



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update Oct 2019: Republic of Korea

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1. New Initiatives, Programs, and Policies on Hydrogen and Fuel Cells

[The 3rd Master Plan for National Energy](#), covering from 2019 to 2040, finally includes Hydrogen in the energy mix. Hydrogen is considered as one of main clean energy sources. The energy mix in the Master Plan includes coal, natural gas, nuclear, oil and hydrogen. This document is expected to solidify the positioning of Fuel Cell and Hydrogen (FCH) in the national energy mix in the future in combination with the [Hydrogen Economy Roadmap Korea](#).

2. Hydrogen and Fuel Cell R&D Update

- “National Roadmap of Hydrogen Technology Development” to be finalized by December 2019. Several long-term projects are in preparation for preliminary feasibility study by multiple Ministries, which is under exhaustive review.
- Year 2020 budget draft included 50T KRW (approximately US\$423M) for FCH-related RD&D. Some of themes are as follows;
 - Ministry of Trade, Industry and Energy (MOTIE): Full-cycle technology development for hydrogen and fuel cells, P2G technology development for long-term storage and conversion, Hydrogen production base, Demonstration project of a Hydrogen Refuelling Station (HRS) for FCEV bus
 - Ministry of Energy (MOE): Deployment of FCEV passenger cars, FCEV buses, HRS’s
 - Ministry of Land, Infrastructure, and Transport (MOLIT): [Hydrogen Model City](#) related infrastructure technology, Technology development of safety evaluation and equipment for hydrogen buses, HRS deployment in Smart city projects
 - Ministry of Science and ICT (MSICT): Development of innovative hydrogen energy technologies, Education and training high-end workforces

3. Demonstration, Deployments, and Workforce Developments Update

- A [HRS](#) was installed in central Seoul near the main entrance of National Assembly as the first outcome of the regulatory sandbox, which lifted administrative hurdles.
- Further deregulation is expected to follow by revising the enforcement decree of the “Development Restriction Zone Act” possibly by December 2019. This action is very important for rapid nationwide expansion of HRS installation particularly by private investment.
- [Hydrogen Model City Projects](#), mainly focusing on the hydrogen ecosystem demonstration in residential and transport applications, are finally formulated to include production, storage and transport, and final use within 3~10 km² area depending on hydrogen supply condition. The projects must include either the validation of new technologies or strong synergistic connections with regional industries. Each project is expected to require approximately 29B KRW (approximately US\$25M) with 50% financial support from central government. Three cities will be decided by December, 2019.



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4. Events and Solicitations

Nothing new to report.

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

[KOGAS](#), a public enterprise in Korea, announced its action plan on April 29, 2019 to build national hydrogen infrastructure worth 4.7 trillion KRW (approximately US\$4.1B). Its plan covers from hydrogen production and transport to use with 100 HRS's by 2022 and FC power generation using BOG (boiled-off gas). This is one of the most significant commitments in infrastructure investment made so far to Hydrogen Economy Roadmap Korea announced in January 2019 in the standpoint of full cycle ecosystem of hydrogen infrastructure.

6. Regulations, Codes & Standards, and Safety Update

- [Korean Agency for Technology and Standards \(KATS\)](#) started to work in international collaboration on the standard for FC-battery hybrid systems for construction machinery. (Oct. 2, 2019)
- [KATS](#) also designated various valves used in HRS as products requiring KS certification upon the request of Korea Gas Safety Corporation to strengthen hydrogen safety. (July 24, 2019)
- [Deputy Prime Minister](#) announced the 4th Strategic Plan of Deregulation and Innovation which included the revision of “Development Restriction Zone Act” and enforcement decree. This action is expected to allow HRS's to be located near the ordinary gas and LPG stations, securing more rapid installation of some delayed HRS projects. (Oct. 24, 2019)
- Legal framework has been developed to pursue both nurturing FCH industries and accelerating deployment and hydrogen safety. The bill is under extensive review for a vote in the National Assembly by December, 2019 with the help of safe operation of the [HRS installed in National Assembly](#).



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Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fuel Cell Vehicles ¹	11,000 by 2020 79,000 by 2022	3216 as of 30/9/2019	• 5467 planned by Dec, 2019 with supplementary budget	• KRW 22,500K (MOE) • KRW 10,000K-13,500K (Local government)
FC Bus	145 by 2020 2,000 by 2022	7 as of 30/9/2019	Budget secured for 37 buses in 2019	• MOE incentive: 200M KRW/bus
Fuel Cell Trucks ²				
Forklifts				
H ₂ Refueling Stations	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
70 MPa On-Site Production			Expected to be adopted in Hydrogen city project	
70 MPa Delivered	e.g., WWW by 2020	24 as of 30/9/2019	MOE(28), MOLIT(10), MOTIE(3), HyNet Budget secured for 111 HRS's	• Subsidy amounting to 50% of installation cost
35 MPa On-Site Production				
35 MPa Delivered	e.g., No target	As of [date] SS		

¹ Includes Fuel Cell Electric Vehicles with Range Extenders

² As above



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Stationary	Target Number ³	Current Status	Partnerships, Strategic Approach	Support Mechanism
Small ⁴	50MW by 2022	54 As of 30/9/2019	<ul style="list-style-type: none"> Residential Incentive Program by Korea Energy Agency (KEA) Remaining budget expected to be reallocated to Building Incentive Program Cumulative installation: 2845 As of 31/12/2018 	<ul style="list-style-type: none"> Subsidy covering ~70-80% of installation cost Gas pricing for FCs (local supplier)
Medium ⁵		270 kW As of 30/9/2019	<ul style="list-style-type: none"> Building Incentive Program by Korea Energy Agency (KEA) Cumulative installation: 1595kW (150 sites) As of 31/12/2018 Reallocated budget available for additional 1350 kW 	<ul style="list-style-type: none"> Subsidy covering ~70-80% of installation cost NRE obligation in public buildings
Large ⁶				
District Grid ⁷	1 GW by 2022 8 GW by 2040	97MW As of 31/12/2018	Cumulative installation capacity: 348MW As of 31/12/2018	Renewable Portfolio Standard (RPS)
Regional Grid ⁸				
Telecom backup				

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)



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H ₂ Production	Target ⁹	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fossil Fuels ¹⁰	e.g., CO ₂ -free H ₂ by 2020		<ul style="list-style-type: none"> e.g., Target is one of the government policy objectives of the <i>Strategy for a Hydrogen Society</i> 	
Water Electrolysis ¹¹ (PEM, Alkaline, SOEC)	e.g., 3Mt by 2020			
By-product H ₂				
Energy Storage from Renewables	Target ¹²	Current Status	Partnership, Strategic Approach	Support Mechanism
Power to Power ¹³ Capacity				
Power to Gas ¹⁴ Capacity				

⁹ Target can be by quantity (Nm³, 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, Alkaline, 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)