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Blue Paper

Commercial supply chain and hydrogen strategy roadmap for Asia Pacific - South Korea

Part-12 (Global demand clusters, international trade and development hydrogen strategy roadmaps for different geographies)

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South Korea is betting big on hydrogen. The market size of Korea is anticipated to reach Korean Won (KRW) 26.8 Trillion by 2030

S.KOREA

The hydrogen economy is of key strategic importance to Korea, a country lacking in both conventional and easily exploitable renewable energy resources. Its industrial gases industry has long been influenced by Japanese, American and German technologies and standards, but as hydrogen begins to play a more transformative role in the broader economy, Korea is keen to ensure it has greater control over the technologies and standards that will underpin that transition. Building on this, the Korean government announced its Hydrogen Economy Roadmap in 2019. The roadmap aims to deploy 15GW of utility-scale and 2.1GW of commercial and residential fuel cells by 2040. In terms of mobility, the goal is to have 5.9 million fuel cell cars and 60,000 fuel cell buses on the road by 2040 all supported by 1,200 hydrogen refuelling stations.

The announcement of Korea's Green New Deal in July 2020 - a coronavirus stimulus plan outlining KRW 74 trillion (£47bn) in 'green' public-private capital investment by 2025 - should help the country on its way to achieving these aggressive long-term goals. Korea's hydrogen industry is forecast to almost double in size from KRW 14.1 trillion (£9.1bn) in 2020 to KRW 26.8 trillion (£17.3bn) by 2030. This growth will be driven by investments from large local players such as Hyundai and Doosan who increasingly see hydrogen as a key growth engine. Hyundai Motors intends to spend KRW 7.6 trillion (£4.9bn) under its 'Fuel Cell Vision 2030' programme and looks well placed to capitalise on its early-mover advantage in fuel cells, both by selling its own vehicles and by licensing its fuel cell systems to OEMs around the world.

> Korea Gas Corporation (KOGAS) laid out its 2030 H2 business development targets in May 2019, construction of 25 H2 production plants , more than 700 km of H2 pipelines and operation of 110 HRS and 500 H2 tube trailers by 2030
>
> - KOGAS

Hydrogen strategy roadmap and targets for S.Korea – A landscape view till 2030

Hydrogen Utilization Objective

A. Mobility

Objective		Taxis – 120,000 units by 2040 to expand across country
		Refuelling Stations – 1,200 by 2040 with localisation upto 100%
		Buses - 60,000 units by 2040 that can run for 800,000 kms
		Trucks - 120,000 units by 2040 with localisation upto 100%

B. Energy

Objective		FC Power Plants - 15 GW by 2040
		Residential FC- 2.1 GW by 2040

$20 Billion **Anticipated government investment in South Korea for hydrogen development till 2030**

Hydrogen Supply Objective

A. Hydrogen Supply

Objective		Hydrogen Supply – 5.26 Million Tones/ Year Note- Installation cost down to KRW 7.1m (£4,600)/kW
		Hydrogen Cost – KRW 3000 for large scale electrolyser (£1.9)/kg

B. National Core Technology Plan

		Current Status	Target
Technology	SMR	System Design small scale demonstration	System Efficiency 78% (HHV) by 2030
	Water Electrolysis	Design stage of the development of 1MW original technology and stack technology	100MW system; System Efficiency 50kWh/kg-H2; Dozens of MWs of P2H technology development connected to RE by 2030

Source: Eninrac research & analysis, Hydrogen Roadmap –S. Korea, Channel Checks

Hydrogen strategy roadmap and targets for S.Korea – A landscape view till 2030 (Contd.)

Landscape of Hydrogen in S.Korea as on 2021

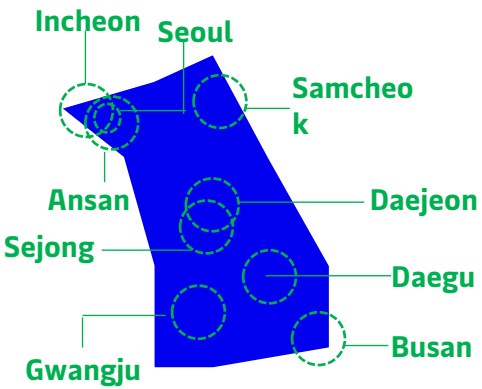
Currently S.Korea Has

- Expected to run in large cities
- ~ 310 hydrogen fueling
- ~2000 buses
- ~ 10 - ton trucks

Key industry archetypes focused in Korea for hydrogen usage

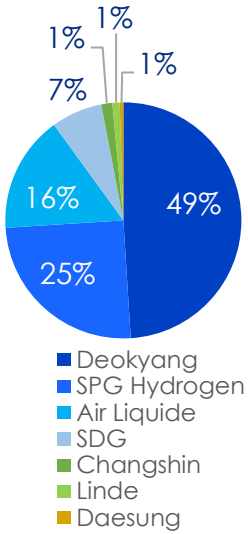
Power | Transport | Buildings

Key Demand Centers



Key hydrogen suppliers in S. Korea and their market share

Company Name	Capacity (NM3/hr)
Deokyang	150,000
SPG Hydrogen	65,000
Air Liquide	53,000
SDG	21,300
Changshin	5,200
Linde	3,200
Daesung	2,000



Source: Eninrac research & analysis, Hydrogen Roadmap- S. Korea, Channel Checks

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Hyundai is indeed well – positioned to become a fuel cell system supplier to the bus OEMs in Korea. However, we cannot deny the fact that this might put us at risk of becoming dependent on our competitor when it comes to the critical technology. Therefore, we are also considering the option of a foreign supplier for the development of our own fuel cell bus

_ Mr. Chihwan KIM, Director of Purchasing Divison (Edison Motors)

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