

Hydrogen Cluster in Japan

- Regional Activities to Promote Hydrogen -

26 March, 2019

Eiji Ohira

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

Two Major H₂ Cluster in Japan



Fukuoka Pref.



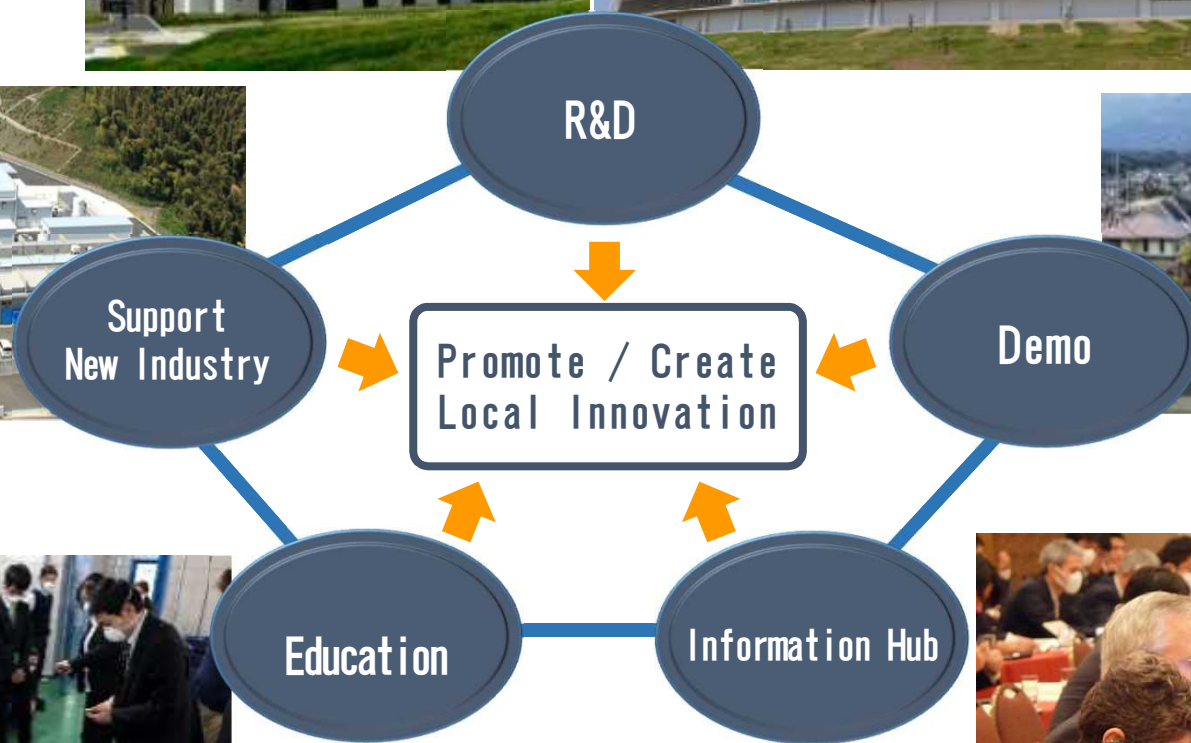
Fukushima Pref.



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 using 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:

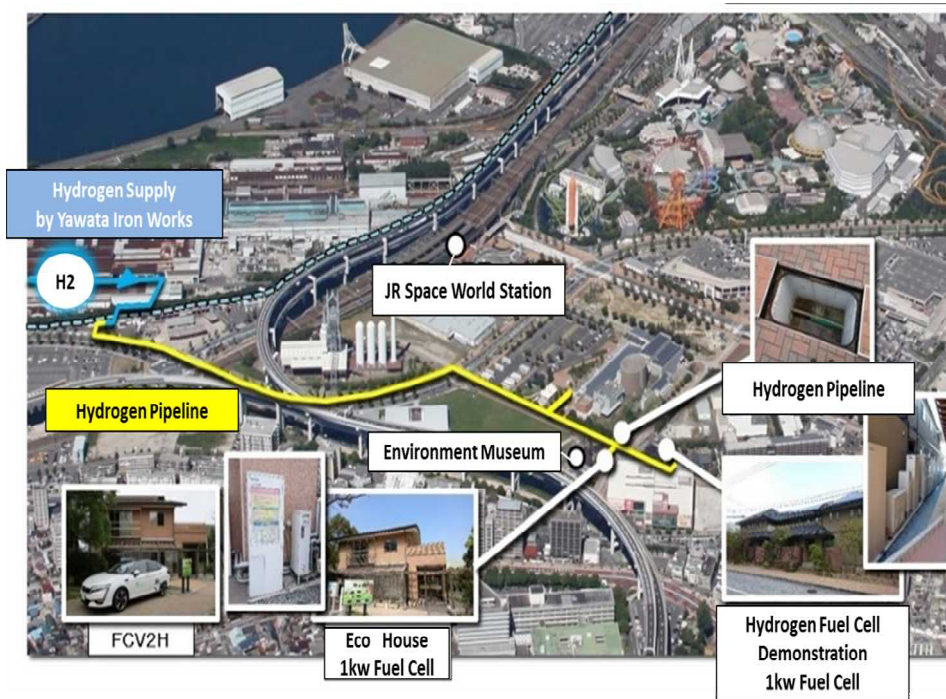
- Support local company product development (Hydrogen visualization sheet, stainless steel packing, hydrogen gas impurity analyzer, O-ring, etc.)

(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)

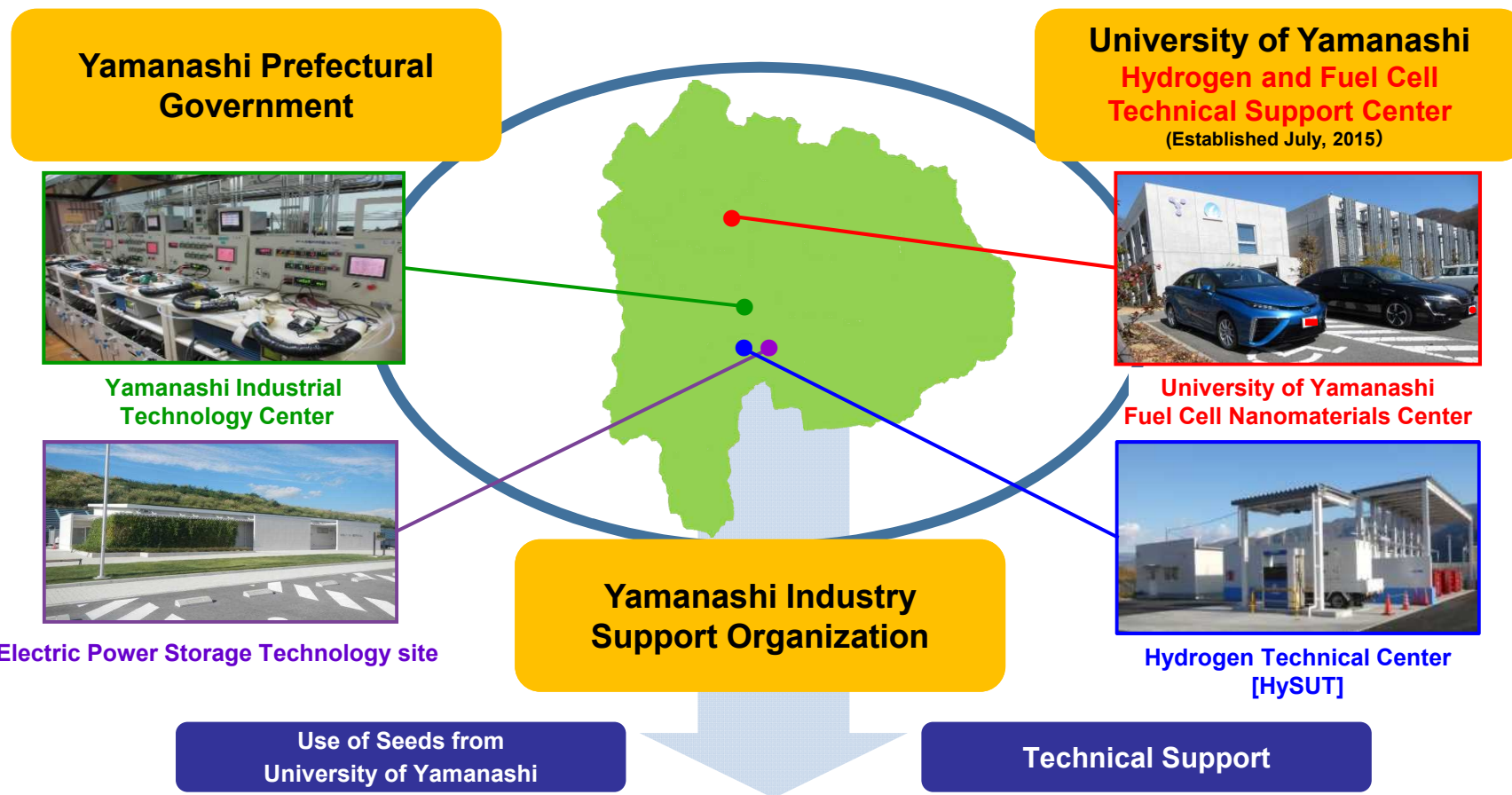
- CO2 free hydrogen supply chain construction

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

PtG demonstration site



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**: Promotion of green energy in Aizu region.
- Hydroelectric Power Plants around Lake Inawashiro**: Utilization of hydroelectric power around Lake Inawashiro.
- Tsuchiyu Ocean Binary Power Plant**: Development of ocean binary power plants.
- Stinchi Town**: Smart community project in Soma City.
- Soma City**: Smart community project.
- Minami-Soma Substation**: Substation for power transmission.
- Renewable Energy-based Small Hydrogen Station (within Kariyama City Office)**: Hydrogen production and distribution.
- Namie Town**: Smart community project.
- Shin-Fukushima Substation**: Substation for power transmission.
- Fukushima Renewable Energy Institute (FREI)**: Research and development center.
- Naraha Town**: Smart community project.
- Fukushima Airport Mega Solar Power Plant**: Large-scale solar power plant.
- Solar-Sharing Power Plant "Tomato Land Inaki"**: Solar power plant for tomato production.
- Fukushima Floating Offshore Wind Farm**: Offshore wind farm in the ocean.
- Koriyama-Narabiki-kogen Wind Farm**: Wind farm in Koriyama.
- Okutadami Hydroelectric Power Plant**: Hydroelectric power plant.

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 world and to contribute 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, Aizuwakamatsu 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 in red on the map are smart community projects.

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

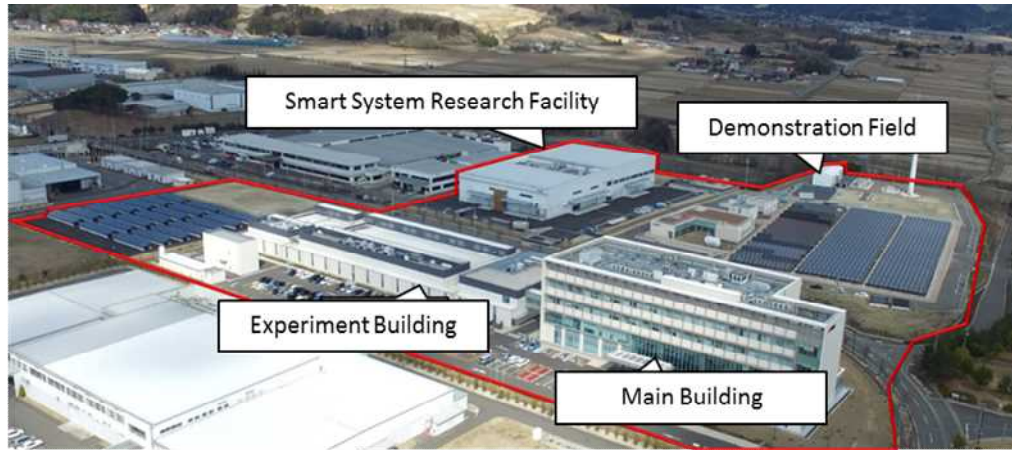
(4) Industry accumulation

- 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



➤ *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*

Seeing is believing...

7 June, 2019 (excursion during WHTC 2019) Limited!!





Thank you!