INTERNATIONAL PARTNERSHIP FOR
HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update April, 2016: JAPAN

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Covered Period	From December 2015 to April 2016

1. New Policy Initiatives on Hydrogen and Fuel Cell

- On March 23, 2016, METI has revised "Strategic Road Map for Hydrogen and Fuel Cells", which was originally published by in June 2014. The Road Map indicates updated / new targets on fuel cells and hydrogen, as well as specific steps to achieve the targets

2. Hydrogen and Fuel Cell R&D Update

- NEDO started new RD&D projects, including the development of type-2 composite hydrogen cylinders to lower hydrogen refuelling station construction cost, and the regulation review to allow self-refilling to lower the operation cost of stations.
- In 2015, NEDO started new PEM R&D project, whose results and achievements can be applied to next generation FCVs on the road in 2025 - 2030. NEDO also continued SOFC R&D project, which was started in 2013.

3. Demonstration and Deployments Update

- As of March 2016, 573 FCVs are on the road. Also, Honda released a new FCV "CLARITY FUEL CELL" in March 2016.
- 78 sites of hydrogen stations (70 MPa) are in operation as of April 2016.
- 156,000 units of ENE-FARM, residential micro-CHP fuel cell, are sold as of March 2016.
- The revised Strategic Road Map defines new targets.
  FCV targets: about 40,000 by 2020, about 200,000 by 2025, about 800,000 by 2030.
  HRS site targets: about 160 by 2020, about 320 by 2025.
- Under "Establishment of a Hydrogen Supply Chain Utilizing Untapped Energy" project, NEDO conducted several R&D projects, including the simulation on handling of large volume of hydrogen.

4. Events and Solicitations

- "FC-EXPO 2016", the largest exhibition on hydrogen and fuel cells, was held in March 2016. Dr. Laurent Antoni, a French delegate to IPHE, was invited as a speaker on "Fuel Cell Range Extender EVs in France" in Technical Conference Program Session.

5. Investments: Government and Collaborative Hydrogen and Fuel Cell Funding

Budget highlight on hydrogen and fuel cells in FY 2016 (METI).

- <u>Promotion of stationary FCs:</u>
  Subsidies for Micro-CHP FC sales [JPY9.5 billion = US$ 86 million]
- <u>Promotion of FCVs:</u>
  Subsidies for CAPEX and OPEX of HRS [JPY 6.2 billion = US$ 56 million]
  Subsidies for clean-energy vehicle sales (incl. FCVs) [JPY 13.7 billion = US$ 125 million]
- <u>Establishing hydrogen supply-chain:</u>
  Demonstration of a hydrogen supply chain [JPY 28 billion = US$ 25 million]
- <u>R&D on FCs</u> [JPY 3.7 billion = US$ 34 million]
- <u>R&D on HRS</u> [JPY 4.15 billion = US$ 38 million]
- <u>R&D on hydrogen production, transport and storage</u>
  (incl hydrogen production from renewables) [JPY 1.55 billion = US$ 14 million]

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Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
Fuel Cell Vehicles[1]	40,000 by 2020 200,000 by 2025 800,000 by 2030	573 (as of Mar 2016)	-	• Subsidy for purchase (national government initiative)
FC Bus	Over 100 by 2020 (by Tokyo Government)	a few in demo	-	• Subsidy for R&D, demonstration (national government initiative)
Fuel Cell Trucks[2]	No target	-	-	• Subsidy for R&D, demonstration (national government initiative)
Forklifts	No target	4 (Ministry of Env.)	• FC forklifts will be launched in 2016	• Subsidy for R&D, demonstration (national government initiative)
H_2 Refueling Stations	**Target Number**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
70 MPa On-Site Production	160 by 2020 320 by 2025	15 [13 in operation] (as of Apr 2016)	• Initially focusing on four major metropolitan areas	• Subsidy for CAPEX / OPEX (national government and partially local government initiative)
70 MPa Delivered		76 [65 in operation] (as of Apr 2016)		

[1] Includes Fuel Cell Electric Vehicles with Range Extenders
[2] As above

35 MPa On-Site Production	100	14 [Open 5 in operation] (as of Apr 2016)	• Municipality-lead introduction as official vehicles	• Subsidy for CAPEX / OPEX (national government and partially local government initiative)
35 MPa Delivered	No target	-	-	-
Stationary	**Target Number[3]**	**Current Status**	**Partnerships, Strategic Approach**	**Policy Support**
Small[4]	1.4 mil by 2020 5.3 mil by 2030	155,938 (as of Mar 2016)	• Establishing ENE-FARM partners (manufacturers, gas companies and constructors)	• Subsidy for purchase (national government initiative)
Medium[5]	No target	6: SOFC 73: PAFC (Sales number)	• "Commercializing fuel cells for industrial application by 2017" (Strategic Road Map, METI)	• Subsidy for R&D, demonstration (national government initiative)
Large[6]	No target	-	-	-
District Grid[7]	No target	-	-	-
Regional Grid[8]	No target	-	-	-
Telecom backup	No target	-	-	-

[3] Targets can be units installed and/or total installed capacity in the size range indicated
[4] <5 kW (e.g., Residential Use)
[5] 5kW – 400 kW (e.g., Distributed Residential Use)
[6] 0.3MW – 10 MW (e.g., Industrial Use)
[7] 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)
[8] 30MW plus (e.g., Grid Storage and Systems Management)

H_2 Production	Target[9]	Current Status	Partnerships, Strategic Approach	Policy Support
Fossil Fuels[10]	No target	-	• Commercialized at on-site HRSs	-
Water Electrolysis[11] (PEM, Alkaline, SOEC)	No target	-	• Promoting under renewable H2 project (effectively converting surplus renewable energy into hydrogen as an energy storage)	• Subsidy for R&D, demonstration (national government initiative)
By-product H_2	No target	-	• Commercialized at off-site HRS	-
Energy Storage from Renewables	**Target[12]**	**Current Status**	**Partnership, Strategic Approach**	**Policy Support**
Power to Power[13] Capacity	No target	-	• Utilization of hydrogen to support expansion of renewable energy	-
Power to Gas[14] Capacity	No target	-	-	-

[9] Target can be by quantity (Nm^3, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target
[10] Hydrogen produced by reforming processes
[11] Please indicate if targets relate to a specific technology (PEM, Alkiline, SOEC)
[12] Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity
[13] Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity
[14] Operator has the opportunity to provide the stored energy in the form of hydrogen back to the energy system through multiple channels (e.g., merchant product, enriched natural gas, synthetic methane for transportation, heating, electricity)