

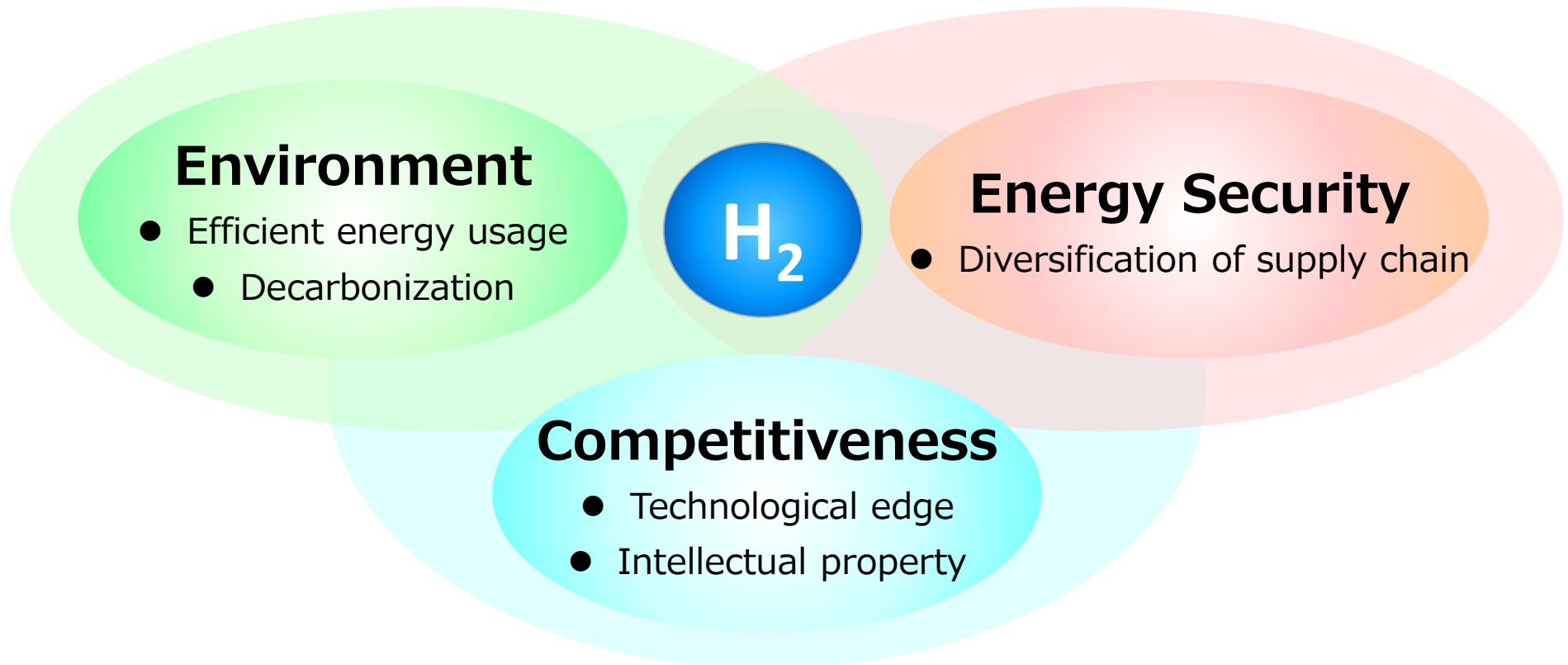
# **Session-II: Hydrogen Storage & Transportation**

2017/12

Ministry of Economy, Trade and Industry (METI)  
Automobile Division  
Batteries and Next-Generation Technologies Office

# Why Hydrogen?

- Potential to be ultimate energy for Japan satisfying both **environmental** and **energy security requirements**
- ✓ Origin of the start of developing hydrogen & fuel cells technologies in Japan: **Oil Crisis of the 1970's (= Energy Security)**
- ✓ Recent expectation for hydrogen: **Paris Agreement (= Environment)**



# Strategic Roadmap to realize a "Hydrogen Society"

## Phase:1

A dramatic increase of Fuel Cells Installation

2009: Residential FC



2014: FCV



2014:HRS



Introduction support and R&D



## Phase:2

H2 Power Generation/  
Mass Supply Chain

- Accelerate RD&D



2<sup>nd</sup> half of 2020's:  
-Enhance Supply Chain in Japan

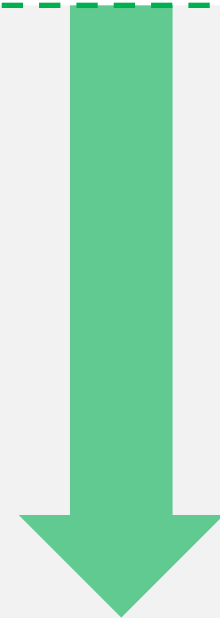


Around 2030:  
-Hydrogen Power Plant



## Phase:3

CO<sub>2</sub>-free Hydrogen



Around 2040:  
-Full Scale  
CO<sub>2</sub>-free Hydrogen

2020

2030

2040

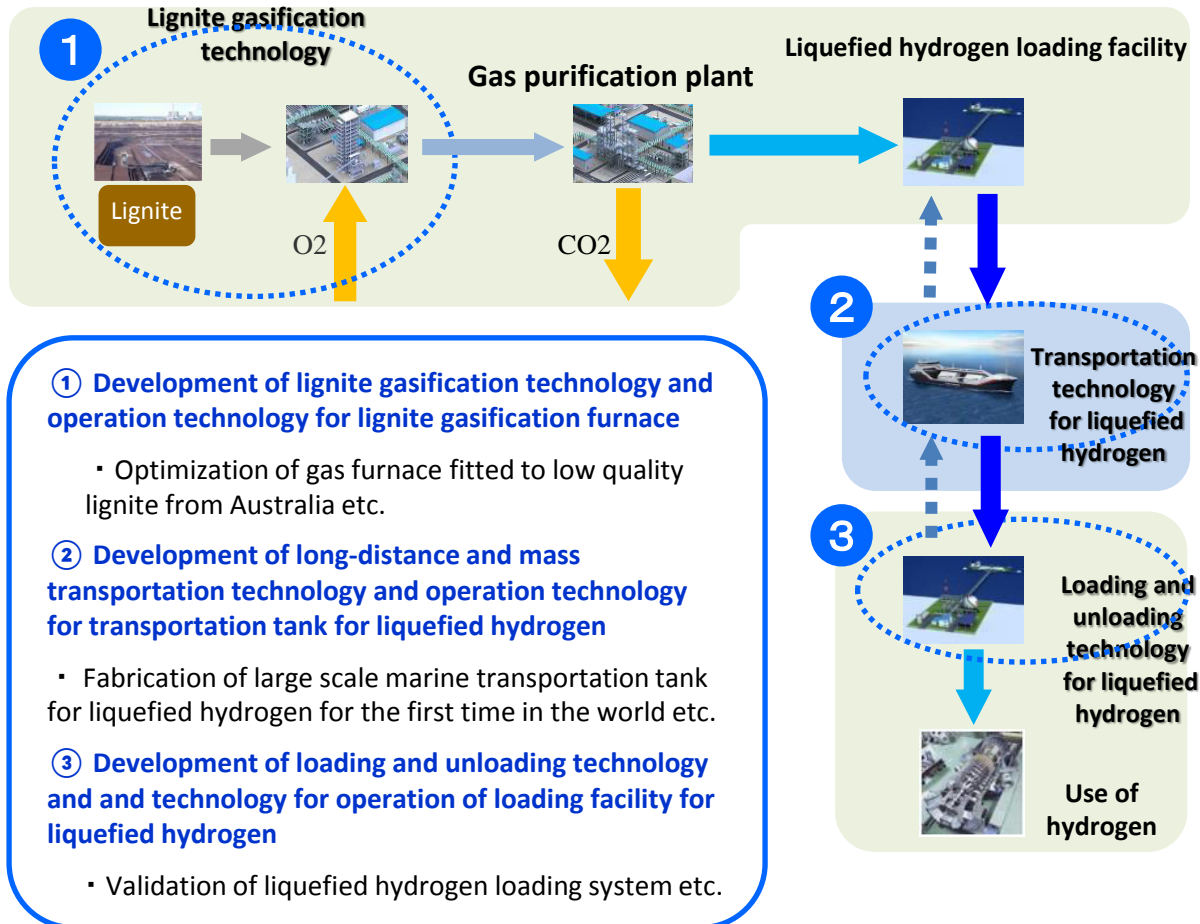
Tokyo Olympic  
/Paralympics

FCV : Fuel Cell Vehicle  
HRS : Hydrogen Refueling Station

# [Hydrogen Supply Chain] ① Lignite × Liquefied Hydrogen

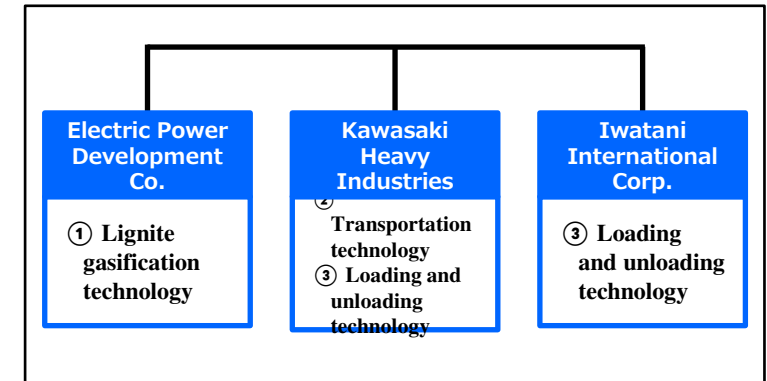
- Aiming at establishing supply chains of liquefied hydrogen, in which production, storage, transportation and utilization are integrated. Hydrogen production, liquefaction of hydrogen, and loading of liquefied hydrogen are conducted in Australia and shipped on the sea, and then the process from unloading to supply are conducted in Japan.

## Outline of chains and validation terms



## Implementation system, schedule

### <Implementation system>



### <Assumed schedule>

FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020
Component tests, specification design	Design, production, test operation etc.				Validation operation

# Draft Budget for Hydrogen and Fuel Cells in FY 2018

## Phase 1

### Installation Fuel Cell

Focus on implementation from the present

## Phase 2

### H2 Power Plant/ Mass Supply Chain

Realized in the late 2020s

## Phase 3

### CO2-free Hydrogen

Realized in around 2040

#### Disseminate stationary FCs

#### Subsidies for Stationary FCs [8.9 billion yen]

Promote the accelerated introduction and cost reduction of Ene-farm. From FY 2017, support for stationary FC for business and industrial use is added.



#### Disseminate FCVs

#### Subsidies for HRSs [5.7 billion yen]

Support HRS installations and promote creating new FCV demand.



#### Support for FCVs [Included in 15 billion yen]

#### Build a H2 supply chain

#### Demonstrations for global H2 supply chain 9.4 billion yen]

Demonstrate how hydrogen can be produced from untapped overseas energy resources, transported in the form of liquefied hydrogen or organic hydride, and used to generate power. Implement P2G field tests, etc.



#### R&D of FC, etc.

#### R&D of FCs [2.9 billion yen]

Conduct R&D for better performance and lower costs of FCs, and demonstrate stationary FCs for business use



Stationary FC for business use

#### R&D of HRSs [2.4 billion yen]

Develop technologies for lower costs and safety of HRSs, and collect data for reviewing regulations.

#### R&D of H2 production, transport and storage

#### R&D for producing, transporting and storing H2 derived from renewable energy [0.9 billion yen]

Develop technologies of high efficiency water electrolysis units, tanks for storing liquefied hydrogen, etc. with the use of renewable energy sources.