

Japan's Policy on Hydrogen Energy in maritime fields

Ikuo HAMANAKA

Ministry of Land, Infrastructure,
Transport and Tourism (MLIT)

Background

- Main challenges

Policy

- Role of Hydrogen
- Hydrogen / FC Strategic Roadmap

How we approach (Projects)

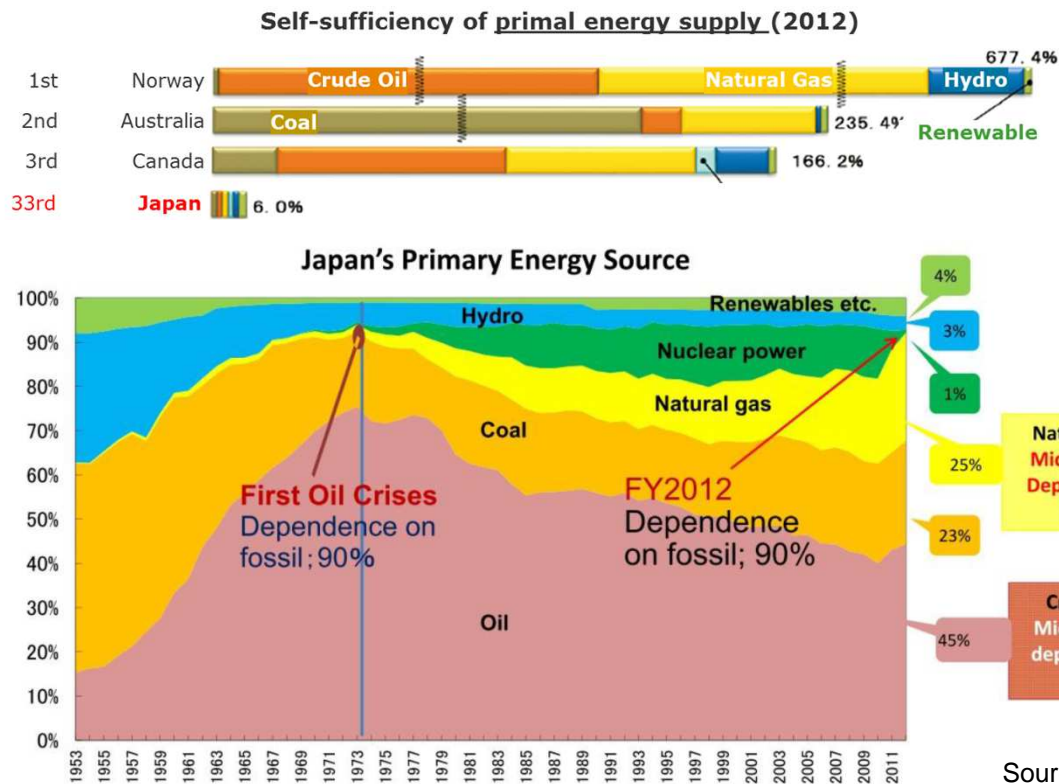
- Establishment of mass hydrogen supply
- Expansion of usage of hydrogen (Fuel Cell Boat)

Future cooperation between Norway and Japan

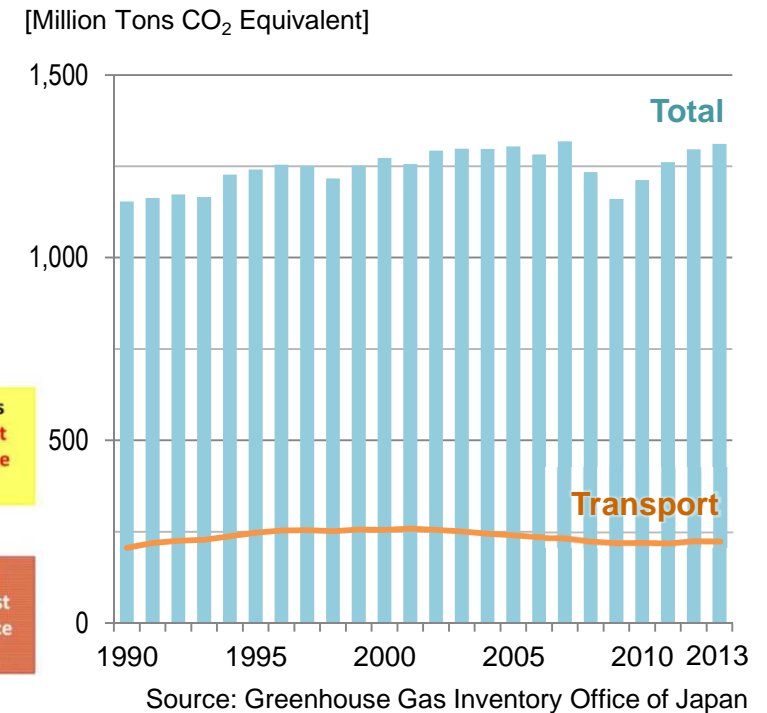
3E + S (Energy Security, Economic Efficiency, Environment + Safety)

-Strategic Energy Plan of Japan, April 2014

■ Energy supply

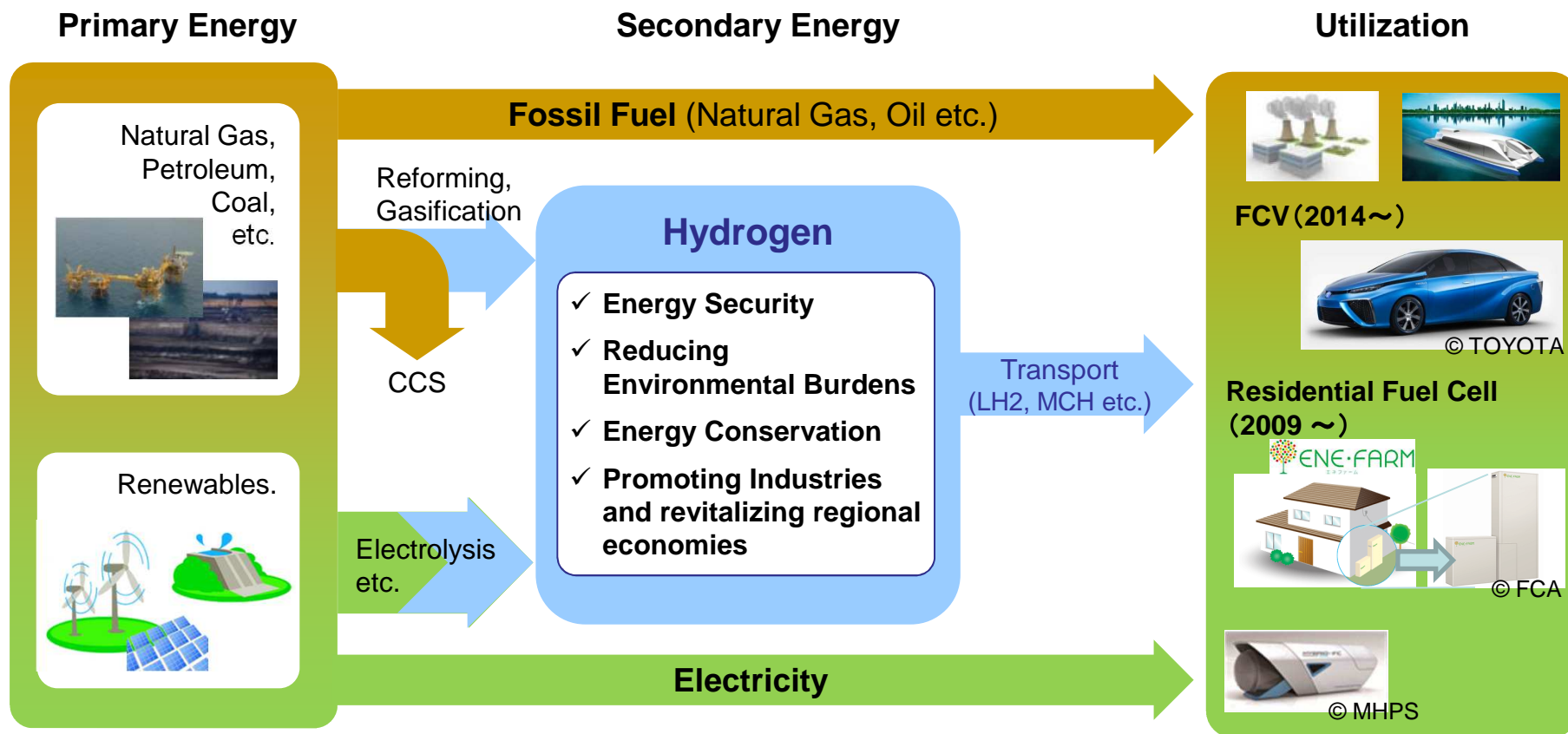


■ Greenhouse gas emissions

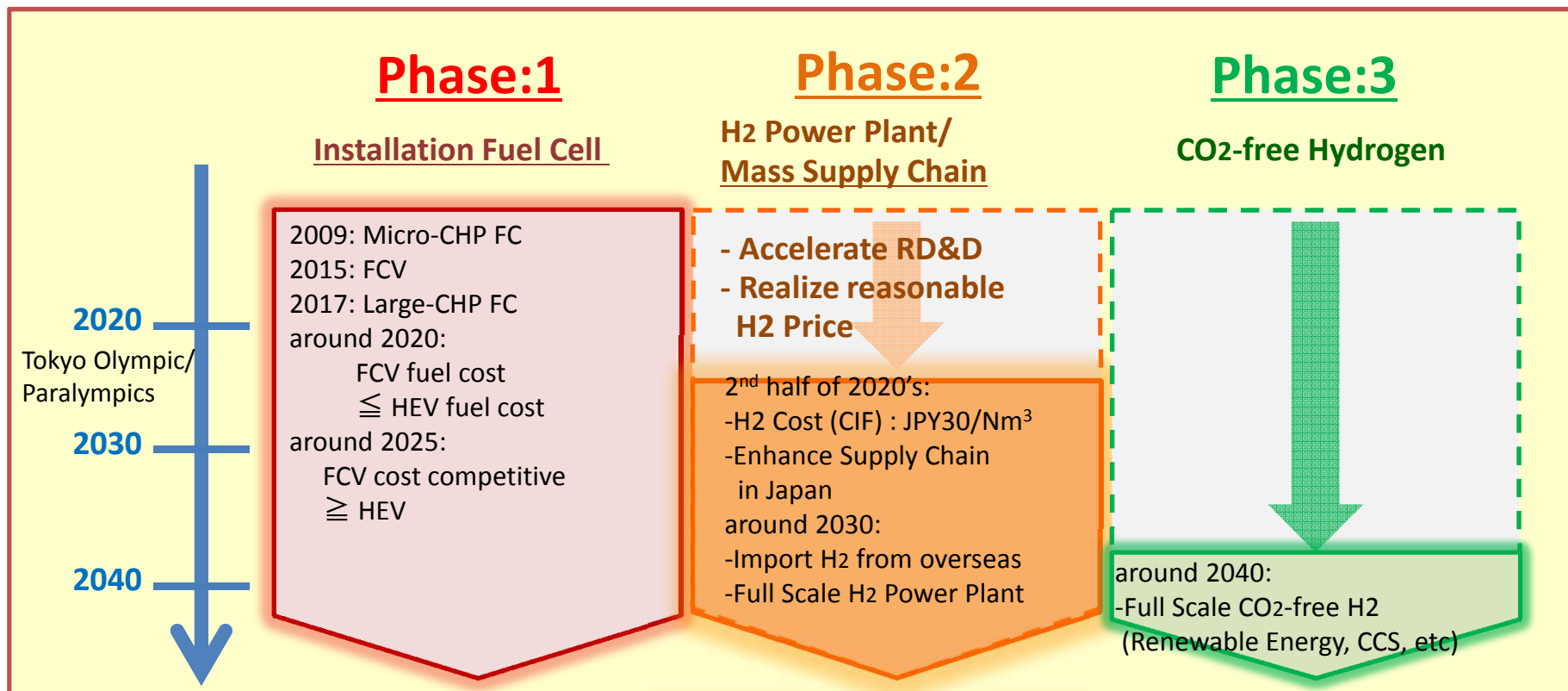


Roles of Hydrogen

As for future secondary energy, **hydrogen is expected to play a central role**, as well as electricity and heat
-Strategic Energy Plan of Japan, April 2014



- **Step by Step approach** to realize Hydrogen Society
- **Expansion Usage** ← → Establishment of **mass hydrogen supply**



Building a hydrogen supply chain

FY2015 – 2021
(NOK 137 million in FY2015)

Demonstrate the whole supply chain of hydrogen produced from untapped overseas energy resources

Demonstrations on:

- Method(s) of **hydrogen production** from e.g. by-product hydrogen, brown coal (untapped overseas resources)
- **Transportation and storage** in the form of cryogenic liquid hydrogen or organic hydride
- **Power generation** using (imported) hydrogen



Production



Transportation and storage



Power generation

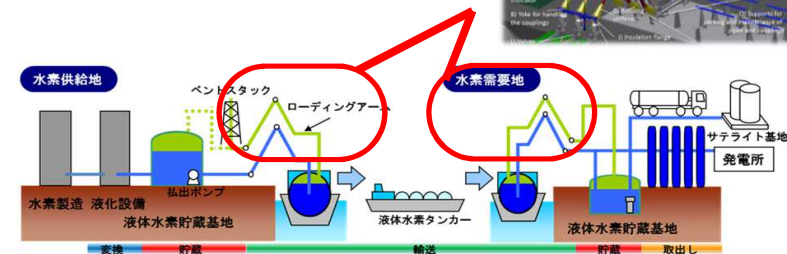
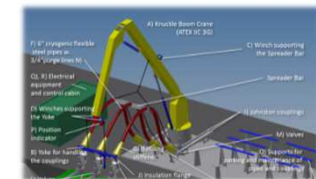
Development of loading system for LH2

FY2014 – 2018
(NOK 9 million + overhead cost in FY2014)

Develop ship-shore loading system(s) for cryogenic liquid hydrogen

Key Issues:

- **R&D** (Emergency Release System, swivel joints etc.)
- **Procedures** for loading/offloading operations
- **Safety regulations and standards**



Fuel cell boat as a future ship



Advantage of fuel cell boats

- Environmental performance
 - No emission of CO₂, NO_x neither SO_x when use
- Comfortableness
 - Less vibration and noise



Set target on water taxis and small restaurant ships for the Tokyo 2020 Olympic games



Small restaurant ship



Water taxi

Verification of the technology & development of safety guidelines

FY2015 – 2017 (NOK 1.3 million in FY2015)

Technical challenges to be addressed

- FC degradation by salty air
- Continued high load operation
- FC operation in ship motions/ load fluctuation
- Leak prevention/ detection
- Prevention of ignition
- Emergency preparedness

2015 FY	2016 FY	2017 FY
Tech. Study		
	Experiment	
	Develop Safety guideline	

■ Remaining challenges:

- Cost (boat itself, fuel)
- Fuel Supply (availability, infrastructures etc.)



Demonstration

Extensive experiences of Norway & Ambitious visions and projects of Japan

→ Cooperative initiatives in the future



2) Production of H₂ from intermittent wind energy, liquefaction and export in spherical tankers to the market

Thank you for your attention!