

Strategic Roadmap for Korea's hydrogen Economy & Role of H2KOREA

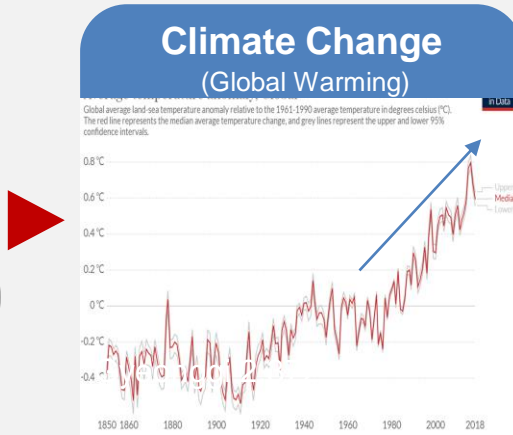
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Why Hydrogen Economy?



Use of fossil fuels



Environmental Issue & Resource Depletion
due to **Climate Change**

Paris Climate Agreement(2015)

A global agreement on the reduction of climate change

- Keeping the increase in the global average temperature to well below 2 °C
- The automotive industry is facing changes and challenges



In response to **global warming and climate change**,

Global Leaders agreed to

- ① Keep a global temperature rise in 21st century well below **2°C** above pre-industrial levels
- ② Pursue efforts to limit the temperature increase even further to **1.5°C**

* U.S. withdrew from the Agreement in 2019,
But officially rejoined the Paris Climate Agreement in 2021

With global trend of **transition into renewable energy**,

Eco-friendly energy source

Hydrogen

will replace the fossil fuels



Types of Hydrogen & their importance

Hydrogen is Versatile eco-friendly energy



Fuel

Heat

Feedstocks

Transport



Industry



steel, aluminum
cement, paper, etc.

Chemicals



fertilizer, plastic,
refinery, etc.

Power



electricity,
power generation
(for peak-time), etc.

Buildings



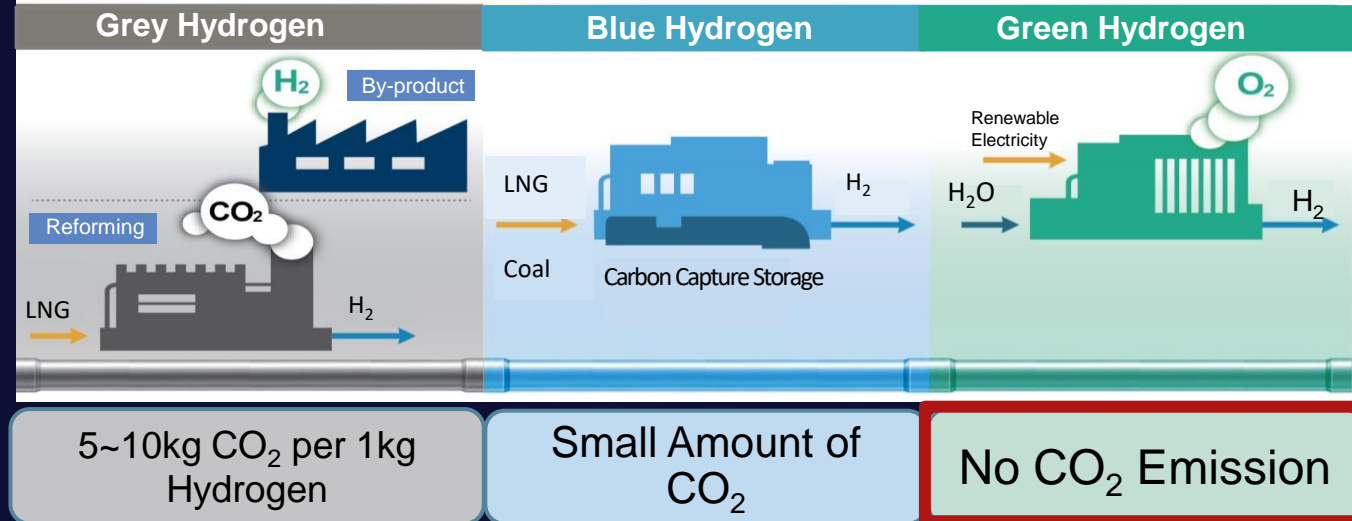
household &
industrial use, etc.

Products



Metallurgy, Steel,
Glass, etc.

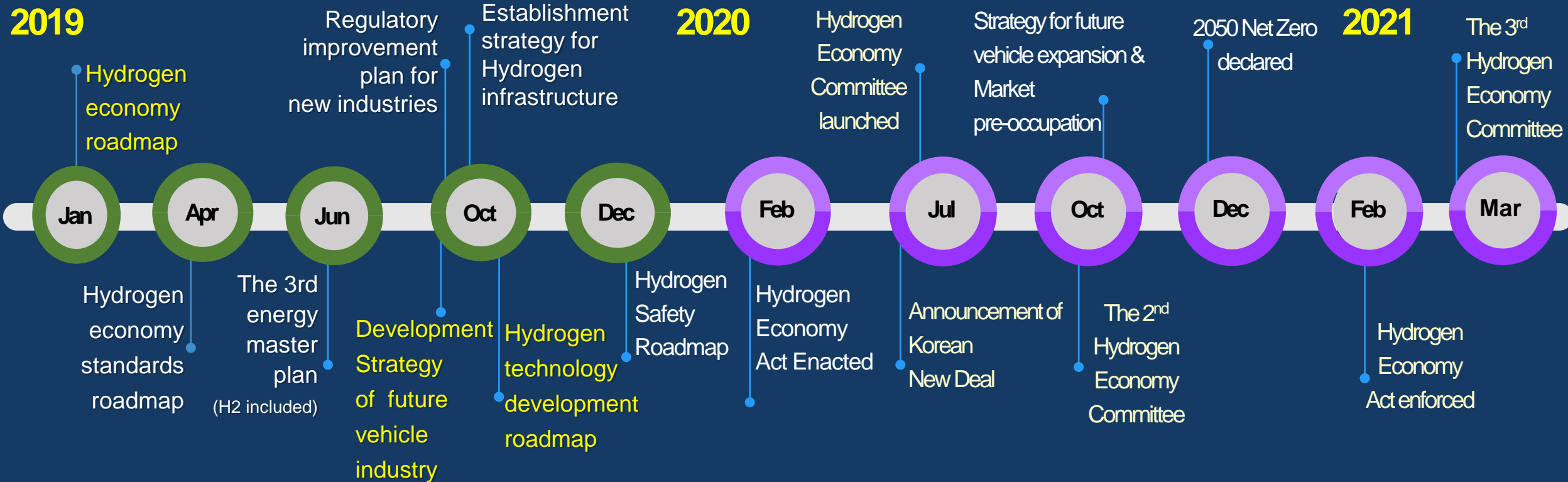
Types of Hydrogen



CO₂ Emission Free during the entire producing value chain

Play a crucial role in **Carbon neutrality** in 2050

Korea's Efforts to realize hydrogen economy



Korea's Hydrogen Economy Roadmap and its progress (17 Jan. 2019)



➤ Vision

To Become the World's Top-Class Country in Hydrogen Economy

- ① Achieving the No.1 share of global market for FCEV and fuel cells
- ② Becoming Green Hydrogen Producer from Energy Importer



➤ Target

	2018	2022	2030	2040
	1,800 units	81,000 units	850,000 units	6.2 million units
	14	310	660	1,200
	307MW	1.5 GW	2.0 GW	15 GW
	130,000 tons / year	470,000 tons/ year	1,940,000 tons / year	5,260,000 tons / year
	8,000won / kg	6,000 won / kg	4,000 won / kg	3,000won / kg
	By-product hydrogen	By-product hydrogen Hydrogen extraction (LNG reforming)	By-product hydrogen, Hydrogen extraction Water electrolysis, Overseas production	

Korea's Hydrogen Economy Roadmap and its progress (as of May)

Hydrogen Vehicle and HRS

- Hydrogen cars: 14,426 units
※ Gyeonggi 2,372, Ulsan 2,040, Seoul 2,005 etc.
- Bus: 106 units, Taxi: 20 units
※ Hydrogen-powered public transport (~2040)
Taxi : 80,000 units, Bus : 40,000 units, Truck : 30,000 units



- Hydrogen Refueling Station(HRS): 88 units

The 1st Regulatory sandbox :
HRS at the National Assembly(2019.9)



Fuel cell power plants

- Plants: 53 units, 659MW
- Buildings: 7.1MW (as of Dec 2020)



Institutionalization the Promotion of Hydrogen Economy

- Hydrogen Act : Main contents & the meaning of enactment

Promulgation of <The Promotion of hydrogen economy and the hydrogen Safety Management Act>:
Enactment ('20. 2. 4.), Enforcement(21.2.5, Safety Sector : 22.2.5)

Main Points

- 1 Preparation of a promotion system for the hydrogen economy
 - Hydrogen Economy Committee (led by Prime Minister)
 - Designation of a dedicated institution for promotion/distribution/safety of hydrogen industry
 - Preparation of a hydrogen economy implementation system
- 2 Support policy to foster the hydrogen economy
 - Promoting the creation of a foundation such as fostering/supporting hydrogen-specialized companies
 - Human resources management, technical development, standardization, commercialization, and designation of hydrogen-specialized complexes
- 3 Safety management of related plants and low-pressure balance of plant such as electrolyser
 - Establishment of safety management regulations for hydrogen-related products(fuel cell, electrolyser, hydrogen extractor, etc.) and facilities

Meaning of enactment

- > World's First Hydrogen Act to promote safety-based hydrogen economy
- > Eliminate uncertainty and Secure sustainability in government policy → Encourage private investment

* SK, Hyundai Motor Co, Posco agreed to invest 43 trillion won('21.3.2, The 3rd Hydrogen Economy Committee)



Institutionalization the Promotion of Hydrogen Economy

- Hydrogen Economy Committee

Status

"Hydrogen Economy Control Tower"
chaired by prime minister and related ministers



Role

"Leap forward as a pioneer in Hydrogen Economy
through policy review and resolution"



Launch

Leap forward as a global leader in hydrogen economy by converging the capabilities of ministries

- 1 Compare to developed countries(USA,JPN,DEU), momentum is needed to become a leader in the global hydrogen economy
- 2 Building at-scale ecosystem to achieve the goal of supplying 67,000 FCEV, 310 HRS by 2021
* Designation of institutions dedicated to industrial promotion, distribution, and safety to support balanced development of the ecosystem such as fostering specialized companies
- 3 Need to start mid-to-long term future projects in advance
* full-scale international cooperation projects needed to build and expand global green hydrogen supply chain

1st('20.07)



2nd('20.12)



3rd('21.03)

Institutionalization the Promotion of Hydrogen Economy

- Designation of hydrogen economy dedicated agencies

Promotion of Hydrogen Industry (H2KOREA)



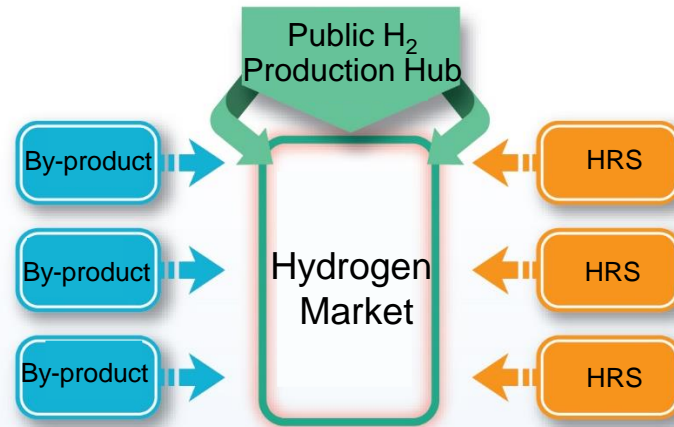
Main role

- Establishing the foundation of the Hydrogen Industrial Promotion
- Fostering Hydrogen Economy Eco-system

Main Business Plan

- Promoting and Supporting Hydrogen Specialized Enterprises
- Improving Public Relations & International cooperation

Hydrogen Distribution(KOGAS)



Main role

- Stabilizing Hydrogen cost
- Establishment of Hydrogen Distribution Order

Main Business Plan

- Opening and Operating a Hydrogen trade market
- Monitoring illegal activities & H2 quantitative Inspection

Hydrogen Safety(KGS)



Main role

- Hydrogen Safety Standards, R&D, International Cooperation
- Promotion of Hydrogen Safety Education

Main Business Plan

- Establishment of life cycle assessment on Hydrogen Safety Management System
- Securing Safety of Hydrogen Infrastructure & Establishing Hydrogen Safety Eco-system

Introduction of H2KOREA

H2KOREA is an organization dedicated to promoting the hydrogen industry in Korea

It was designated by the Korean government on July 1st, 2020.

Background

- Various value-chain including FCEV, H2 production & transportation, deployment & operation of HRS, etc.
- Need an organization for participation and cooperation of public and private sector

Purpose

- To develop H2-based industry and to take its leading role between public and private



Policy Planning

Policy support for promoting the supply of FCEVs and hydrogen refueling stations and fostering sustainable hydrogen energy-related industries

Infrastructure Build-up

Support smooth supply of FCEVs, hydrogen refueling stations

Technology Development

Support for commercialization of FCEVs, hydrogen refueling stations & hydrogen technology

Business Coordination

Support for public safety promotion, technical standards, international cooperation and export of hydrogen energy-related industries

Main roles of H2KOREA

Offer **customized support activities** for improvement in **public acceptance**, **policy making**,
Industry·Academic·Research cooperation



National policy & Legislative assistance

Improving consistency and
transparency of domestic
hydrogen policies

Activities for establishing relevant
policies, laws and regulations



Increasing public awareness

Increase in the public's
understanding of hydrogen safety

Establishing a Public-Private joint
hydrogen energy promotion system
(government, related agencies, enterprises, experts &
public participation)



Support for Industry·Academic ·Research cooperation

Establishment of industry-
academic-research cooperation
network for advancing hydrogen
industry technology

Exploring new business areas,
R&D designing, technology
commercialization



Challenges to Overcome

Laws and Institutions

Challenge Absence of regulations and institutions

Overcome

Analyze existing Laws → Create special-case clause
→ Improve regulations(eg. regulatory sandbox) → Propose

[Best Practice] 1st regulatory sandbox(HRS in National Assembly)



Infrastructure Build-ups

Challenge Avoid operating HRS due to deficits

Overcome

Improving profitability by expanding subsidy support
and improving regulations

[Best Practice] Allow commercial facilities



Public Acceptance

Challenge Civil appeals of residents in installation sites

Overcome

Promote positive aspects preemptively
Collecting opinions in advance and promoting communication

[Best Practice] Resolution of conflicts in Incheon FC plant

인천 수소연료전지발전소 갈등 봉합...최종 민·관 합의

입력 2019-11-18 11:43:16 수정 2019-11-18 11:43:16 정현일 기자

인천 동구 수소연료전지발전소 사업을 놓고 빚어진 주민과 사업자 간 갈등이 봉합됐다.

전해 사업 백지화를 주장했던 주민들은 발전소 건립에는 합의하는 대신 주주 발전 분량을 증설하지 않겠다는 약속을 받아들였다.

박남소 인천시장은 18일 인천시청에서 기자회견을 열고 "올해 1월부터 10개월 만에 분산과 갈등으로 대립하던 인천 동구 수소연료전지발전소 사업이 오늘 민관합의체의 4차 회의로 해결의 실마리를 찾게 됐다"고 밝혔다.



Conflicting interests of stakeholders

Challenge Conflicts due to industry transformation

Overcome

Provide incentives for the co-existing industry
transition

[Best Practice] Support industry transition(Gas station → HRS)



Competences of Domestic Companies

Challenge Avoid using domestic products due to their reliability

Overcome

Encourage collaboration between large enterprises,
SMEs, public organizations, and research institutes

[Best Practice] Hydrogen technology transfer

에너지원, 수소 기술이전 활발...수소경제 활성화 '날개'

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수소생산유닛·수전해 스택 등 기술이전 잇달아
동아화성과 합작투자, 연료전지 시장 진출 추진
개발 중인 사업화 유망기술도 많아 수소산업 확장 기대



Global Issues

Challenge Immediate respond to global issues

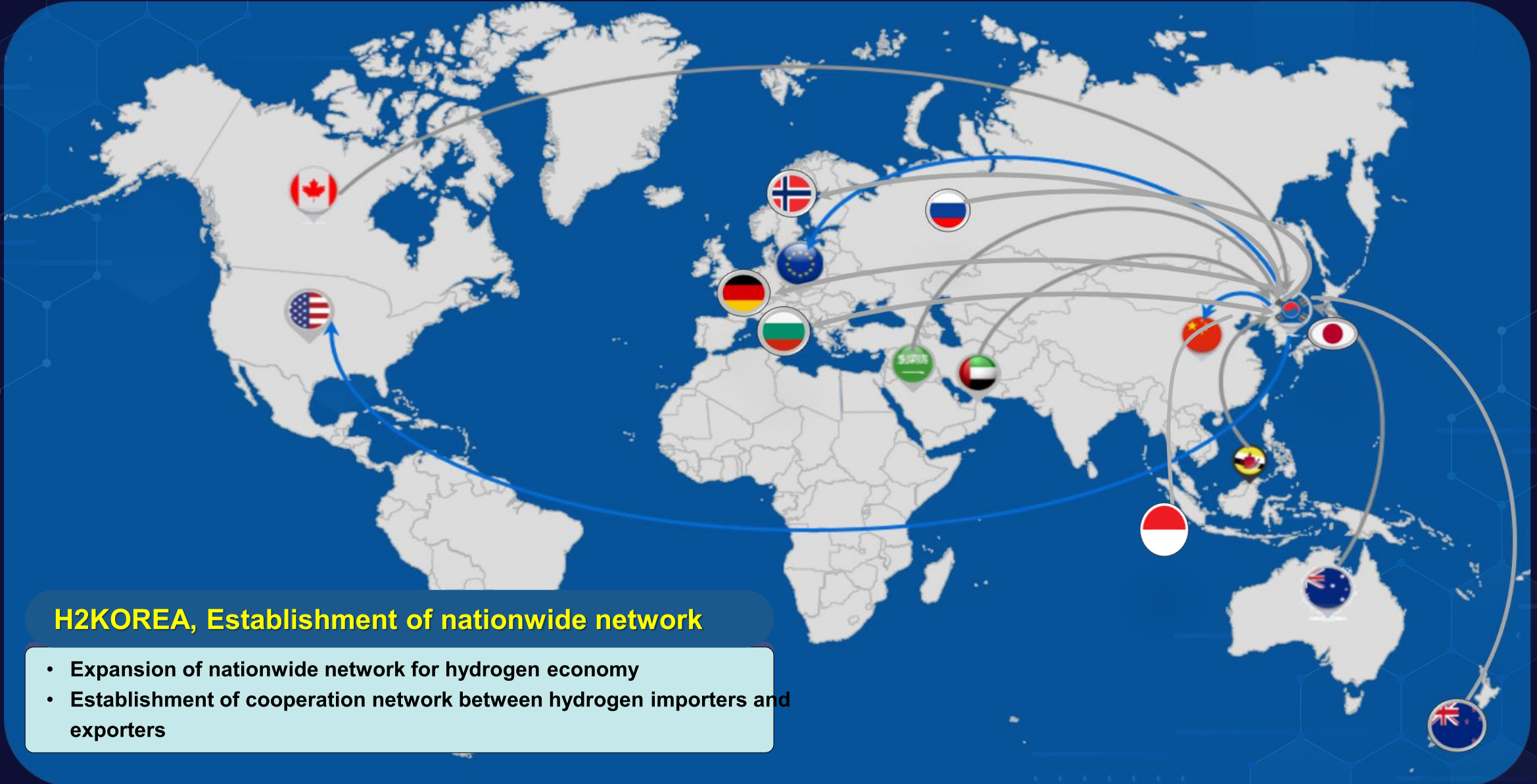
Overcome

Strengthening international network through active
information exchange and regular support

[Best Practice] Cooperation with major countries



Importance of International Cooperation



Thank you for your attention.

