# Korea Hydrogen Notes (as of April 8, 2024)

1. **Existing Korea Hydrogen Policy Plan**
2. **Targets in the Hydrogen Economy Roadmap (January 2019)**

* **Hydrogen Mobility**: domestic use + export

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|  | **2018** | **2022** | **2040** |
| **Fuel Cell Vehicle** | 1,800 (900) | 81,000 (67,000) | More than 6,200,000 (2,900,000) |
| For personal use | 1,800 (900) | 79,000 (65,000) | 5,900,000 (2,750,000) |
| Taxi | - |  | 120,000 (80,000) |
| Bus | 2 (2) | 2,000 (2,000) | 60,000 (40,000) |
| truck | - |  | 120,000 (30,000) |
| **Charging stations** | 14 | 310 | More than 1,200 |
| **Train, ship, drone** | R&D and pilot project first, and start to commercialize and export before 2030 | | |

* ( ) means for domestic use
* **Hydrogen Energy**

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| --- | --- | --- | --- |
|  | **2018** | **2022** | **2040** |
| **Fuel Cell** |  | | |
| Power | 307.6 MW | 1.5 GW (1GW) | More than 15 GW (8GW) |
| Residential & Building | 7 MW | 50 MW | More than 2.1 GW |
| **Hydrogen Gas turbine** | Technology development by 2030,  Commercialization from 2035 | | |

* ( ) means for domestic use
* **Hydrogen Supply and Price**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2018** | **2022** | **2030** | **2040** |
| **Supply**  (tonnes, per year) | 130,000 | 470,000 | 1,940,000 | More than 5,260,000 |
| **Technology** | ① Byproduct (1%)  ② Extracted (99%) | ① Byproduct  ② Extracted  ③ Electrolysis | ① Byproduct  ② Extracted  ③ Electrolysis  ④ Import  \* ①+③+④ : 50 / ② : 50 | ① Byproduct  ② Extracted  ③ Electrolysis  ④ Import  \* ①+③+④ : 50 / ② : 50 |
| **Price for hydrogen sale** | -  (determined by policy) | 6,000 KRW/kg  (4.5USD/kg)  (initial market price) | 4,000 KRW/kg  (3USD/kg) | 3,000 KRW/kg  (2.2 USD/kg) |

1. **New Government’s Hydrogen Policy Direction** **(November 2022)**

* **Major Targets to Create Clean Hydrogen Ecosystem**

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| --- | --- | --- | --- |
|  | **2022** | **2025** | **2030** |
| **Hydrogen Bus & Truck**  **(cumulative)** | 211 | 5,000 | 30,000 |
| **Liquefied Hydrogen Charging Station** | 0 | 40 | 70 |
| **Power generation by clean hydrogen (%)** | 0 | 2.1 | 7.1 |
| **Construction of Liquefied Hydrogen Plant** | - | - | Capacity: 40,000 tonnes per year |
| **Construction of Ammonia Receiving Facility** | - | - | Capacity: 4,000,000 tonnes per year |
| **Construction of Liquefied Receiving Facility** | - | - | Capacity: 100,000 tonnes per year |

* Creating Hydrogen Power Generation Bidding Market
* Notification on the Hydrogen Bidding Market (implemented in May 2023)

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| --- | --- | --- | --- |
|  | **General Hydrogen** | **Clean Hydrogen** | **note** |
| **Overview** | * General hydrogen is defined as “hydrogen (including hydrogen produced from fossil fuel or natural gas resources) or ammonia”. * Focused on fuel cells power generation * 1st bidding launched in June 2023 | * Clean hydrogen is defined as “hydrogen or hydrogen compounds that have received a clean hydrogen certificate, including carbon-free hydrogen, low-carbon hydrogen, and low-carbon hydrogen compounds”. * Will launch in 2024 |  |
| **Annual Bidding Volume** | * 2023: 1,300 GWh (commercial operation in 2025) * 2024: 1,300 GWh   (commercial operation in 2026)   * 2025: 1,300 GWh   (commercial operation in 2027) | -  -  -  - 2024: 3,500 GWh (commercial operation in 2027)  - 2025: 3,000 GWh (Commercial operation in 2028) |  |
| **Annual Purchase volume for buyers** | * 2025: 1,300 GWh * 2026: 2,600 GWh * 2027: 3,900 GWh * 2028: 5,200 GWh   For 2025, Korea Electric Power Coporation (KEPCO) and 5 district electricity companies will be required to purchase certain quantity of hydrogen power generation. (mostly by KEPCO) | -  -  - 2027: 3,500 GWh  - 2028: 9,500 GWh | Certain electric utility entities, such as Korea Electric Power Corporation (“**KEPCO**”) and district electricity companies, will be required to purchase a certain quantity of hydrogen power generation |

* Creating Clean Hydrogen Certification System in 2024

1. **Implementation Plan for New Government’s Hydrogen Policy (December 2023)**

* **Notification on the Operation of Clean Hydrogen Certification System**
* **Projection of clean hydrogen demand**
* Clean hydrogen power generation will account for 2.1% of Korea's energy mix by 2030 and 7.1% by 2036, with a demand of 800,000 tonnes
* Transport targets include 300,000 hydrogen commercial cars, 660 charging stations, and 390,000 tonnes of hydrogen demand by 2030.
* Industry: no detailed projections
* **Clean Hydrogen and Certification Standards**  
    
  The Proposed Notification uses the greenhouse gas emissions calculated by the life cycle assessment (the “LCA”), a technique for calculating and evaluating the CO2 equivalent amount per hydrogen mass emitted during the process from raw material extraction to hydrogen production/import (including domestic/international transportation), as the standard for clean hydrogen certification(so-called “well-to-gate” perspective).   
    
  The Proposed Notification establishes the greenhouse gas emissions benchmark for clean hydrogen is established as “4kgCO2eq/kgH2” and devides it into four grades based on the actual amount of greenhouse gas emissions.

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| --- | --- | --- | --- | --- |
| **Classification** | **Grade 1** | **Grade 2** | **Grade 3** | **Grade 4** |
| **Certification Standards (Emissions)**  **(Unit: kgCO2eq/kgH2**) | 0.00 - 0.10 | 0.11 - 1.00 | 1.01 - 2.00 | 2.01 - 4.00 |

* **Incentives for Clean Hydrogen**
* Expand funding for overseas hydrogen production facilities with government loans up to 30% of business cost.
* Tax incentives for clean hydrogen technology development, if designated as “national strategy technology” include 30%~50% tax incentives for R&D and 15% for infrastructure investment
* Subsidies for certain electrolysis pilot programs

- Green hydrogen production combined with renewable energy (3MW in Jeju 13.5 billion KRW, 12.5 MW in Jeju 29.6 billion KRW)

- pink hydrogen production during 2024 and 2028, totaling 29 billion KRW.

* Plan to subsidize for the unit price of clean hydrogen power generation, but no details are available at this time.
* **Updated target to Expand Hydrogen Vehicle Plan**

By 2030, 300,000 of hydrogen vehicles and 660 hydrogen charging stations.

1. **Current Performance**
2. **Targets and Performance under the Hydrogen Economy Roadmap**

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | **2018** | **2019** | **2020** | **2021** | **2022** | **June 2023** |
| **Hydrogen Vehicle**  **(cumulative)** | **Target**  (domestic) | **1,800**  (900) | - | - | - | **81,000**  (67,000) | - |
| **Performance** | **1,829** | 6,807 | 13,671 | 23,290 | **33,907** | **36,984** |
| **(domestic)** | 893 | 5,083 | 10,906 | 19,404 | 29,623 | 32,484 |
| Personal use | 891 | 5,068 | 10,831 | 19,270 | 29,337 | 32,135 |
| Bus | 2 | 15 | 75 | 129 | 281 | 342 |
| Truck | 0 | 0 | 0 | 5 | 5 | 7 |
| **(Export)** | 936 | 1,724 | 2,765 | 3,886 | 4,284 | 4,520 |
| Personal use | 936 | 1,724 | 2,719 | 3,838 | 4,199 | 4,410 |
| Bus | - | - | - | - | - | - |
| Truck | - | - | 46 | 48 | 85 | 110 |
| **Charging stations** | **Target** | 14 | 34 | 100 | 180 | **310** | - |
| **Performance** | 14 | 34 | 70 | 170 | **213** | **252** |
| **Fuel Cell (MW)** | **Target**  (domestic) | 314.6 | - | - | - | **1,500**  (1,000) | - |
| **Performance** | 352.5 | 472.3 | 618.1 | 799.9 | **882.2** | **929.6** |
| Power | 347.3 | 464.4 | 604.8 | 781.8 | 858.6 | 903.5 |
| Residential & Buildings | 5.2 | 7.9 | 13.3 | 18.1 | 23.6 | 26.1 |

* Note: **Performance Data from unpublished source**

1. **Exports**

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| --- | --- | --- | --- | --- | --- | --- |
|  | **2018** | **2019** | **2020** | **2021** | **2022** | **June 2023** |
| **Hydrogen Vehicle** | 227 | 788 | 1,041 | 1,121 | 398 | 236 |
| **Fuel Cell(MW)** | - | - | - | 1.76 | 109.8 | - |

* Note: **Performance Data from unpublished source**

1. The 1st liquefied hydrogen plant in Korea was announced to be built in Changwon, Gyeongsangnam-do (South-east coast) in January 2024. The plant will produce 5 tonnes per day, totaling 1,825 tonnes per year, which will be distributed to nearby businesses, hydrogen filling stations, and research institutions, etc.
2. **Other points**
3. **Central Government Budget for Hydrogen**

* The Ministry of Trade, Industry, and Energy (MOTIE) will allocate 19.6 billion in 2023 to 17.4 billion in 2024 for hydrogen-related expenses.
* The Ministry of Land, Infrastructure, and Transportation (MOLIT) allocates budgets for hydrogen transportation (12.8 billion in 2023 to 11.7 billion in 2024) and hydrogen filling stations (4.5 billion in 2023 and 2024).
* The Ministry of Environment (MOE) allocates subsidies for hydrogen vehicles (633 billion in 2023 to 621 billion in 2024) and hydrogen filling stations (189.6 billion in 2023 to 181.7 billion in 2024).

1. **Investment** (The below contents does not include all of the investments)

* According to a July 2022 report by Korea Institute for Industrial Economics & Trade, the number of Enterprises in Korea’s hydrogen industry has expanded from 58 in 2015 to 279 in 2021.
* Korean government (MOTIE) and private enterprises propose to invest 317.7 billion KRW in total over 5 years to construct liquefied hydrogen facility in Samcheok, Gangwon Province (east coast of Korea).
* Korea Gas Corporation will scale back its plans for establishing liquefied hydrogen plant. KOGAS projected to invest 2.83 trillion KRW by 2026 in total (311.4 billion KRW in 2024). However, it adjusted its hydrogen business plan, stating that it will invest 344.5 billion KRW in total by 2027, compared to 29.9 billion KRW in 2024.