Japan’s efforts to mobilize international actions toward “Hydrogen Society”

October 2019

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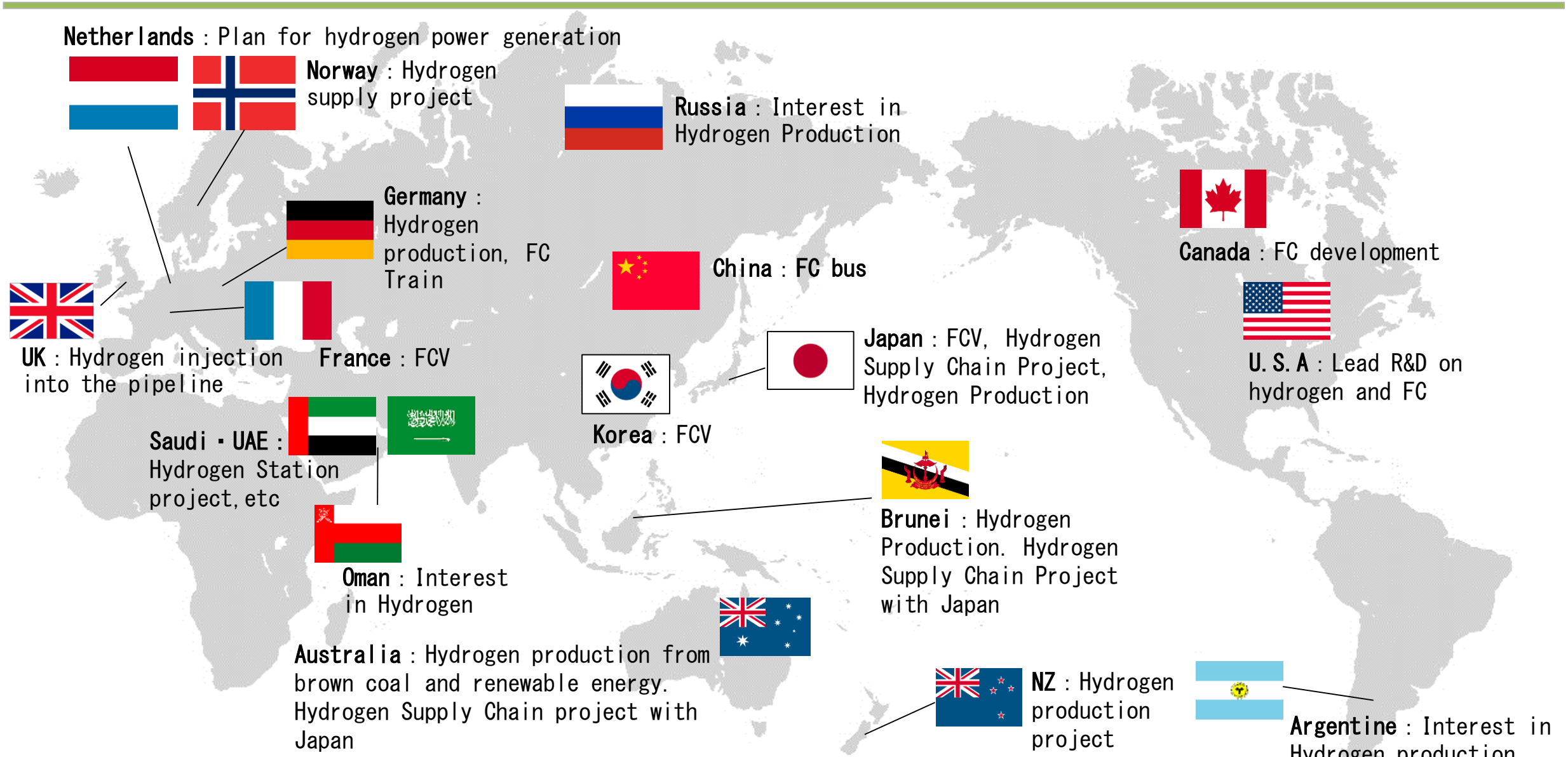
Growing momentum of hydrogen and fuel cells around the world



Multi-lateral initiatives on hydrogen

HYDROGEN INITIATIVE
AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL

H2EM 2019

IPHE

MISSION INNOVATION

Hydrogen Energy Ministerial Meeting 2018

- Date / Place : October 23rd, 2018 / Dai-ichi Hotel Tokyo
- Participants : 300 people including representatives from 21 countries, regions, international organizations, etc.*

*Japan, Australia, Austria, Brunei, Canada, China, France, Germany, Italy, the Netherlands, New Zealand, Norway, Poland, Qatar, South Africa, Korea, United Arab Emirates, United Kingdom, United States, European Commission, IEA Participants :

PROGRAM

- Ministerial Session
- Industry and International Organization Session
  - Plenary Session: Potential of Hydrogen Energy
  - Session 1: Expansion of Hydrogen Use
  - Session 2: Upstream & Global Supply
  - Session 3:Renewable Energy Integration & Sectoral Integration

Four Pillars of Tokyo Statement

- ◆ Harmonization of Regulation, Codes and Standards
- ◆ International Joint R&D emphasizing Safety
- ◆ Study and Evaluate Hydrogen's Potential
- ◆ Communication, Education and Outreach

Progress in implementing the Tokyo Statement

National policies for hydrogen

- Australia (Work in progress)
- South Korea (January 2019)
- Japan (December 2017, March 2019)
- New Zealand (Work in progress)
- Germany (Work in progress)

Progress in implementing the Tokyo Statement

International cooperation

- Davos Meeting “Building the fast track for clean hydrogen economy” (January2019)
- International high-level workshop on Hydrogen (IEA, February 2019)
- Mission Innovation (March 2019)
- IPHE in Austria (April 2019)
- Hydrogen Initiative in the CEM (May 2019)
- G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable growth (Japan, June 2019)
- Hydrogen Energy Ministerial (Japan, September 2019)
- Hydrogen Symposium (Oman, October 2019)

G20 Ministerial Meeting on Energy Transitions and Global Environment for Sustainable growth

G20 Communiqué (excerpt)

The G20 Energy Ministers will step up existing international efforts to unlock the potential of hydrogen as a clean, reliable and secure source of energy including cooperation in research and development, evaluating hydrogen's technical and economic potential, cost reduction pathways and addressing the various challenges including regulations and standards.

G20 Karuizawa Innovation Action Plan (excerpt)

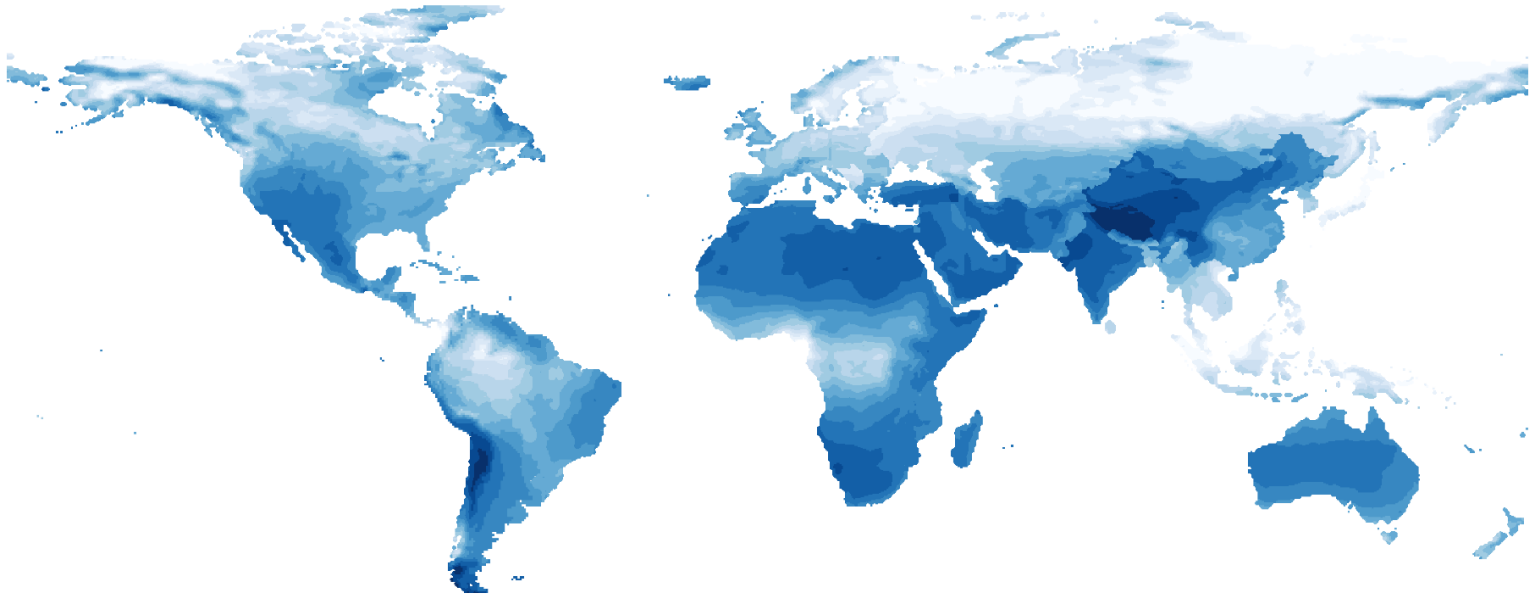
<Hydrogen and other synthetic fuels>

We support the acceleration of our work that will lead to concrete actions which were summarized in the chair's summary at Hydrogen Energy Ministerial Meeting (HEM) 2018, including exchange of best practices, international joint research, evaluation of hydrogen's potential, e.g. for power to x, outreach and addressing regulatory barriers, codes and standards. We promote further international cooperation and discuss concrete actions through frameworks such as HEM 2019 (autumn), the Clean Energy Ministerial (CEM), Mission Innovation (MI) and the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE), and ask relevant international and regional organizations such as the IEA, IRENA and the ERIA to develop the analysis of potential pathways to a hydrogen-enabled clean energy future, including the use of methanol and ethanol as hydrogen carriers in fuel cells. We note that hydrogen as well as other synthetic fuels can play a major role in in the clean energy future with a view to long-term strategies.

IEA Hydrogen Report

- IEA published a report “The Future of Hydrogen”.
- The launch event was held on the occasion of G20.
- The in-depth analysis an study of current state of play & potentials of hydrogen.

Long-term hydrogen production costs from solar & wind systems



(Source: IEA)

Hydrogen Energy Ministerial Meeting 2019

Hydrogen Energy Ministerial Meeting
H2EM 2019

- Date / Place：September 25th 2019 / Hotel The New Otani
- Participants：Representative from **35 nations, regions, organizations**, and more than 600 participants including executive level from relevant enterprises

*Japan, Australia, USA, Bangladesh, Brunei, Oman, Philippine, Vietnam, UK, Costa Rica, Norway, Pakistan, Poland, Argentine, Canada, Chile, EC, France, Germany, Indonesia, Italy, Morocco, Netherland, Korea, New Zealand, Saudi Arabia, Spain, Thailand, UAE, Tanzania, Russia, IEA, ERIA, IRENA, Hydrogen Council

Program

- AM：Discussion for specific international collaboration among each country's minister level
- PM：Workshop among relevant organizations and international enterprises

Participants of 2nd HEM meting
35 nations including regions, organizations

Global Action Agenda（Chair's Summary）

- Launched Global Action Agenda as a principle to guide actions for hydrogen RDD&D to achieve the scale up of hydrogen in the future

Global Action Agenda (Summary)

Hydrogen Energy Ministerial Meeting
H2EM 2019

Context

- Ministers and delegates reaffirmed the view that **hydrogen can be a key contributor to clean, safe and affordable energy for the future**
- Recognizing that **the next ten years will be critical** to enable wider deployment of hydrogen
- The Ministers and Delegates recognized **the value of acting on the Global Action**
- **Agenda** from the Tokyo Statement, **a principle to guide actions for hydrogen technology research, development, demonstration and deployment**

Global Action Agenda (Summary)

Mobility across Applications

- It is of value to share, where appropriate, global, aspirational goals such as, but not limited to, **"10 million hydrogen powered systems" and "10 thousand Hydrogen Refueling Stations (HRS)" in 10 years** ("Ten, Ten, Ten"), as indicative, non-mandatory and collective goals.

- Mobility infrastructure development and market expansion
  - ✓ collaborations to **accelerate the development and deployment of infrastructure**
  - ✓ Facilitate the deployment of **diverse FC mobility systems**
  - ✓ **mobilize financial resources** through innovative mechanisms

- Harmonization of regulations, codes, and standards (RCS)
  - ✓ **harmonization of RCS**, review regulations and address barriers
  - ✓ **strengthen existing global partnerships**

- Research and development (R&D) for next generation FC systems
  - ✓ **promote R&D** (fuel cells, tanks, and hydrogen infrastructure)
  - ✓ **share information** on technologies and challenges

- Ensuring hydrogen safety
  - ✓ **share, accumulate and analyze information** on best practices and incidents

Global Action Agenda (Summary)

Hydrogen Energy Ministerial Meeting
H2EM 2019

Hydrogen Supply Chains

- R&D and Sharing Information
  - ✓ **R&D on supply chain components**
  - ✓ **share challenges and opportunities**

- Promote investment and demonstration projects
  - ✓ identify potential **initial international shipping routes or hydrogen pipelines**
  - ✓ **stimulate commercial demand** for hydrogen through public support

- Support the development of **effective hydrogen trading markets**
  - ✓ support demand creation for the hydrogen market expansion
  - ✓ promote adherence/development of **international standards**
  - ✓ facilitate the **removal and/or reduction of regulatory barriers**

Global Action Agenda (Summary)

Hydrogen Energy Ministerial Meeting
H2EM 2019

Sector Integration

- R&D
  - ✓ **Promote R&D** for areas such as electrolysis, blending hydrogen in pipelines and hydrogen energy storage

- Demonstration
  - ✓ **share and disseminate the progress and outcomes** of demonstration projects
  - ✓ **launch demonstration projects** at coastal ports and regional clusters
  - ✓ **explore the use of existing gas pipelines** for hydrogen blending
  - ✓ continue to identify key areas for **harmonizing RCS**

- Expand the use of hydrogen in various sectors
  - ✓ R&D and scale-up hydrogen use in areas such as **hydrogen power generation and industrial applications**

Global Action Agenda (Summary)

Hydrogen Energy Ministerial Meeting
H2EM 2019

Study and Evaluation of Hydrogen's Potential

- **Conduct further analysis and study** by IEA, IRENA, Economic Research Institute for ASEAN and East Asia (ERIA)
- **Develop projections/scenarios** on the demand for hydrogen to stimulate investment

Communication, Education and Outreach

- **Disseminate information** through various mechanisms (the Education and Outreach Working Group under IPHE)
- **Increase global awareness** (2020 Tokyo Olympics)

Other issues

- Ministers and Delegates acknowledged the **importance of working together to ensure efficient coordination among different international fora**

Hydrogen Energy Ministerial Meeting 2019

- In the afternoon session, Representatives from industry and international organizations discussed the realization of “Global Action Agenda” through speech and panel discussions
- Implemented WS for mobility, supply chain, and sector integration

Mobility WS

Moderator : DOE
Participant : Toyota, Hyundai, Nikola, Iwatani, Linde, JHyM, Ballard

Supply Chain WS

Moderator : IEEJ
Participant : Shell Japan, Kawasaki Heavy Industries, JPOWER, Equinor, JERA, Mitsubishi, Wuppertal Institute

Sector Integration WS

Moderator : EC
Participant : ENGIE, Nel, Asahi Kasei, Nippon Steel, Vattenfall, Hinicio