

Hydrogen Cluster in Japan

- Regional Activities to Promote Hydrogen -

26 March, 2019

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**New Energy and Industrial Techno
logy Development Organization (NEDO)**

Two Major H₂ Cluster in Japan

Fukuoka Hydrogen Strategy

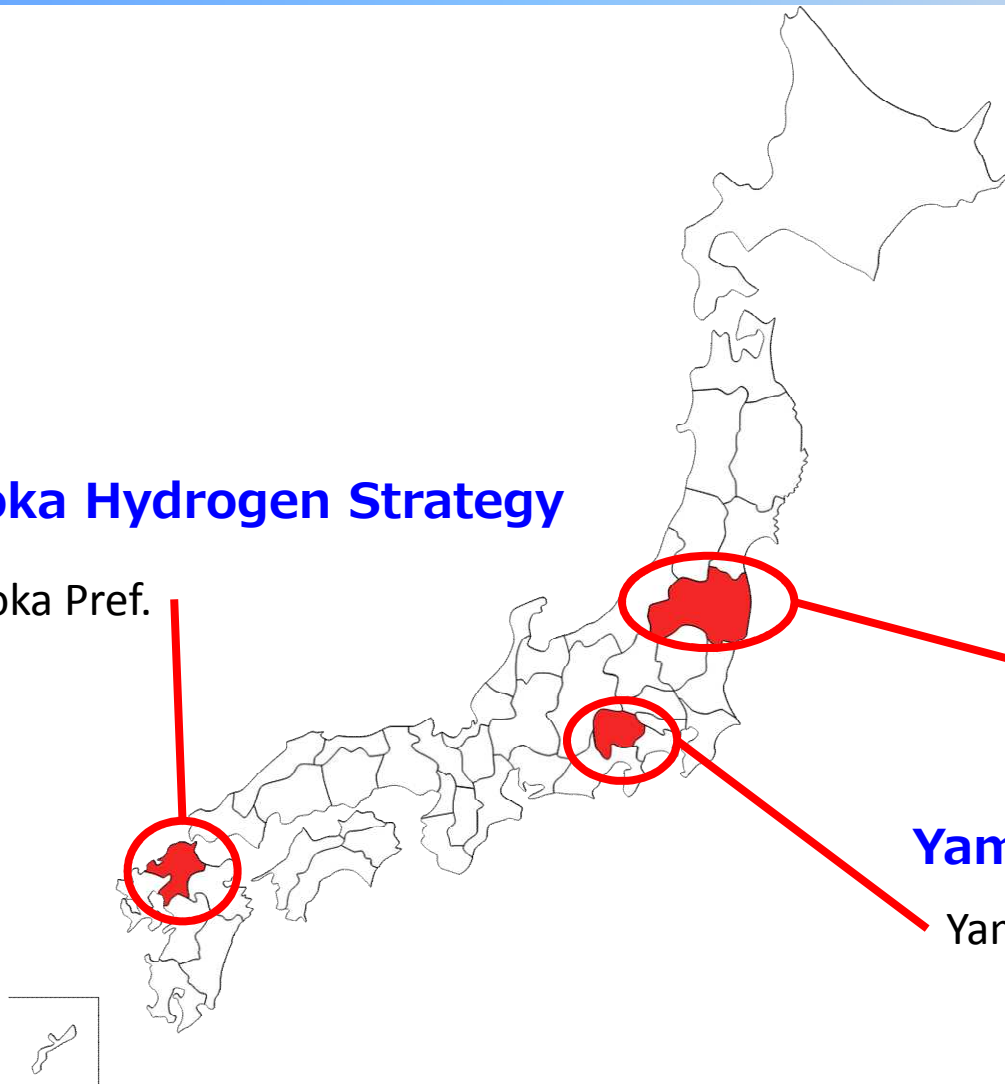
Fukuoka Pref.

Fukushima Plan for New Energy Society

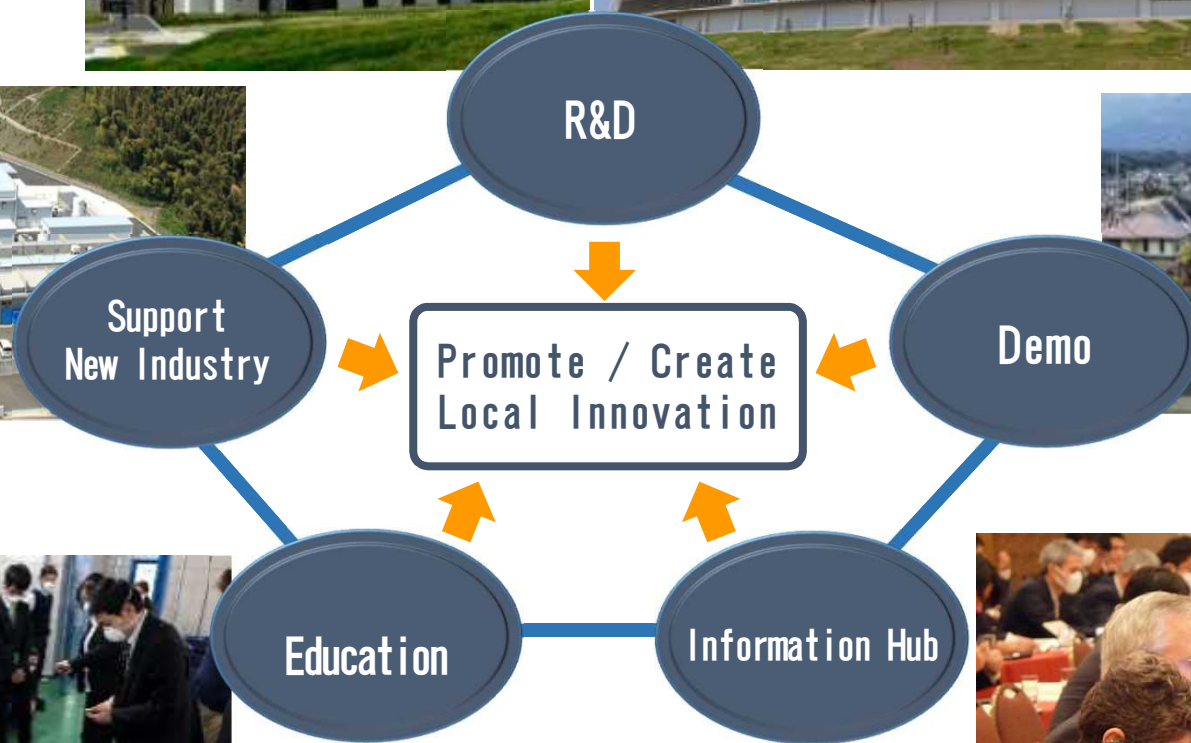
Fukushima Pref.

Yamanashi Fuel Cell Valley

Yamanashi Pref.



Key characteristics of “Fukuoka Hydrogen Strategy”



Hy-Life Project

Key characteristics of “Fukuoka Hydrogen Strategy”



- 2004.4: Hydrogen Technology Research Center
- 2006.7: Research Center for Hydrogen Industrial Use and Storage “HYDROGENIUS”
- 2010.12: International Institute for Carbon-Neutral Energy Research “I²CNER”
- 2012.1: Next-Generation Fuel Cell Research Center “NEXT-FC”



2009.3: Hydrogen Energy Test and Research Center “HyTReC”



Current Status / Topics

(1) Research and Development:

- Long life, anti-high pressure hydrogen seal, joint and equipment.
- Database: Character of material under high pressure

(2) Demonstration project

- Conducting several demonstration project such as;
 - Kitakyushu Hydrogen Town (H₂ supply through pipeline)
 - Energy interchange sing fuel cell in apartment house
 - Renewable energy derived hydrogen utilization project in automobile factory
 - Hydrogen production from sewage sludge

(3) Human resource development :

- More than 1,200 people since 2005

(4) Development of new industries:

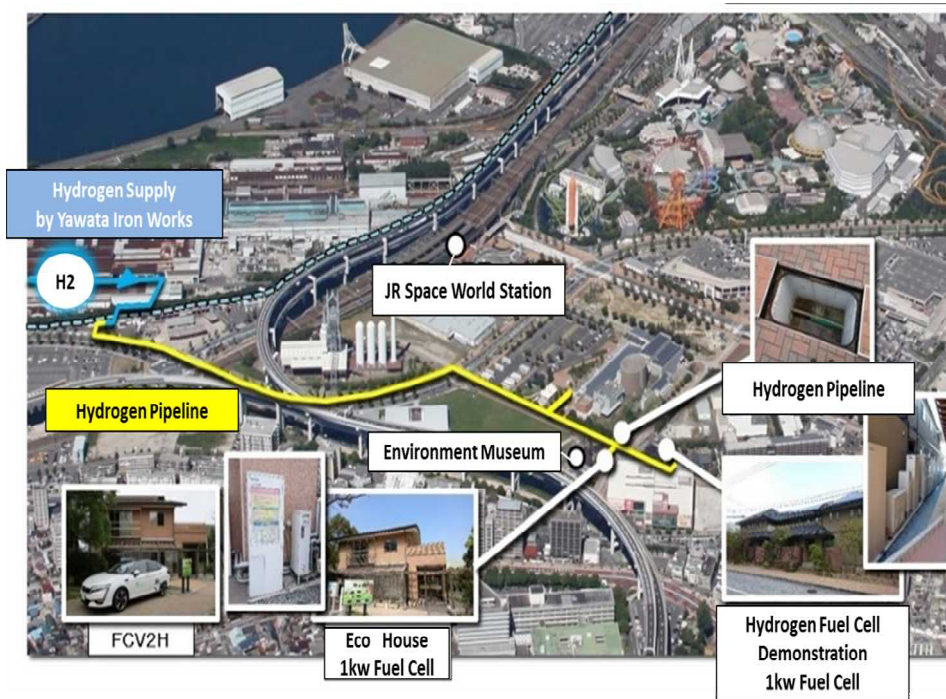
- Support local company product development (Hydrogen visualization sheet, stainless steel packing, hydrogen gas impurity analyzer, O-ring, etc.)

(5) Others: FCV, HRS

- FCV: 109, 10 Hydrogen Refueling Stations

Current Status / Topics

Demonstration project utilizing "local" hydrogen



From Steel mill

From Sewage



Yamanashi Hydrogen Energy Society Realization Roadmap

Efforts making the best use of Yamanashi’s characteristics such as the highest solar power potential in Japan, cluster of research institutes on hydrogen and fuel cells, through following three approaches;

- Expansion of use of hydrogen energy

Shown Yamanashi’s own introduction target

1,300 FCV, 10 FC-Bus, +2 HRS, 34,000 Enefarm (in 2030)

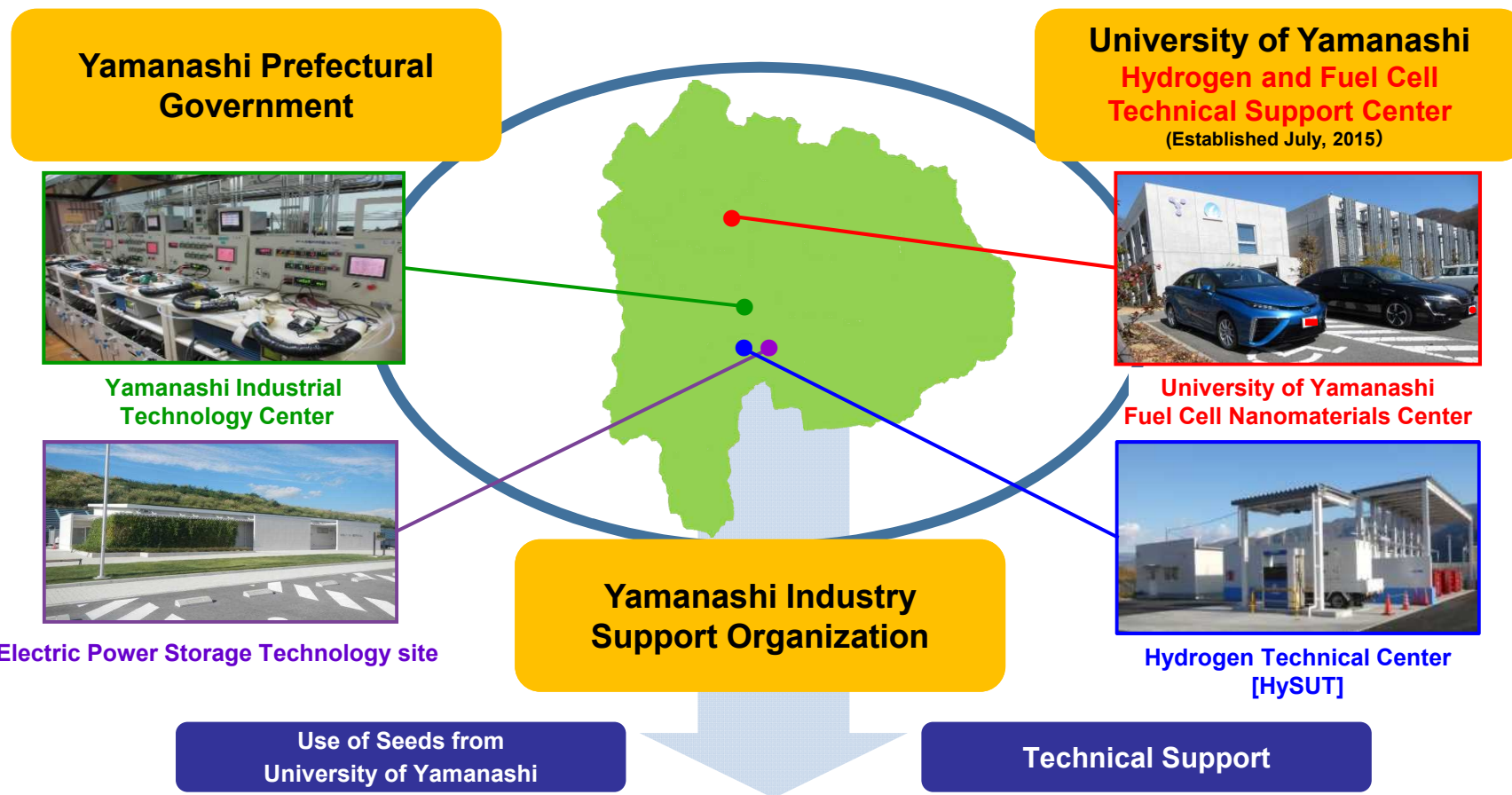
- CO2 free hydrogen supply chain construction

Promotion of PtG utilizing PV

- Promotion of hydrogen and fuel cell related industries

Yamanashi “[hydrogen fuel cell valley strategy](#)”

Key characteristics of “Yamanashi Fuel Cell Valley”



Contribute to the promotion of the hydrogen and fuel cell related industries !

(Expected outcome in 2030)

Sales amount 100 billion yen, 200 enterprises entering, 5,000 employees

Key characteristics of “Yamanashi Fuel Cell Valley”

Yamanashi University



2001.4: Clean Energy Research Center
2008.4: Fuel Cell Nanomaterials Center



2016.4: Fuel Cell Evaluation / Testing Facility
at Yamanashi Industrial Tech Center
2017.12: Hydrogen Technology Center for HRS



Current Status / Topics

(1) Research and Development:

- Improving R&D on analyzing / evaluation for PEFC
- New materials for PEFC (low-PGM catalyst, membrane, etc)

(2) Demonstration project

- Start new Power to Gas project (with 1.5 MW PEM electrolysis)

(3) Development of new industries:

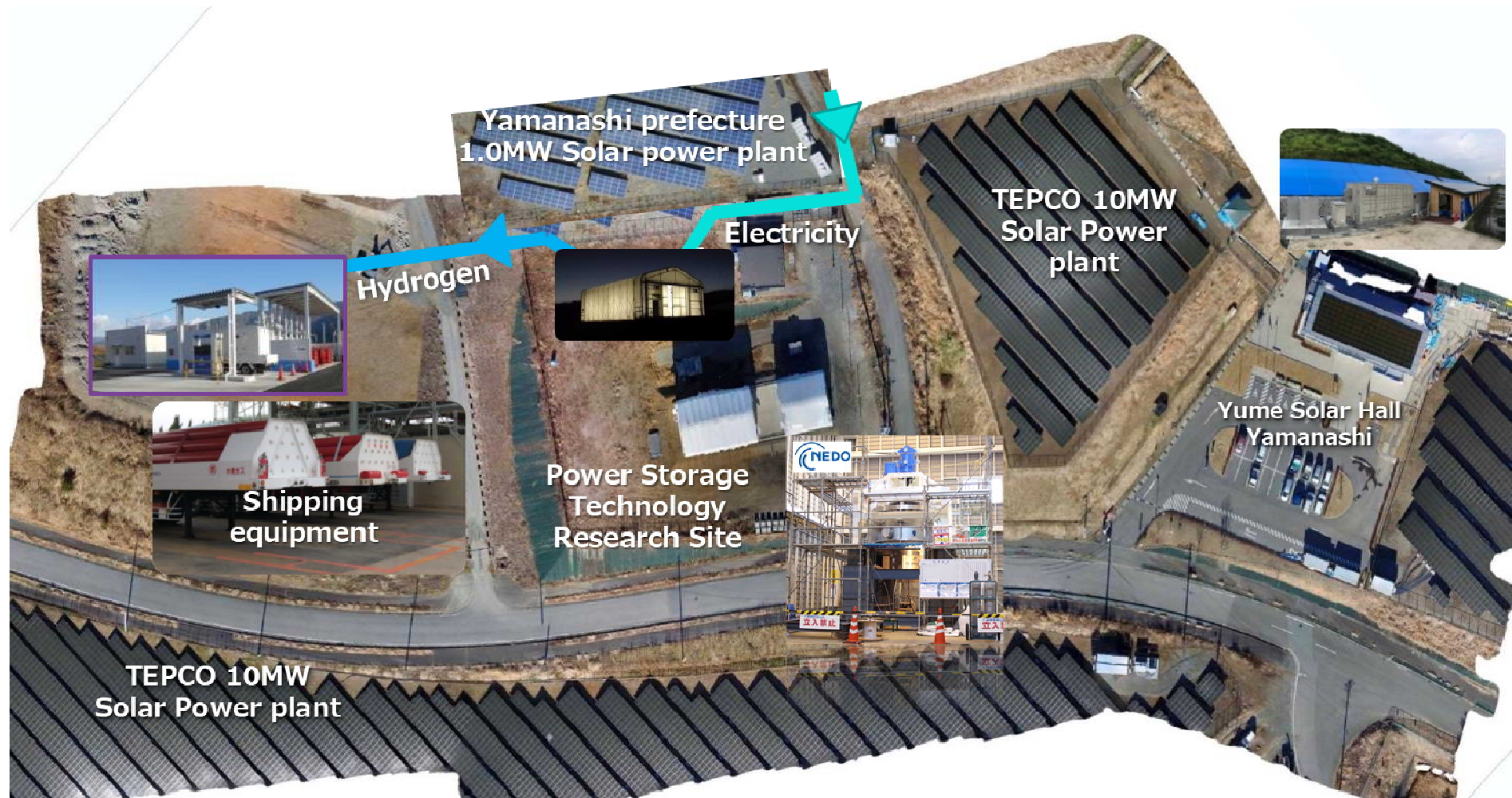
- Small fuel cell power supply system, metal separator integrated with GDL, CCM production process, etc.

(4) FCV, HRS, Stationary Fuel cell

- FCV:22, 1 Hydrogen Refueling Stations, 582 Ene-Farm, etc.

Current Status / Topics

Integrated energy demonstration site under developing



Key characteristics of “Fukushima Plan for a New Energy Society”



Promoting the New Energy Society Concept: From Fukushima to the World

Expanded use of wind, solar and other forms of renewable energy. Leading-edge empirical research using one of the world's largest renewable energy-based hydrogen production facilities. The development of communities based on renewable energy and hydrogen... We are actively moving forward with these projects - with the government and private sectors united - to realize the Fukushima Plan for a New Energy Society.

Model construction for realizing a hydrogen-based society

Hydrogen is a focus of attention as a next-generation source of clean energy. An ambitious project is now in progress in Fukushima: verification of leading-edge technologies required to produce hydrogen from renewable energy on a large scale, and to transport, store and use it. We plan to use the Fukushima-generated hydrogen during the 2030 Tokyo Olympics and Paralympics.

Expanded introduction of renewable energy

Establish a new power transmission company to develop the power grid necessary for building a wind farm in the Abukuma mountain and coastal regions.

Green Energy Aizu
Development of a new energy business model for the Aizu region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Hydroelectric Power Plants around Lake Inawashiro
Development of a new energy business model for the Inawashiro region, including the construction of a large-scale hydroelectric power plant and the promotion of energy-saving measures in buildings.

Tsuchiyu Ocean Binary Power Plant
Development of a new energy business model for the Tsuchiyu region, including the construction of a large-scale ocean binary power plant and the promotion of energy-saving measures in buildings.

Stinchi Town
Development of a new energy business model for the Stinchi region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Soma City
Development of a new energy business model for the Soma region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Minami-Soma Substation
Development of a new energy business model for the Minami-Soma region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Atsuwakamatsu City
Development of a new energy business model for the Atsuwakamatsu region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Yanazu Nishiyama Geothermal Power Plant
Development of a new energy business model for the Yanazu Nishiyama region, including the construction of a large-scale geothermal power plant and the promotion of energy-saving measures in buildings.

Renewable Energy-based Small Hydrogen Station (within Kariyama City Office)
Development of a new energy business model for the Kariyama region, including the construction of a large-scale hydrogen station and the promotion of energy-saving measures in buildings.

Shir-Fukushima Substation
Development of a new energy business model for the Shir-Fukushima region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Namie Town
Development of a new energy business model for the Namie region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Naraha Town
Development of a new energy business model for the Naraha region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Fukushima Renewable Energy Institute
Development of a new energy business model for the Fukushima region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Fukushima Airport Mega Solar Power Plant
Development of a new energy business model for the Fukushima Airport region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Solar-Sharing Power Plant "Tomato Land Inaki"
Development of a new energy business model for the Inaki region, including the construction of a large-scale solar power plant and the promotion of energy-saving measures in buildings.

Okudama Hydroelectric Power Plant
Development of a new energy business model for the Okudama region, including the construction of a large-scale hydroelectric power plant and the promotion of energy-saving measures in buildings.

Koriyama-Narabiki-kogen Wind Farm
Development of a new energy business model for the Koriyama region, including the construction of a large-scale wind farm and the promotion of energy-saving measures in buildings.

Fukushima Floating Offshore Wind Farm
Development of a new energy business model for the Fukushima region, including the construction of a large-scale offshore wind farm and the promotion of energy-saving measures in buildings.

Fukushima Renewable Energy Institute (FREI), National Institute of Advanced Industrial Science & Technology (AIST)

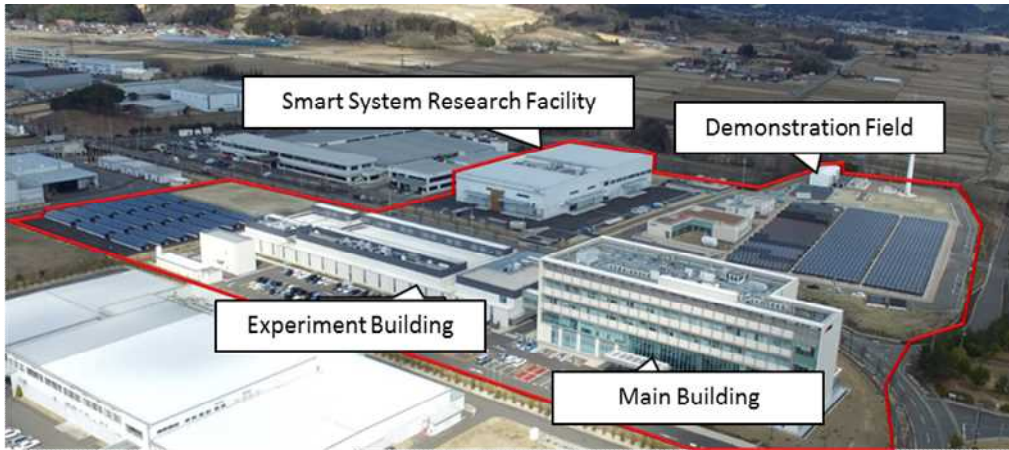
The primary mission of the Fukushima Renewable Energy Institute (FREI) is to promote research and development into renewable energy, which is seen to be the key to reconstruction of the region through developing clusters of new industries. As the only laboratory in Japan dedicated to renewable energy research, FREI focuses on research into new technologies that support the anticipated massive introduction of renewable energy. After developing related technologies in collaboration with local businesses, FREI opened one of the world's largest power electronics test facilities in 2016, which allows it to develop power conditions and other power control devices with local electrical machinery manufacturers. In addition, it undertakes joint research with universities and so forth to foster capable personnel for the future.

Building "Smart Communities"

We are tackling the construction of "Smart Communities" designed to effectively use renewable energy and hydrogen locally. In FY2018, Atsuwakamatsu City completed the construction of a smart community powered by solar energy. Smart community projects are currently in progress in Soma City and the towns of Shinchi, Namie and Naraha - all in the coastal Fukushima region. The projects also aim to facilitate recovery of these municipalities.

● Marked with red circles are smart community projects.

Key characteristics of “Fukushima Plan for a New Energy Society”



Current Status / Topics

- (1) R&D and Demonstration
 - FREA: R&D on MCH for hydrogen storage and transport.
 - FH2R: Power to Gas with 10MW electrolysis and 20MW PV .
- (2) Human Resource Development
 - FREA has been conducting training course (on HRS)
- (3) Establish network with industry, government and academia
- (4) Industry accumulation
 - REIF Fukushima has led to new businesses and contracts between exhibitors and visitors.
- (5) Current status of hydrogen usage in the prefecture
 - FCV:35 vehicles, HRS:3 stations

Current Status / Topics

Main system will be installed by end of September 2019



➤ *Motivation*

- *Economic impact to local area
(developing new industry, human resources, etc.)*

➤ *Make the most of the regional features*

- *Center of excellence with unique research(Institute, University)*
- *Utilizing local resource to produce hydrogen*

➤ *Collaboration*

- *Local / central government, industry / academia
under implementing body*



Thank you!