hot water supply systems that use melted snow, including costs of equipment and system installation.

[Requirements for Subsidy]

- Will pay up to one-third of costs (Maximum 5 million yen)
- If the cost to purchase products and/or for ordering the installation of the system to companies in the prefecture is more than one-half of the implementation cost.
- Regular reporting on cost comparisons from one year before the system installation to one year after the installation will be required to be made to the prefecture.



Geothermal energy exchanger

Efforts towards other renewable energy sources

Micro-hydropower generation

- Micro hydro power generation can be implemented (less than 1,000kW) for a wide range of purposes; not only to rivers and dams but also agricultural water channels and sewage.
- Micro hydro power generation system have been used in 30 sites so far. There are also plans to use another generator at an agricultural dam.



Nation's 4th largest volume of hydraulic resources

Hydropower generation

- Utilizing the prefecture's abundant water resources, we operate 12 hydro power generation plants (maximum total output: 133,900kW)
 (source: Bureau of Public Enterprise)



Biomass (waste gas) power generation

- Implementation of a waste gas power generation system, which uses gas produced during sewage sludge processing as energy, done in a regional sewage treatment facility.
- Contributes to a reduction in the consumption of electricity by the facility. (Total costs are reduced by as much as 20-40%)



Nation's 3rd largest number of hot springs

Binary geothermal power generation

- Niigata prefecture conducted a survey to evaluate the possibility of implementation
 ⇒ Expected sites: 4 hot springs: 100°C
 Matsunoyama, Itoigawa, Senami, Muramatsu
- Validation testing at Matsunoyama hot spring (From 2010-2016. Rated power output: 50kW)
- Survey in Itoigawa hot spring (2015 and 2016)

First-time use of hot spring water under 100°C



Development of shallow Methane Hydrate

Ocean energy: Japan Sea Union for Resource Development & Promotion

The union was formed by 12 prefectures on the Japan Sea coast in order to accelerate the development of Ocean energy resources by utilizing the benefits of the Japan Sea and its regions. (Established in 2012)

Activities

- Organize meetings and forum with national government towards resource development and promotion
- Organizing activities to suggest and request to the national government.

Niigata Research Committee for Shallow Methane Hydrate

On September 2015, it was formed by companies, universities, and municipalities. (Currently approx. 40 organizations)

Regular meetings are held twice a month

- Conducted technical research in 2015
- Held an open forum in August 2016

Activities

- Form networks among member parties
- Share information regarding shallow methane hydrate
- Research and study the utilization of technology in Niigata for resource development

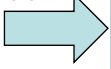
Goals

- Secure local profit
- Expected to become a commercial nucleus in the future after its commercialization

Back up the nation's survey to figure out the amount of resources



Conduct thorough research on methods and technology to suggest at the prefectural level.



As a Nation

- Survey for the amount of surface-layer shallow Methane Hydrate (From 2013 to 2015)
 - After conducting a wide area land survey, 1,742 gas chimney structures were found in which shallow methane hydrate possibly exists.
 - The volume of methane hydrate on one of Off-shore Joetsu site is estimated to be roughly 600 million cubic meters of methane hydrate.

Shallow Methane hydrate obtained from Gas chimney site at off-shore Joetsu, with a length of approx. 1.3 meter.

- Nation's response from now on
 - Research and study on shallow methane hydrate collection techniques
 - Research positions for collection techniques open to the public (scheduled from 2016 to 2018)
 - Investigation to prove the existence of shallow methane hydrate deposits

Subsidy for start-up and promote to nurture the new energy project

Objective · Goals

- Encourage companies in Niigata to start up the new energy sector which is expected to grow and create the new field in industry, and enhance economic growth in Niigata.
- Financially assist companies in Niigata in new energy product development, and to support research and development costs so that they can present their own products other manufacturers.
- To support costs for marketing surveys before product development in order to promote appropriate product development to meet market needs.
- Support pre-survey costs of investigating the environment before conducting empirical research (To help them work with companies in Niigata in the post survey development stage.)

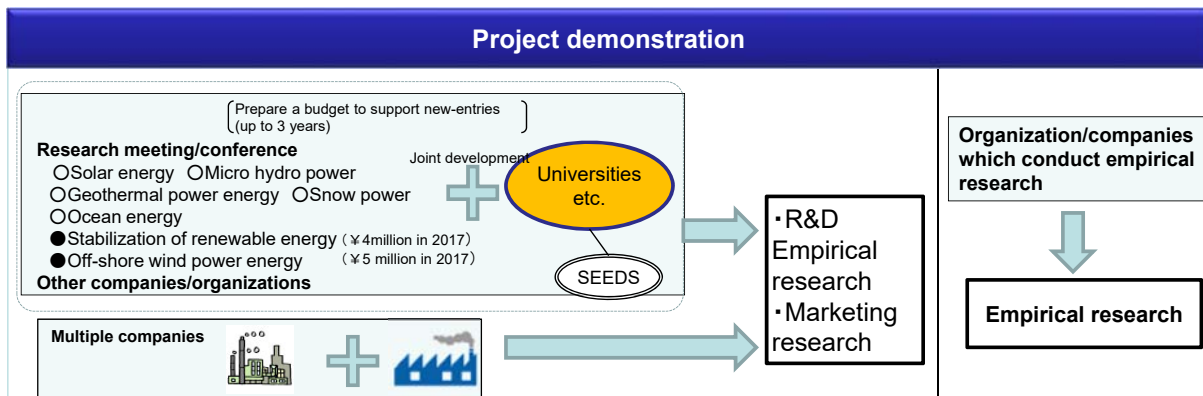
Project Outline

- Financial support for research and development, empirical research and surveys to encourage companies in Niigata to start and bring up a new energy industry sector.

[Parties to be subsidized]
Business owners/companies in Niigata which collaborate with universities, etc. Several companies including Niigata companies
Companies/organizations which conduct empirical research in Niigata.

[Costs to be subsidized]
Development costs (research and development, validation testing)
Research fee (e.g. marketing research, empirical environmental testing)

[Subsidy rate] Less than 50%(one-half)
[Maximum amount of subsidy] 5 million yen



Subsidy to promote the use of Renewable Energy Regions

Objective · Goals	Project Outline
<p>● Encourage local communities to undertake current issues, by making use of the advantages of renewable energy, that is, so-called decentralized energy. To promote and implement renewable energy in the local communities..</p> <div style="display: flex; justify-content: space-between; border: 1px solid gray; padding: 5px;"> <div style="width: 45%; border: 1px solid gray; padding: 5px;"> <p>If multiple communities start implementation together, each community is able to maintain stability.</p> </div> <div style="width: 45%; border: 1px solid gray; padding: 5px;"> <p>Effective utilization of renewable energy will become possible.</p> </div> </div>	<p>● Provide financial support in order to build a new system for energy production and consumption in each community. Support projects that will make use of resources particular to the region for implementation of renewable energy in local communities.</p> <p>[Parties to be subsidized] Private companies/organizations etc. [Percentage Subsidized] Up to 50% [Maximum amount of subsidy] ¥2.5 million</p>

Project demonstration

Plan

【Process e.g.】

- Hold meetings
- Review energy management
- Project planning
- Review community production/consumption models
- Field Research etc.

Fuel Cell Vehicle · Project for the promotion & spreading of hydrogen supply facilities

Objective · Goals	Project Outline
<p>● The country is currently undertaking the outfitting and promotion of hydrogen (fueling) stations (hydrogen ST), centered regionally around the 4 largest cities, and the dissemination of fuel cell vehicles (FCV) in Niigata Prefecture is at a stand-still.</p> <p>● As a result, there is a need for the prefecture to increase its energy self-sufficiency and promote its vehicle companies. We will thus undertake the promotion, development and dissemination of FCVs and hydrogen STs.</p>	<p>● To investigate the possible effects and significance in undertaking the dissemination of FCVs, and development and promotion of hydrogen STs on the prefectural level, while consulting with an outside expert and taking the prefecture's traits into consideration.</p> <p>● In addition, to determine a visionary plan which will become the pillar of policy development, we will hold a hearing for corporations within the prefecture about hydrogen fueling techniques, and conduct a simulation of FCV dissemination, among other things.</p>

Project Demonstration

Subjects for consideration

Prefecture Characteristics


- Dissemination of FCVs, promotion and implementation of hydrogen (fueling) stations, significance, results
- A hearing about use and application of hydrogen fueling techniques by corporations within the prefecture and their techniques.
- Simulation of dissemination of FCVs within the prefecture.

Vision plan for promotion and dissemination

Hydrogen Station (Presented by the Iwatani Corporation)

FCV

Procedures for dissemination



Thank you for your attention.