



International Partnership
for Hydrogen and Fuel Cells
in the Economy

The Growing Role of Hydrogen in the Economy: a Sample of International Developments

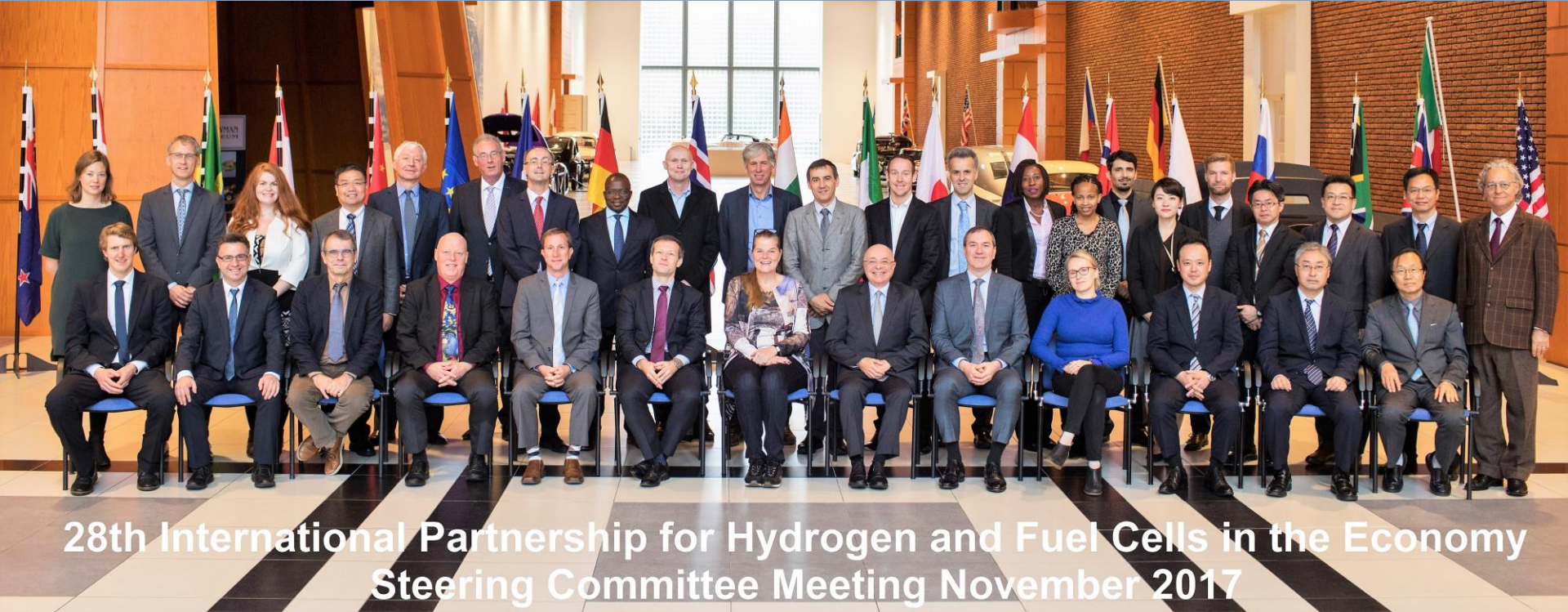
International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) Perspective

by

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Executive Director of the IPHE

9 May 2018



28th International Partnership for Hydrogen and Fuel Cells in the Economy Steering Committee Meeting November 2017

- An Inter-governmental Partnership providing policy-oriented forums to share information to accelerate the cost-effective transition to clean energy, transportation, industry, and building sectors using Fuel Cells and Hydrogen (FCH).
- Partners doing R&D, demos, deployments, and/or implementing policies to increase the use of FCH in the economy.
- From 2003, 19 Partners meeting twice/year, appointed by Governments².

Country Updates

1. New Policy Initiatives
2. Research & Demonstration Updates
3. Demos & Deployments Updates
4. Events & Solicitations
5. Gov't Collaborations / Investment Funding
6. Regulations, Codes and Standards Update

Objective is to provide the latest developments in a Snapshot



INTERNATIONAL PARTNERSHIP FOR
HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update [Month Year]: [Country Name]

The IPHE Secretariat requests each IPHE member submit a one-page narrative update on fuel cell and hydrogen (FCH) activities. Please only report actions and developments since the last Country Update and leave Sections blank if there have been no new developments.

Please complete this form and send to secretariat@iphe.net by 8 November 2017.

Name	[Delegate Name]
Contact Information	[e-mail address, phone number]
Covered Period	[The period between SC meetings]

1. New Policy Initiatives on Hydrogen and Fuel Cell

Report on the introduction of new policy initiatives on FCHs. You may also report significant policy decisions, the release of new strategic papers and/or roadmaps, hydrogen-related organizational changes in the government, etc.

2. Hydrogen and Fuel Cell R&D Update

Provide R&D progress against plans since the last member update. For example, information on cost reductions and enhanced performance of FCH technologies. Please report demonstration and deployment activities separately in the following section.

3. Demonstration and Deployments Update

Provide information on the progress of current demonstration projects and any newly introduced demonstration projects since the last country update. Also, please highlight any deployment decisions made by stakeholders.

4. Events and Solicitations

Provide information on upcoming hydrogen-related events that will include international participants. Also, please provide any information regarding solicitations¹ that can lead to collaboration among IPHE members.

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

Provide recent government, and, government with industry collaborative funding for hydrogen and fuel cell R&D, Demonstrations, Deployments and Infrastructure (in domestic currency and U.S. dollars). Please only include government funding for activities directly related to hydrogen and fuel cells.

6. Regulations, Codes & Standards Update

Provide an update on any national or regional developments related to Regulations, Codes & Standard.

¹ Can include *Requests for Information* and *Calls for Proposals* and other requests that may or may not involve funding support but looks to address issues that may be of interest to IPHE members



Policy Drivers: Based on National Circumstances

1. Energy Security

- Security of Supply and Ability to Switch

2. Energy Efficiency

- Effective Use of Variable Generation – grid services and storage at system-wide and community scale
- Moving from Centralized to Distributed Generation

3. Economic Growth

- New Products and Supply Chains
- Same Products Produced Differently
- Taxpayers Return on Research, Development & Demonstrations

4. Environmental Performance

- Clean Air/Local Air Quality, Climate Change, Noise



Fuel Cell & Hydrogen Deployments a Reality

Comparative Advantages, Policy Objectives, Programmes, & Regulatory Frameworks all impact on the roll-out of FCH.

Country	# of Cars	# of Buses	# of Fork Lifts	# of Stations	# of Stationary Units
China	60	150	2	10	-
France	200	-	~100	18	>50
Germany	~500	146	100	43	~1,900
Japan	~2,450	6	77	122	~235,000
Korea	~100	Demo only		17	177MW
United States	~4,500	25	~16,000	>80	235MW

Source: Member Statements <http://www.iphe.net/partners.html>

In 2016:

- 500 MW of Fuel Cell Power Shipped Worldwide
- 62,000 Fuel Cell Units shipped Worldwide
- \$1.6 Billion in Fuel Cell Revenue

Sources: https://energy.gov/sites/prod/files/2017/11/f46/fcto_nov17_h2_scale_session_satyapal.pdf



Leading Economies Recognizing the Role of H2

New Initiatives on Hydrogen and Fuel Cell

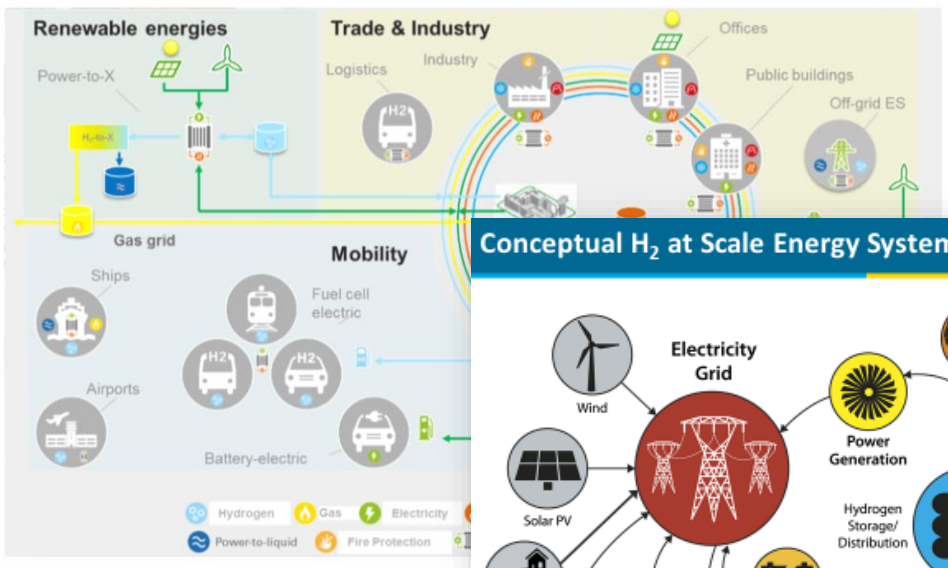
Policy Speech by Prime Minister to Diet Session (20th January 2017)

"The hydrogen energy is a trump card for energy security and global warming mitigation measures. The world's first electric power supply will be started using a hydrogen generator in Kobe by spring 2018. We will challenge to transport a large amount of hydrogen using the world's first liquefied hydrogen carrier and we will build hydrogen supply chain covered from production through to transport and consumption. Realizing these challenges, we will proceed with the reformation of all regulations among ministries."



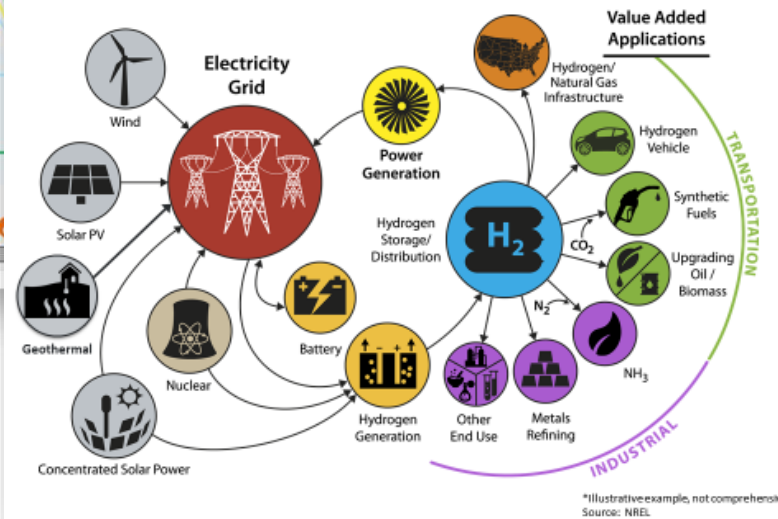
Ministerial Council on Renewable Energy, Hydrogen and Related Issues (April 2017)

Prime Minister Shinzo Abe attended the first meeting of the Council on Renewable Energy, Hydrogen and Related Issues on April 20, 2017, and stated "Japan will be the first in the world to realize a based society. I request relevant ministers to formulate the basic within this year. In particular, I would like relevant ministers to the establishment of hydrogen refuelling stations, and regulations on them, and to formulate a common scenario of building of supply chains and the full-scale introduction of hydrogen generation."



Conceptual H₂ at Scale Energy System

U.S. Department of Energy | Energy Efficiency & Renewable Energy
Fuel Cell Technologies Office

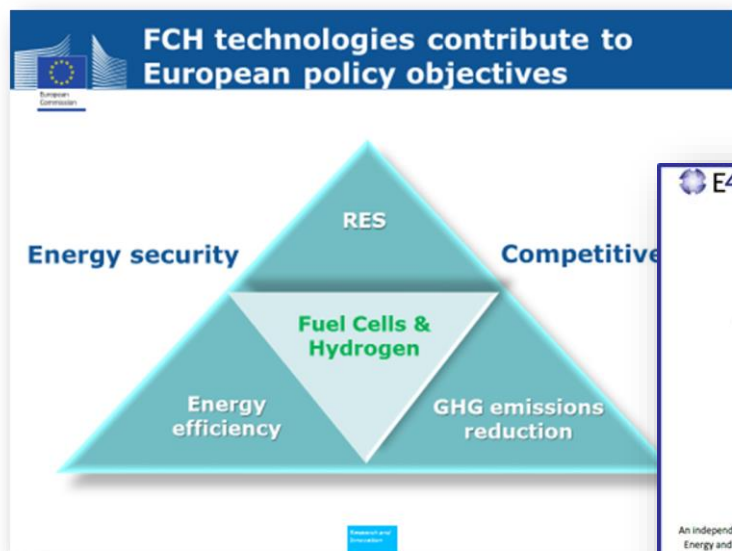


*Illustrative example, not comprehensive
Source: NREL

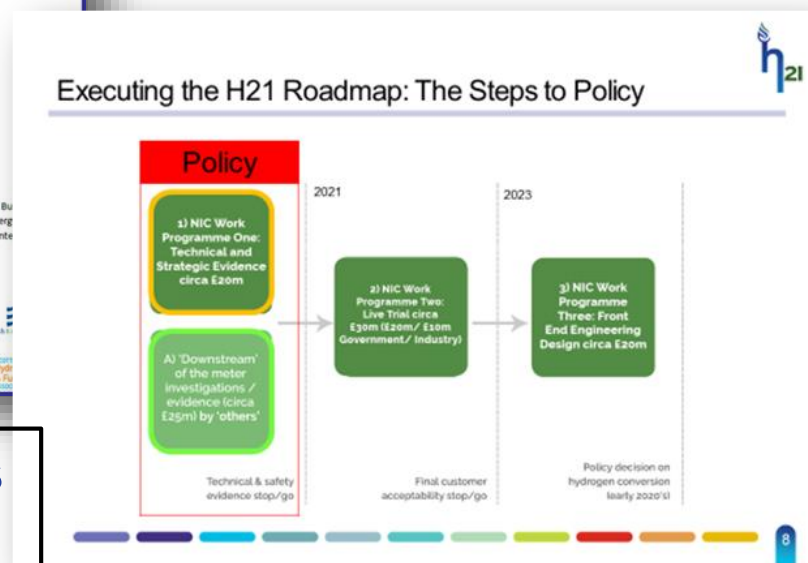
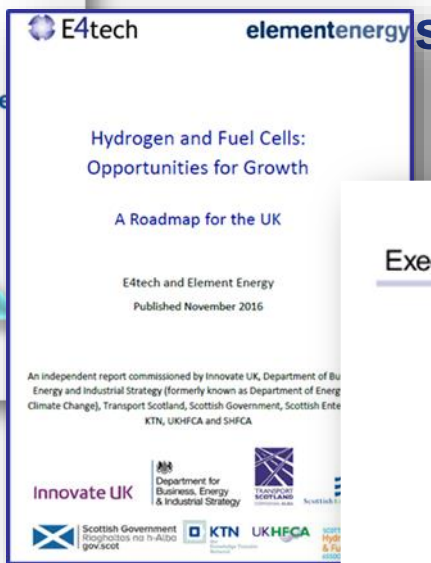


...and the International Energy Agency

Detailed Analysis of Policies, Regulations, Codes & Standards Necessary and On-Going



- Detailed Strategies
- Technical
- Regulatory Reviews
- Technology Road Maps



Changing frameworks & regulations is crucial to the efficient transition to a carbon constrained world.



Unique National Circumstances Driving Actions

- Economic & Industrial Transformation
- Resource Constraints and Requirements
- Comparative Advantage

Country Update China (Fall 2017)

New Policy Initiatives on Hydrogen and Fuel Cell

- On April 6, 2017, MIIT/NDRC/MoST jointly announced the national Mid- and Long Development Plan of Auto Industry. According to this plan, the annual sales/production target of new energy vehicles (NEV) will reach 2M units, and the NEV sales/production is expected to reach 10% of total auto sales/production by 2025. The RD&D of fuel cell is one of the key tasks.
- On September 5, 2017, Shanghai Municipal Government announced the Development Plan on Fuel Cell Vehicle. Shanghai is set to build hydrogen refueling stations and launch 3,000 vehicles, including buses and logistics vehicles, by 2020. Within the timeframe 2017-2020, to have 20,000 fuel cell vehicles in deployment, along with refueling stations.

28th IPHE Steering Committee Meeting The Hague, Netherlands, Nov 2017

7. Main Policies and Strategies in NRE

Overview

- Enforces 18 power producers to supply certain amount of the total Power generation by NRE (Implemented in 2012)
- ※ Obligators: power producers with capacity of 500MW or above

Goal and Current Status

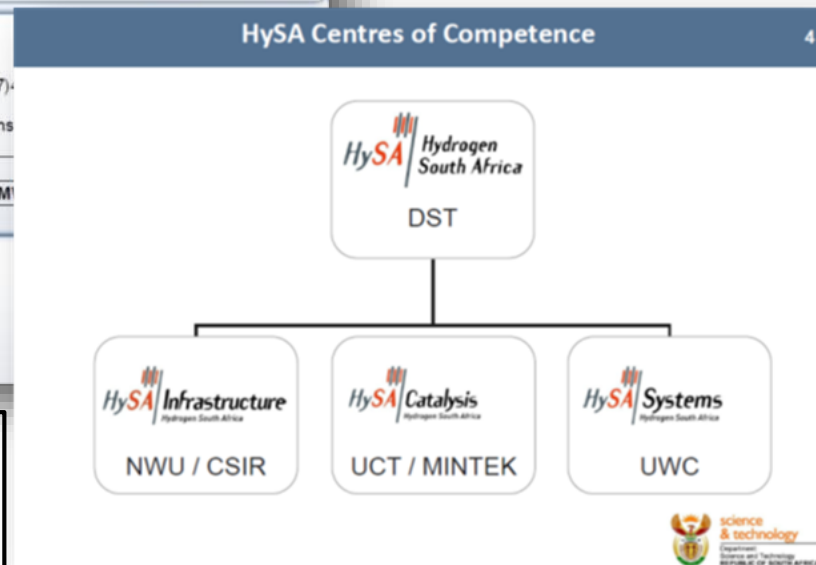
Goal : (*12)2.0% → (*13)2.5% → (*14)3.0% → (*16)3.5% → (*17)4.0%

Current Status : RPS achieved 6.8 times of total FIT ins

RPS(*12~Aug.'16)	FIT(*02~'11)
6,663MW (Solar PV 2,941MW)	980MW (Solar PV 497M)

Best Practice

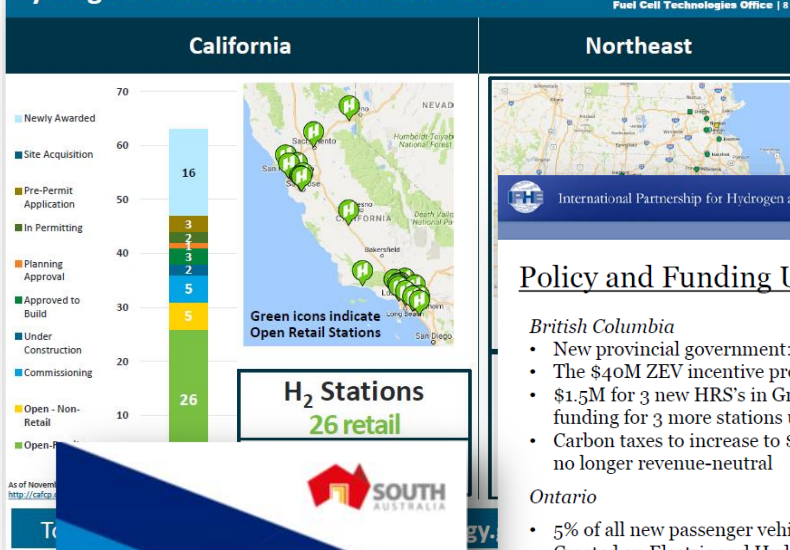
- Gyeonggi Green Power Plant(Fuel Cells)
 - 58.8MW(2013, Hwasung City)
 - MCFC / 2.8MW × 21 Units



Countries' actions reflect the emerging role hydrogen can take in their economy.

Regional Circumstances Also Drives Actions

Hydrogen Infrastructure Activities- Status



Policy and Funding Updates

- New provincial government: **NDP** & **Green** parties
- The \$40M ZEV incentive program remains in place
- \$1.5M for 3 new HRS's in Greater Vancouver funding for 3 more stations under development
- Carbon taxes to increase to \$50/tonne by 2022 no longer revenue-neutral

Ontario

- 5% of all new passenger vehicles to be zero-emissions
- Created an Electric and Hydrogen Vehicle Advancement Fund and updated the Electric Vehicle Incentive Program
- “Hydrail” feasibility study – Greater Toronto region

Quebec

- Completed public consultations for Canada's first
- Pilot network of multi-fuel service stations in 1

28th IPHE Steering Committee Meeting: The Hague, N

Canada



Green Hydrogen Economy in the Northern Netherlands



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Rijkswaterstaat
IPHE Presentation



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For All IPHE Country Reports and Updates see
<http://www.iphe.net/partners.html>