[Country/region summary - Japan]
Japan promotes utilization of hydrogen with the framework of the Basic Hydrogen Strategy to contribute significantly to decarbonization

Japan

Reduction Target

Mid-term targets (NDC)	Long-term strategy
By 2030, **-26.0 % (compared to 2013)** (-25.4 % (compared to 2005))	**In 2050, carbon neutral** accomplishment

Position of Hydrogen

- **Can significantly contribute to decarbonization in various sectors**
  - Aiming to realize “Hydrogen Society" where hydrogen is used in both daily life and industrial activities

Name of Environmental Policy

The Long-term Strategy under the Paris Agreement; Green Growth Strategy towards 2050 Carbon Neutrality

=>Details later

Overview of Hydrogen and FC Policy

- The “Basic Hydrogen Strategy” (2017/12) established by the Ministry of Economy, Trade and Industry(METI) sets the outline of the policy on hydrogen and FC*1and the introduction target of the application.Based on this strategy, the "Strategic Roadmap for Hydrogen and Fuel Cells" (2019/3 revision) formulated and set the technical target of hydrogen SC*2, "Strategy for Developing Hydrogen and Fuel-Cell Technologies" formulated (2019/9).
- **METI, the Ministry of the Environment (MOE), and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) promote research and development related to hydrogen and fuel cells.**
- Agency of Natural Resources and Energy sets“ Innovative Environmental Innovation Strategy” formulated, position hydrogen as a priority field (2020/1)

Quantitative Target

- The following are shown: Application of FCV etc., introduction target of hydrogen ST*3 etc., and hydrogen consumption target.

	2025	2030	2050
FCV	200,000 units	800,000 units	-
FC Bus	-	12 million units	-
Hydrogen ST	320 locations	900 locations	-
Consumption	-	3 million tons	20 million tons

- **Hydrogen costs and technical targets for entire SC also set**

=>Details later

Examples of Measures (Budget Details)

- **Ministry of the Environment**
  - Project to promote a hydrogen society using renewable energy
  - Social Infrastructure Development Project Utilizing Hydrogen
- **Ministry of Economy, Trade and Industry**
  - Strengthening efforts to realize a hydrogen society
  - Promotion of making the renewable energy industry in Fukushima

*Budget for FY 2020 for measures related to hydrogen and fuel cells: 77 billion yen

=>Details later

Source: UNFCCC, MOE, METI, Press Releases
*1: Fuel Cell * 2: Supply Chain * 3: Station

<Reference: Position of Hydrogen>
Hydrogen and fuel cells are mentioned in both the medium-term targets and long-term strategy under the Paris Agreement.

Hydrogen and Fuel Cells under NDC and Long-Term Strategy (Japan)

	Emission Reduction Target	Contents of Hydrogen and Fuel Cells	Date Submitted*2
Medium-term goal (NDC)	By 2030, **-26.0 % (compared to 2013)** (-25.4 % (compared to 2005))	■ One of the measures to reduce energy-derived CO2 emissions in the residential sector is the introduction of high-efficiency water heaters, including fuel cells. ➢ In the residential sector, target 2013 CO2 emissions of 201 Mt*1to 2030 of 122 Mt.	2016/11/8
Long-term strategy	**In 2050, carbon neutral** accomplishment	■ **Hydrogen was mentioned in 10 fields of the 14 priority technology fields.** ➢ Covering four sectors: electric power, industry, transport, business and home =>Details later	2020/12/25 The long-term strategy under the Paris Agreement; Green Growth Strategy towards 2050 Carbon Neutrality

Source: UNFCCC
*1: M = million * 2: Date submitted to UNFCCC

<Reference: Position of Hydrogen>
Green Growth Strategy was formulated for the realization of "virtuous economic and environmental cycles“ and hydrogen is expected to be used across technologies

Outline of Green Growth Strategy

Legend
: Fields referred to for hydrogen

Name	Green Growth Strategy towards 2050 Carbon Neutrality		
Date	December 25, 2020	Formulator	METI

Background

■ Prime Minister Suga declared the goal of realizing a carbon-neutral, decarbonized society by 2050.

➢ METI will take the lead in formulating an industrial policy that will lead to a “virtuous economic and environmental cycles” in cooperation with MOE and other relevant ministries and agencies, presenting concrete prospects as much as possible, setting high goals, and creating an environment that will make it easier for companies to take on challenges.

Realization Conditions

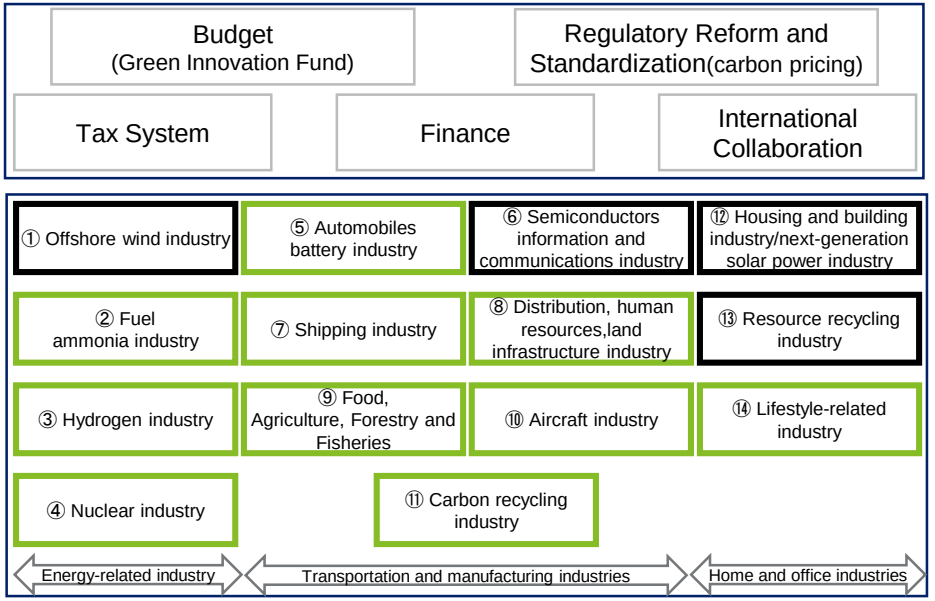
Electric power sector	Industrial sector	Transportation sector	Business and Home sector
Decarbonization is a major premise	Transformation of the manufacturing process	Electric, biofuels and hydrogen fuels	Use of electrification, hydrogenation, and storage batteries

Strategic Framework

Set ambitious targets to encourage companies to invest in cash and deposits (240 trillion yen). **Mobilizing all policy tools** and promoting international cooperation.

According to the action plan, **there are 14 priority technology areas**:
Depending on the development and introduction phase, the schedule will be based on the time base up to 2050.

Covering corporate needs from technology development to recent capital investment. Policy focus on regulatory reform, standardization, demand generation through financial markets, and price reduction through increased private investment



Source: DTC prepared based on Green Growth Strategy

<Reference: Quantitative Target>
Future targets include a hydrogen cost of 20 yen/Nm3 and a water electrolysis equipment of 50,000 yen/kW

Overview of Quantitative Targets Provided by the Hydrogen and Fuel Cell Roadmap*1

		Objectives of the Basic Strategy	Setting targets to aim for		Efforts to achieve the target
Utilisation	Mobility	FCV 200,000units @ 2025 800,000 units @ 2030	2025	● Price difference between FCV and HV (3 M*2 yen → 0.7 M*2 yen) ● Cost of FCV system (FC 20,000 yen/kW → 5000 yen/kW) (Hydrogen storage: from 700,000 yen → 300,000 yen)	• Thorough regulatory reform and technological development
		ST 320 locations @ 2025 900 locations @ 2030	2025	● Maintenance and operation costs (Maintenance costs: 350 M*2 yen → 200 M*2 yen) (Operating expenses: 34 M*2 yen → 15 M*2 yen) ● ST component cost (Compressor 90 M*2 yen → 50 M*2 yen) (Accumulator: 50 M*2 yen → 10 M*2 yen)	• Expansion of Nationwide ST Network, open on Weekend • Expansion of ST at gas stations and convenience stores
		Bus 1,200 @ 2030	early 2020s	● FC Bus Vehicle Price (105 M*2 yen → 52.5 M*2 yen)	• Expansion of bus compatible ST
	Power	Commercialization @ 2030	2020	● Power generation efficiency in hydrogen power generation (26% → 27%)	• Development of high-efficiency combustors
	FC	Grid-parity early realization	2025	● Realization of grid parity for commercial and industrial fuel cells	• Technological development of cell stacks
Supply	Fossil + CCS	Hydrogen cost 30 yen/Nm3 @ 2030 20 yen/Nm3 @ future	early 2020s	● Production: Production cost due to lignite gasification (millions of yen/Nm3 → 12 yen/Nm3) ● Storage and transportation: Liquefied hydrogen tank size (thousand m3 → 50,000 m3) Hydrogen liquefaction efficiency (13.6 kWh/kg → 6 kWh/kg)	• Larger and more efficient lignite gasifier • Improvement of heat insulation and enlargement of liquefied hydrogen tanks
	Reenergized hydrogen	Cost of water electrolysis system 50,000yen/kW @ Future	2030	● Cost of water electrolysis equipment (200,000 yen/kW → 50,000 yen/kW) ● Water electrolysis efficiency (5 kWh/Nm3 → 4.3 kWh/Nm3)	• Model area demonstration utilizing Namie demonstration results • Improvement of efficiency and durability of water electrolysis equipment • Building a Hydrogen Supply Chain Utilizing Local Resources

Source: METI website *1: Based on hydrogen and fuel cell roadmap *2: M = Million

<Reference : Budget Details>
In 2020, MOE and METI invested around 77 billion yen in the hydrogen and fuel cell business

Budget related to hydrogen and fuel cells in FY 2020

Ministry	Classification	Name	Budget Amount	Budgeted Amount Total
MOE	Toward a Decarbonized Society In the technological and social systems practice of innovation	Project to promote a hydrogen society using renewable energy	**3.58 bn. yen**	**6.58 billion yen**
		Social infrastructure development project using hydrogen	**3 bn. yen**	
METI	Strengthening efforts to realize a hydrogen society *1	Subsidy for the introduction of clean energy vehicles	**13 bn. yen**	**70 billion yen**
		Subsidies for hydrogen station construction projects to promote fuel cell vehicles	**12 bn. yen**	
		R & D projects to utilize innovative fuel cell technologies and other technologies to realize a hydrogen society	**5.25 bn. yen**	
		Demonstration project to build hydrogen supply chain using unused energy	**14.12 bn. yen**	
		R & D projects for the construction of low-cost hydrogen supply infrastructure utilizing ultrahigh-pressure hydrogen technology	**3 bn. yen**	

Source: MOE, METI website
*1: Major measures in this section are shown in the sub-section.

<Reference : Budget Details>
In 2021, MOE and METI plans to invest around 77 billion yen in the hydrogen and fuel cell business

Budget related to hydrogen and fuel cells in FY 2021

Ministry	Classification	Name	Budget Amount	Budgeted Amount Total
MOE	Acceleration of decarbonization innovation	Hydrogen utilization promotion project derived from renewable energy, etc. for building a carbon-free society (1)Project to build decarbonized regional hydrogen supply chain (2) Support for decarbonization in the transportation sector through the use of hydrogen	**6.58 bn. yen**	**6.58 billion yen**
METI	Acceleration of Realization of a Hydrogen Society*2	Demonstration project to build a hydrogen society model for decarbonization of industrial activities	**7.31 bn. yen**	**70.7 billion yen**
		Demonstration project to build hydrogen supply chain using unused energy	**4.75 bn. yen**	
		Development of environmentally friendly steelmaking process technology	**2.8 bn. yen**	
		Subsidy for the introduction of clean energy vehicles	**15.5 bn. yen**	
		Subsidies for hydrogen station construction projects to promote fuel cell vehicles	**11 bn. yen**	
		R & D projects for the construction of low-cost hydrogen supply infrastructure utilizing ultrahigh-pressure hydrogen technology	**3.2 bn. yen**	

In addition: Fund for continued support in innovative technology development to achieve carbon neutrality by 2050
(2 trillion yen in 10 years)
① Electrification and greening of electric power
② Realization of a hydrogen society
③ CO2 fixation and reuse, etc.

Source: MOE, METI website
*1: Major measures in this section are shown in the sub-section.