Hydrogen development in Japan

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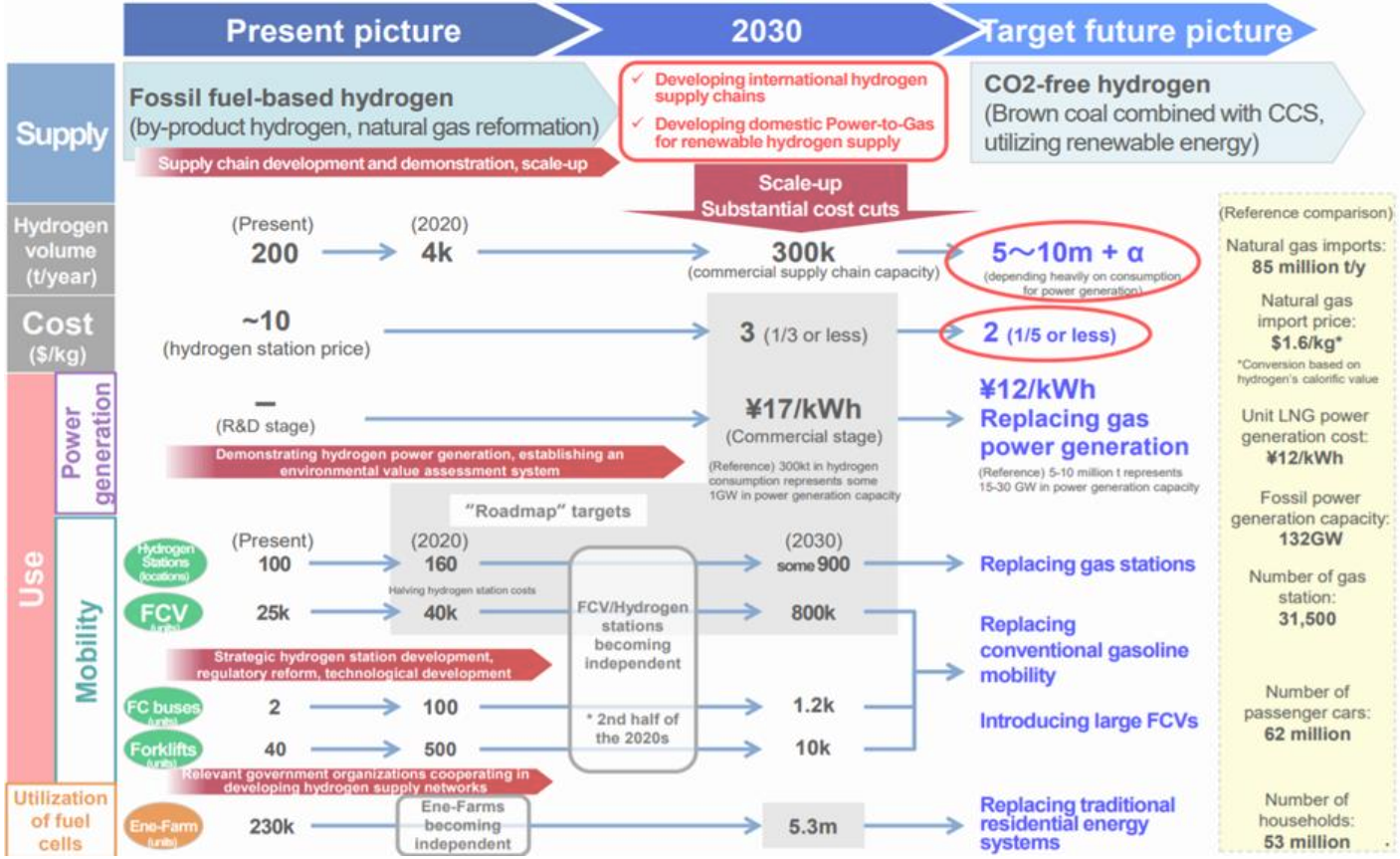
New Energy and Industrial Technology Development Organization (NEDO)

Japan's policy on Hydrogen

- **"Basic Hydrogen Strategy" (former Prime Minister Abe's Initiative)**
  - ✓ **World's first national strategy launched in Dec. 2017**
  - ✓ **2050 Vision: position H_2 as a new energy option** (following Renewables)
  - ✓ **Target: make H_2 affordable** ($3/kg by 2030 ⇒ $2/kg by 2050)



Japan's Policy Update

- Revision of Basic Hydrogen Strategy (6 June 2023)
  - ✓ Setting new targets
    - H_2 introduction: 12million tons (2040)/ Electrolysis: 15GW(2030, worldwide)
  - ✓ Promoting transition to "low-carbon hydrogen"
    - Definition of low-carbon hydrogen: below 3.4kg-CO_2e/kg-H_2
  - ✓ Strengthening industrial competitiveness
    - JPY 15 trillion Public-Private investment for H_2 supply chain next 15 years (incl. contracts for difference (CfD)-style subsidy scheme)
    - Prioritizing nine strategic areas (Electrolysis, Hydrogen Supply Chain, Fuel Cells, Power Generation, etc.)

Direction: How to promote Hydrogen

Goals **Cost ($/kg): $3/kg by 2030 & less than $2/kg by 2050**

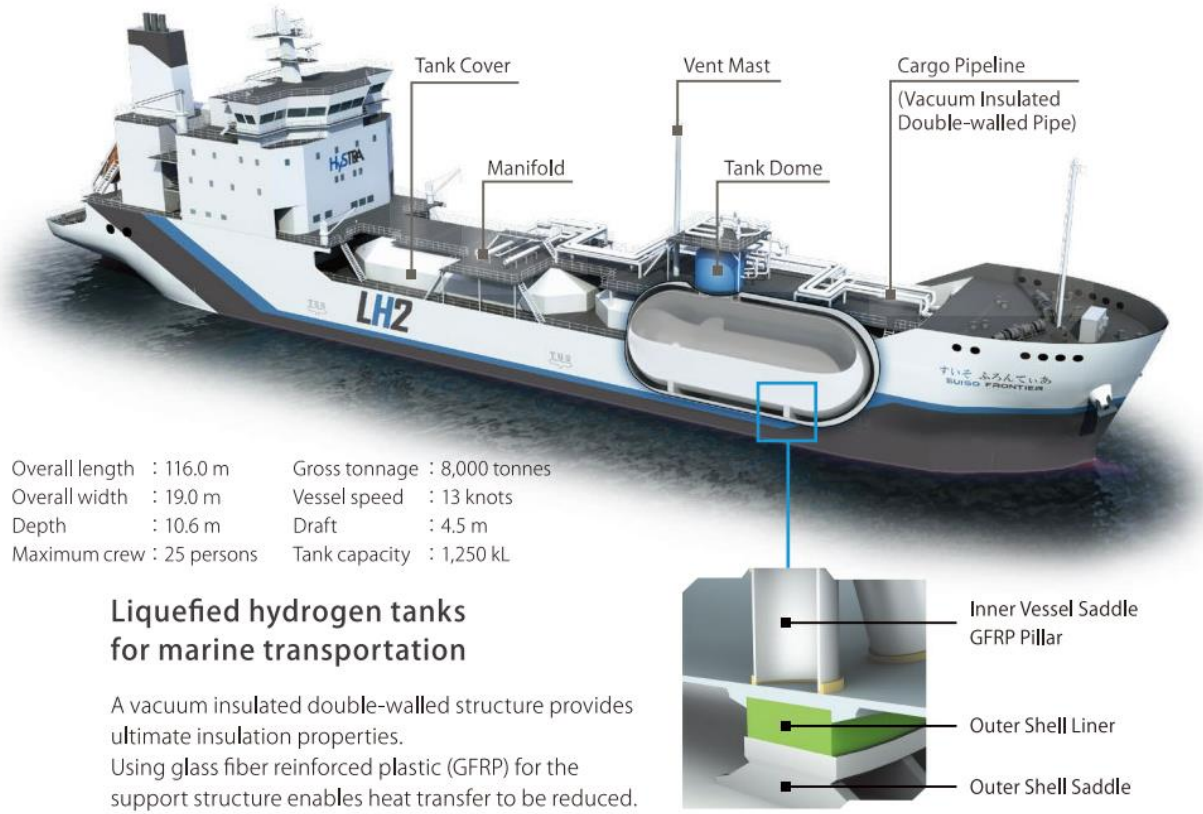
		Short Term (- 2025) Approx. 2 million tons	Mid Term (- 2030) Max. 3 million tons	Long Term (- 2050) 20 million tons
Supply	Existing source (ex. By products)	Maximize utilization as major source	Decarbonization of hydrogen production (with CCUS)	
	Import	Accumulation of knowledge and cost reduction through demonstration project	Development of large-scale international hydrogen supply chain	Further scale up through diversification of hydrogen source
	New domestic source	Accumulation of knowledge and cost reduction through demonstration project	Start up hydrogen production by electrolysis using excess energy from renewables	Scale up hydrogen production by electrolysis, and realizing innovative hydrogen production technology
Demand	Transportation	Expansion to FC trucks in addition to FCVs and FC buses	Launch of ships (FC ships, etc.) to the market	Use of hydrogen and synthetic fuel for aviation
	Power generation	Using of stationary fuel cell and small gas turbine for distributed energy	Commercialization of large-scale hydrogen power generation turbine	Further scale up and function as balancing power
	Industry (raw material)	Conducting technology demonstration project (refinery, steel process, chemical process, etc.)		Realizing hydrogen steel process, green chemical, etc.
	Thermal (Industry, business, household)	Substitute fossil fuels through installation of fuel cell and decarbonization of supply infrastructure using electrolysis and existing gas pipes		Expanding supply through infrastructure development and hydrogen cost reduction

Source: METI

Current status

Items	Japan's Target (in 2030)	Current status (as of Feb. 2023)
Stationary Fuel Cell		
Regidential Fuel Cell (EneFarm)	3 million	480,373 (Mar. 2023)
Mobility		
Passenger Vehicles	800,000	7,692
Fuel Cell Buses	1,200	132
Forklift	N/A	397
Hydrogen Refueling Station		
Public Stations	1,000	167(Mar. 2023)

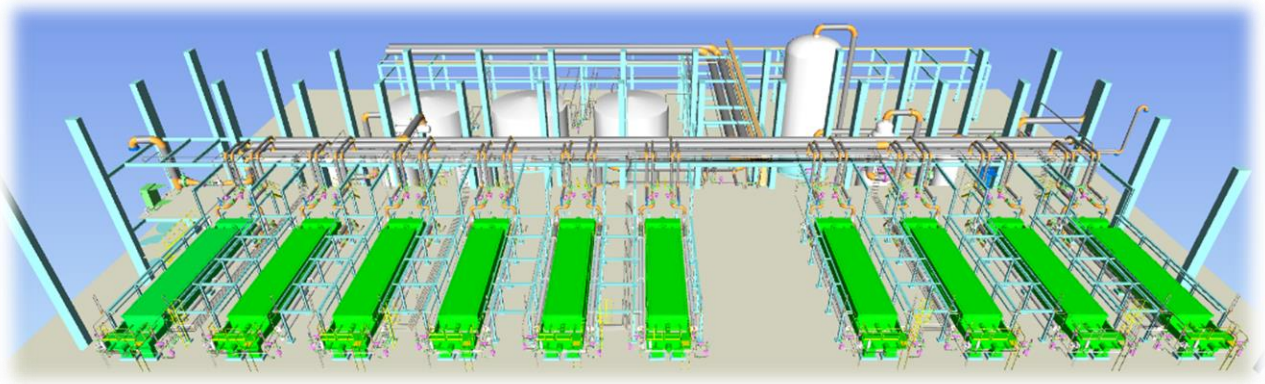
H2 Scale-up: Liquefied Hydrogen Storage

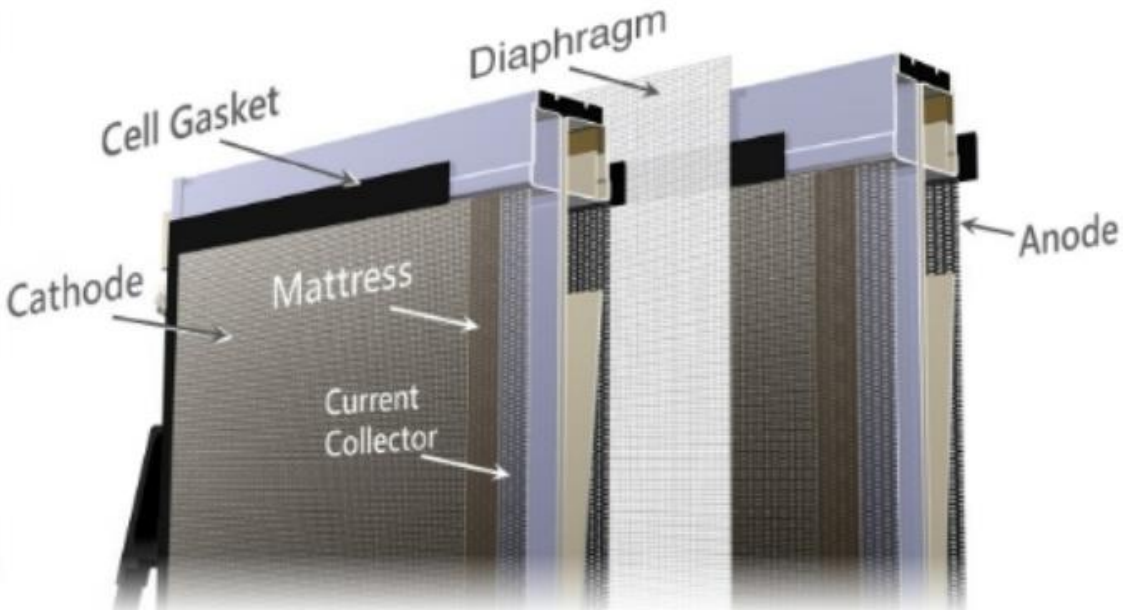


Liquefied hydrogen tanks for marine transportation

A vacuum insulated double-walled structure provides ultimate insulation properties.
Using glass fiber reinforced plastic (GFRP) for the support structure enables heat transfer to be reduced.

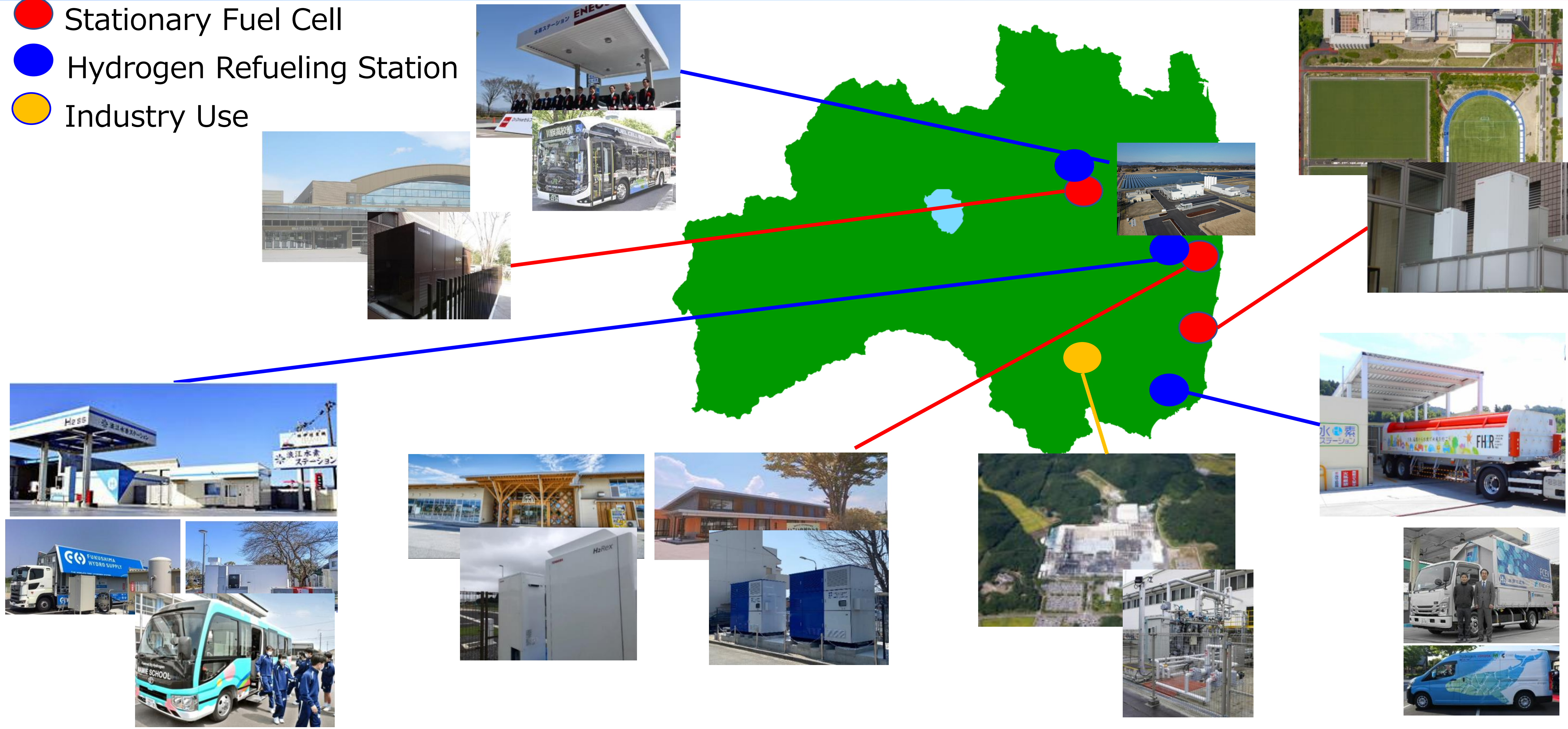
H2 Scale-up: MW scale Electrolysis





Hydrogen Valley / Fukushima

- Stationary Fuel Cell
- Hydrogen Refueling Station
- Industry Use



Hydrogen@Port

Production | **Transportation** | **Utilization**

@Merced | **@San Pedro（LA･LB Port）**

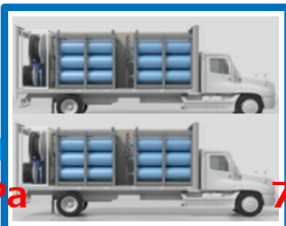
RNG

Pipeline

Production

Storage

93MPa



Mobile Refueler

70MPa

Top handler

RTG

Tractor

Drayage truck

Thank you!