

# MOEJ's Challenges to create (CO<sub>2</sub> free) Hydrogen Society

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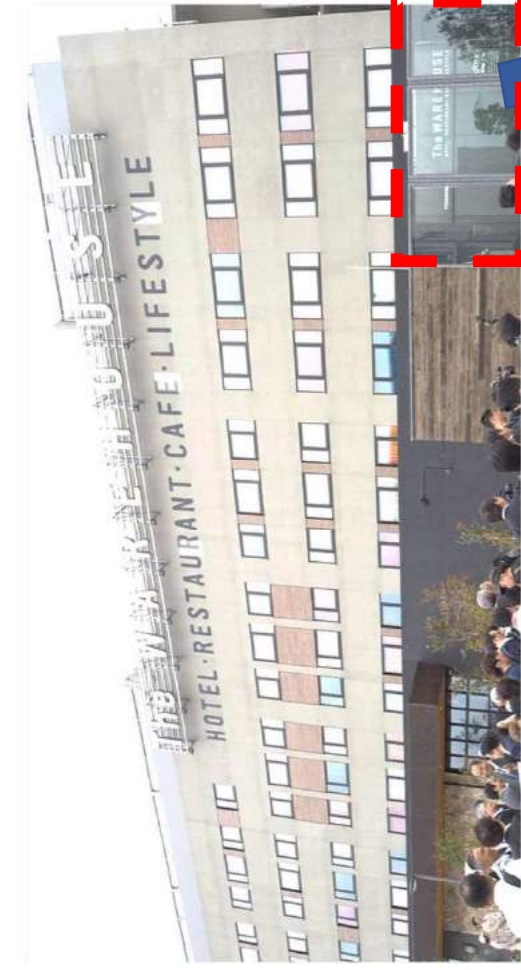
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Global Environmental Bureau,

Ministry of the Environment, Japan (MOEJ)

**Which energy source does  
Tokyu REI Hotel -This Hotel- use?**

# 1st H<sub>2</sub> Hotel in the World



Hydrogen

Used Plastics



Hydrogen Fuel Cell  
in front of the hotel

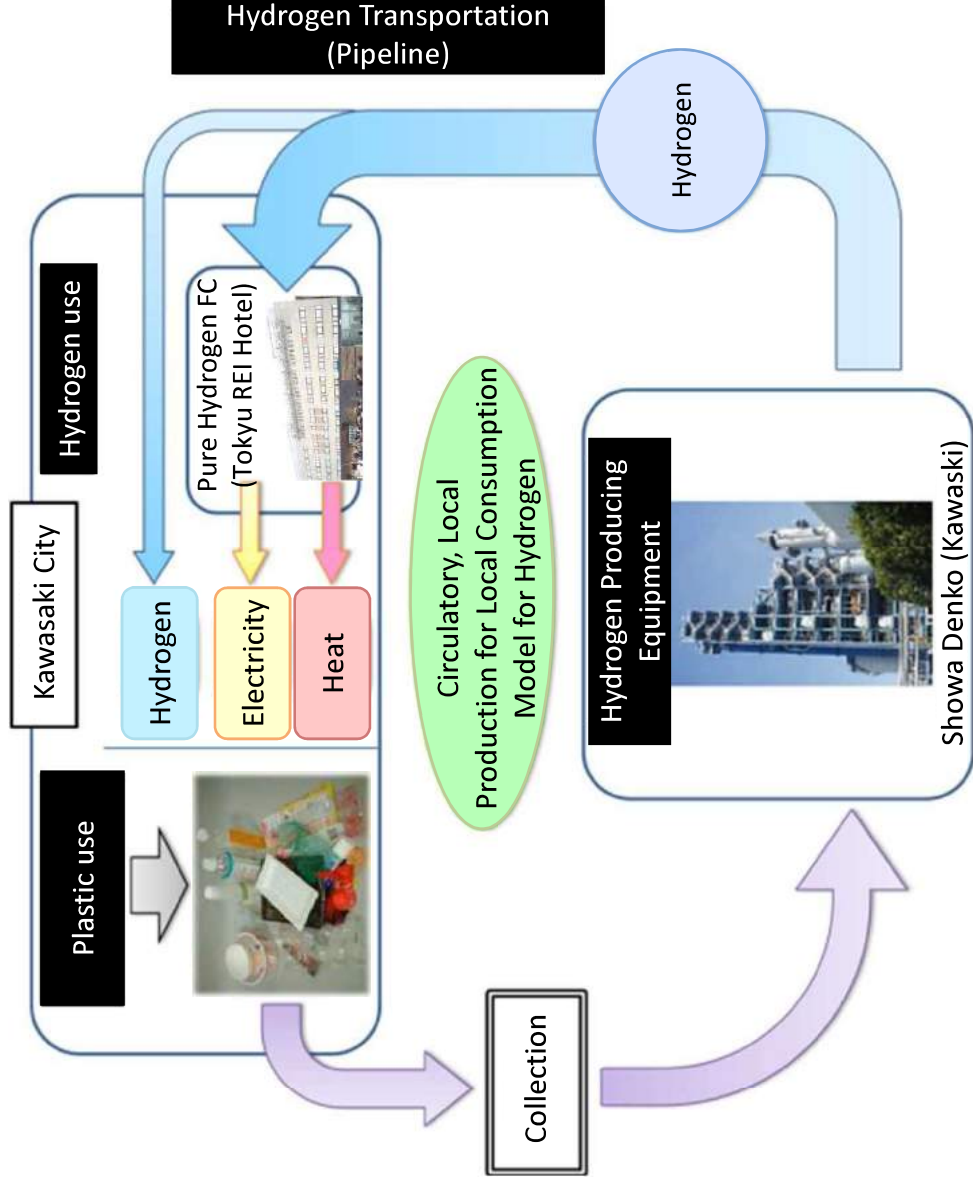
- The hydrogen hotel opened on June 1<sup>st</sup> in Kawasaki City near Tokyo Intl' Airport.
- 30% of total energy use of hotel will be covered by hydrogen which comes from a plastic recycling facility via pipeline.
- The hotel adds values to the new developed research area and the hotel. <sup>2</sup>

**Verification of Circulatory Local Consumption/ Regional Cooperation Model, Utilizing Used Plastic Based Hydrogen**

—Representing Company: **Showa Denko K.K. (FY2015-FY2019)[Kawasaki City]**

- Hydrogen produced in the process of recycling used plastic will be purified, and will be transported through the pipeline, and will be studied to be used in the business facilities' and research facilities' stationary fuel cell.

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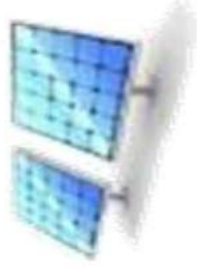


# MOEJ's Projects on Hydrogen

# The Vision of MOEJ

## Renewables

Utilize the potential of regional resources (e.g. local renewable energy)



Solar Power



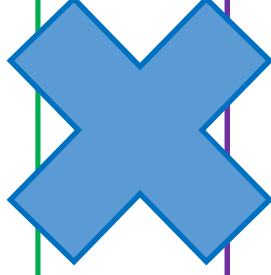
Hydro Power



Wind Power

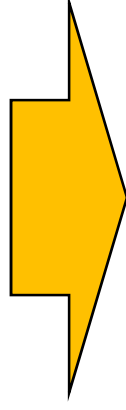


Livestock Excreta



## Off-grid

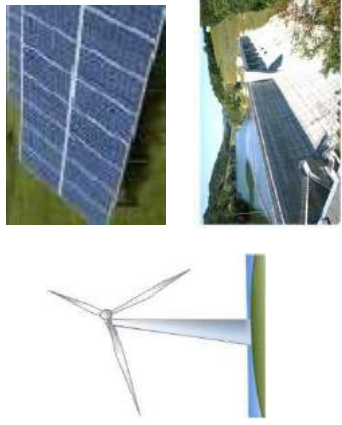
Builds a self-reliant and decentralized region



**Activation of regional employment and economy**

# Hydrogen Supply Chain Depends on Local Conditions

## CO2 Free Energy Sources / Sources of H2



Renewable Energy



Unused by-product H2



Biomass



Used Plastics

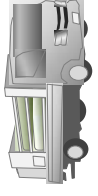
## Transportation of H2



High-pressure hydrogen truck



Hydrogen storage alloy  
Transported by commercial truck



Hydrogen fueling truck



Pipeline

## Applications



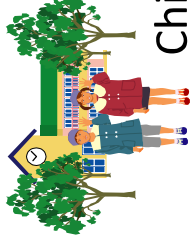
Fuel Cell



Swimming Pool



Fish farming



Children's Clubhouse



Hotels / Buildings



FC Buses



FCVs

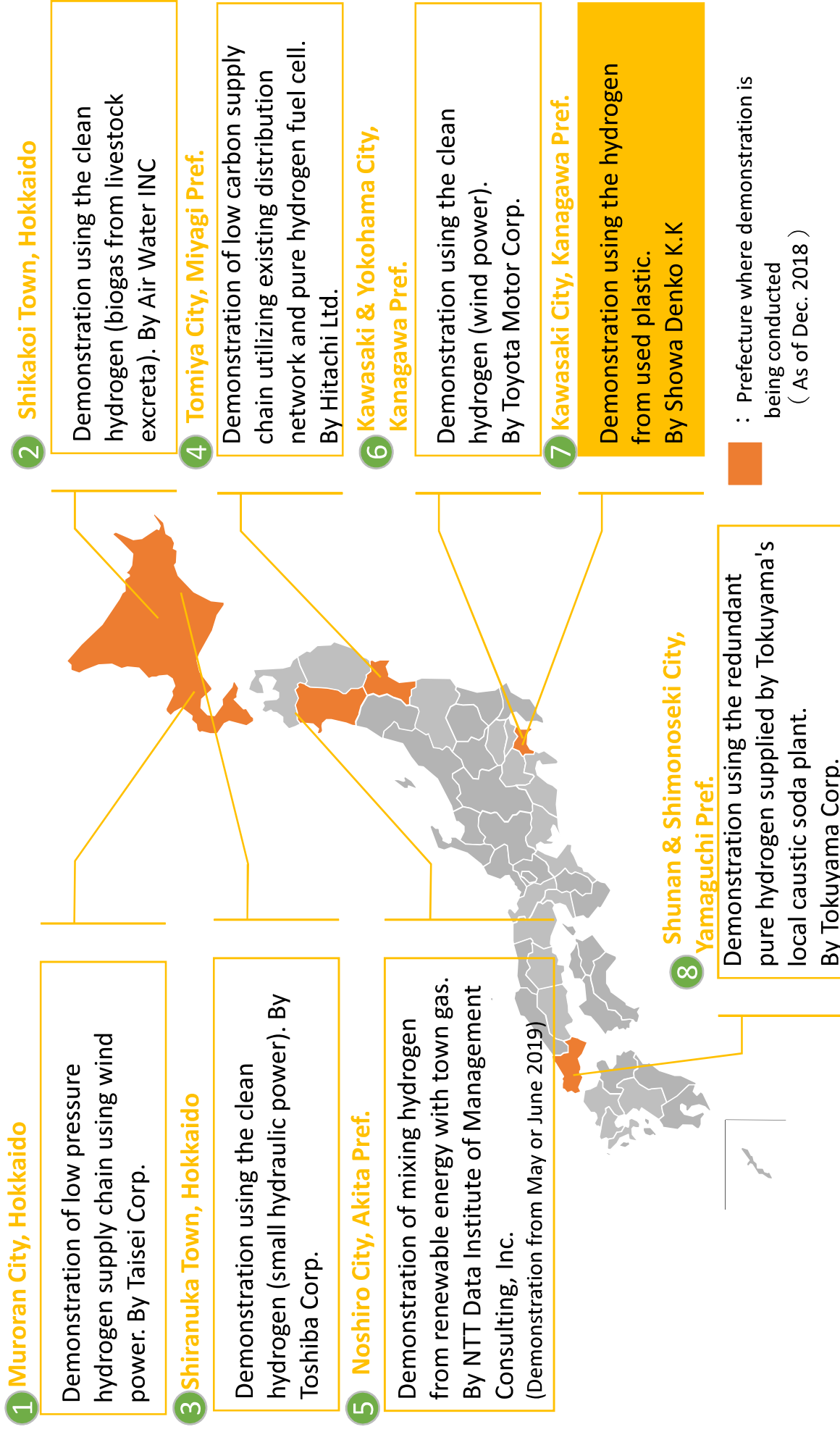


FC Forklifts



# Demonstration Projects for Local Hydrogen Supply Chain

～ Making show cases ～





Project Location	Energy Source & Production method		Storage & Transportation	Application				
				HRS*1	H2 FC	FCV	FC Forklift	Town Gas
1 Muroran City, Hokkaido	Wind power 	Water electrolyzer	H2 absorbing alloy tank→Delivery truck	○	○	○	○	○
2 Shikaoui Town, Hokkaido	Cattle farmer 	Methane fermentation→H2 generator	Storage tank→Curdle*2 (pressured)	○	○	○	○	○
3 Shiranuka Town, Hokkaido	Hydro power 	Water electrolyzer	High-pressure H2 truck, High-pressure curdle*2	○	○	○	○	○
4 Tomiya City, Miyagi Pref.	Solar power 	Water electrolyzer	Storage tank→H2 absorbing alloy→Delivery truck	○	○	○	○	○
5 Noshiro City, Akita Pref. (May or June 2019)	Wind power 	Water electrolyzer	Storage tank→Pipeline	○	○	○	○	○
6 Kawasaki & Yokohama City, Kanagawa Pref.	Wind power 	Water electrolyzer	Storage tank→H2 fueling truck (pressured)	○	○	○	○	○
7 Kawasaki City, Kanagawa Pref.	Used plastics 	H2 generator	Pipeline (pressured)	○	○	○	○	○
8 Shunan & Shimonoiseki City, Yamaguchi Pref.	Caustic soda plant 	—	Curdle (pressured), In-vehicle H2 tanker (liquidified)	○	○	○	○	○

\*1: Hydrogen Refueling Stations \*2: Stack of high-pressure gas cylinder

# Case : Energy from H<sub>2</sub> for Caviar ~In Local / Cold Town~



In winter, about -20°C (-4°F)  
**Hydrogen works!!**



- In Shikaoi Town, Hydrogen is transformed from **biogas** from livestock excreta.
- Electricity & heat from H<sub>2</sub>/FC are utilized for sturgeon farming, etc.
- They try to utilize H<sub>2</sub> for “Local Energy Production for Local Consumption”

# Other Cases

In Kawasaki & Yokohama City, Kanagawa Pref.



Delivery



Hydrogen fueling truck

User (12 FC Forklifts)

Supplying hydrogen without a hydrogen station

In Tomiya City, Miyagi Pref.



3 Hydrogen absorbing alloys in a cassette  
(17 kg / cassette)

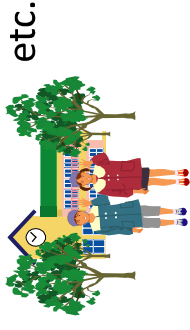


Co-op truck for  
delivery

Delivery



Co-op Supermarket  
Children's Clubhouse  
etc.



# R&D for Hydrogen



**FC FORKLIFT**  
(R&D : 2013-2015)  
(Released from 2016)



**FC BUS**  
(R&D : 2013-2015)  
(Released from 2016)



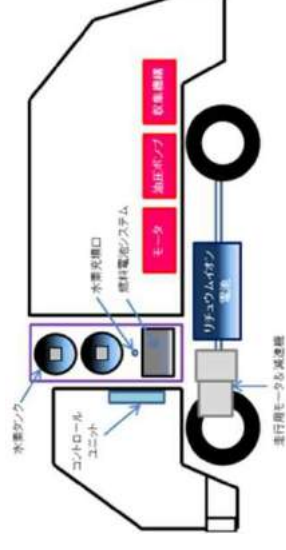
**FC TRUCK**  
(R&D : 2016-)



**FC SHIP**  
(R&D : 2014-2015)



Renewable energy-based  
hydrogen station (**70MPa**)  
(R&D : 2015-2017)  
(Released from 2018)



**FC GARBAGE TRUCK**  
(R&D : 2015-2017)

# Enhancing Hydrogen Infrastructure

## For Mobility

### Support to the installation cost

- Renewable energy-based hydrogen stations (35MPa, 70MPa)  
: Subsidy rate 3/4
- FC industrial vehicles (e.g. FC Forklift, FC Bus) : Subsidy rate 1/2



e.g. Smart Hydrogen Station  
(by Honda)



e.g. FC Forklift  
(by Toyota Industries Corporation)

## For Energy Storage

### Support to the installation cost

- Standalone hydrogen energy supply systems  
: Subsidy rate 2/3  
(Establishing a renewable energy supply system without  
depending on the grid)



e.g. H<sub>2</sub>One  
(by Toshiba Energy Systems)



# Thank you very much for your kind attention!

<A Vision of Hydrogen-based Society>

