



# Hydrogen Mobility International: Country Reports



International Partnership  
for Hydrogen and Fuel Cells  
in the Economy

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**H2Mobility Conference:**  
Fuel Cell Electromobility in Germany and  
throughout the World

April 12, 2016



# Outline of Today's Presentation

**Brief Introduction to the IPHE**

**International Trends in Development**

**International Drivers and Commitments**

**Conclusion**

**Caveat:** Views expressed today are those of the Executive Director of the IPHE and are not those of any specific IPHE member country or organisation.



# Brief Introduction to the IPHE

The IPHE is an inter-governmental partnership that provides a forum to share information and advance collaborative initiatives to accelerate the cost-effective transition to the integrated use of fuel cell and hydrogen (FCHs) in the economy.

- Member partners are undertaking significant research, development, demonstration and/or implementing policy initiatives to increase the use of FCHs in the economy.



**Australia**



**Austria**



**Brazil**



**Canada**



**China**



**European Commission**



**France**



**Germany**



**Iceland**



**India**



**Italy**



**Japan**



**Republic of Korea**



**Norway**



**Russian Federation**



**South Africa**



**United Kingdom**



**United States**



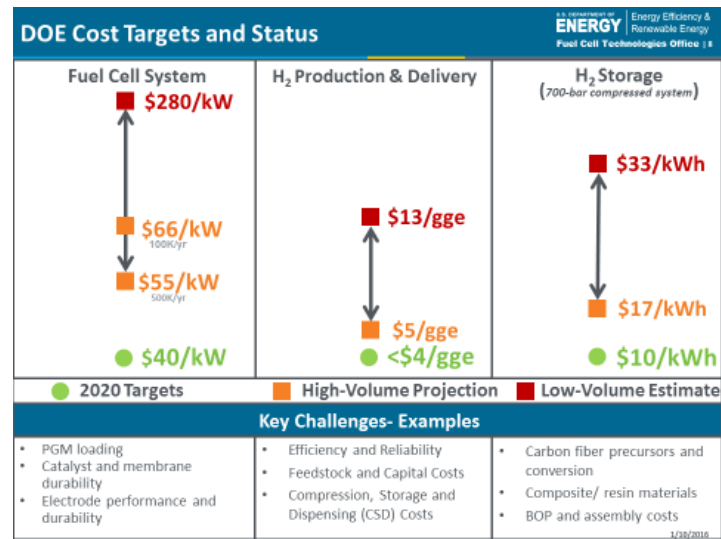
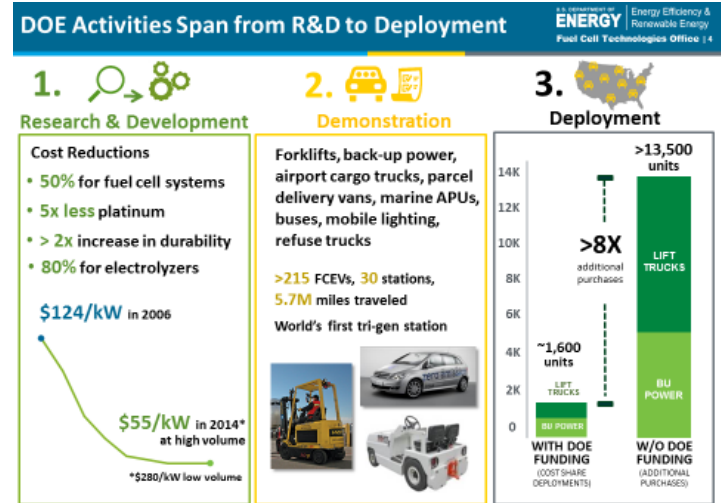
# International Trends

## 1. Significant Cost Reductions:

- Sustained global research, development, and demonstrations by industry and government have led to a significant level of technology maturity and early market deployment.

## 2. Significant Effort to Continue Reducing Costs

- Work across the innovation spectrum is still needed to make further gains in the market and broaden the product suite.






# International Trends

## 3. Initial Commercial Sales Underway


- With cost reductions and leadership by industry, commercial sales are here.
- Initial market introduction also includes range extenders to BEV especially for fleet applications.
- With hydrogen from renewable and low carbon sources the FCEV is a key component in response to Climate Change goals.

**FCEVs are on U.S. Roads Now!**


Available for commercial sale in the U.S.



Now Leasing...



In Auto Shows...



© 2015 Toyota Motor Sales, U.S.A., Inc. © 2015 Hyundai Motor America © 2015 Honda Motor Co., Ltd.





Source: 23<sup>rd</sup> IPHE SC Meeting Wuhan China, May 2015

### Fleets of vehicles

**Fleet definition:**

Fleet vehicles with predictable driving and refuelling patterns, as well as regular visits to or overnight parking at a depot

**Potentially suitable market segments:**

**Rationale**

- ❑ Lower cost 'range-extended' fuel cells could reduce ownership costs of early vehicles
- ❑ Can allow lower pressure fuelling
- ❑ Benefits from existing fleet regulations e.g. zero emissions logistics/urban access restrictions
- ❑ H<sub>2</sub> stations and fleets could be matched to improve utilisation and economics
- ❑ Fleet 'anchor loads' can support early clusters, which can then be connected to form corridors and national coverage

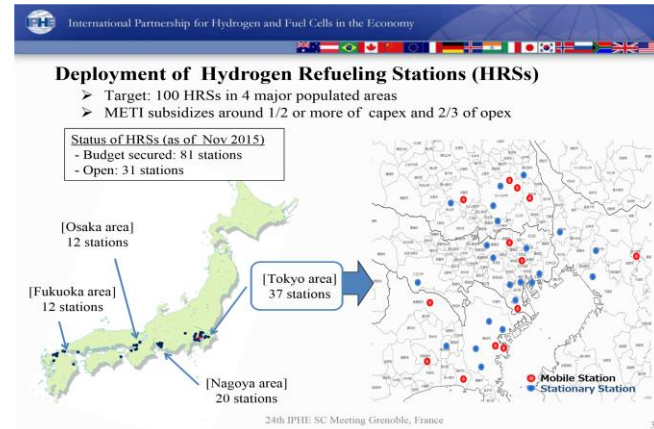
Source: H2 Mobility France



# International Trends

## 4. Focus on Market Frameworks and Market Activation

- International market framework structures are needed such as consistent and robust technical Codes, Standards and compatible Regulations.
- Countries are undertaking significant projects to enable initial stages of infrastructure necessary to take advantage of these emerging FCEVs and other FCH technologies



### Country Update China

- A prototype tram powered by hydrogen fuel cells was unveiled at the CSR Sifang factory in Qingdao on March 19, 2015.



- ✓ A three-car tram capable of carrying as many as 380 passengers; Run for 100 km at speeds up to 70 km/h;
- ✓ Additional testing is being completed at CSR Sifang's facility in Qingdao;
- ✓ Foshan city is going to be the first customer, a fuel cell tram line and hydrogen refueling stations are in design.



# International Trends

## 5. Energy & Transportation System Integration

- Increasing recognition that the longer-term opportunity and need for hydrogen as an integrator.
- Significant technical research and economic analysis is necessary to understand the efficient and effective integration of the systems and the business cases to make it happen.



Vast Promise, Huge Challenges – IEA outlines critical steps to advance hydrogen and fuel cells.  
30 June 2015

International Partnership for Hydrogen and Fuel Cells in the Economy  
**8. Renewable Portfolio Standard(RPS)**

**Overview**

- Enforces 17 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% → ('17) 5.0% → ('20) 8.0% → ('22~) 10.0%
- Current Status : RPS achieved 1.7 times of total FIT installed capacity(proceeded for 10 years) in 2 years

| RPS('12~'13)             | FIT('02~'11)             | Rate of change             |
|--------------------------|--------------------------|----------------------------|
| 1,751MW (Solar PV 589MW) | 1,030MW (Solar PV 497MW) | 170.0% (Solar PV 116.5% ↑) |

☑ **[Fuel Cells Power plants in RPS]** 22 power plants (152.2MW capacity, Mar.'15)

**Best Practice**

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

23rd IPHE SC Meeting Wuhan, China



# International Drivers: Sustainability

## National circumstances drives their actions:

### 1. Energy Security

- Security of energy supply with ability to switch sources, if necessary:

### 2. Energy Efficiency

- More effective use of variable generation – at grid and at community/facility scale; and,
- A move from centralized to distributed energy generation.

### 3. Economic Growth

- Transition of energy and transport systems are leading to new products and supply chains; and,
- Governments (taxpayers) need to realize their R,D&D investments through jobs and economic wealth driven by the private sector.

### 4. Environmental Performance

- Climate change goals for energy and transportation systems; and,
- Clean Air obligations (e.g., NO<sub>x</sub>, SO<sub>x</sub>, Particulates) in Air Sheds.





# International Drivers: Policies

The sustainability objectives also get realized through policies driven by international initiatives such as:

1. **Follow-up to Decisions at COP21**
2. **Actions related to Goals and Objectives under Mission Innovation**
3. **Work within the “Break-through Energy Coalition”**
4. **Components of the work in support of the “Clean Energy Ministerial”**



# International Drivers: Political Commitment

## Recognition of FCHs in the future Energy & Transportation systems

- The China State Council issued *The Energy Development Strategy Action Plan (2014-2020)* ... identifies hydrogen and fuel cells in the list of 20 key innovation directions of energy technology. (Source: Country Update, 23rd IPHE SC Meeting Wuhan, China)
- “[Prime Minister] Abe has declared hydrogen-powered fuel cell vehicles “the ultimate eco-car,” praising their promise for the environment and the nation’s automakers, which are ahead of the pack.” (Source: Japan Times Nov 30, 2015)
- “As part of an all-of-the-above energy approach, fuel cell technologies are paving the way to competitiveness in the global clean energy market and to new jobs and business creation across the country.” Secretary Moniz, U.S. Department of Energy, Dec 19, 2013
- The president [President Park Geun-hye] also asked Hyundai to quickly develop buses powered by hydrogen fuel cells to showcase South Korea's technological prowess at the 2018 Winter Olympics... (Yonhap News Agency March 18, 2016)



# Conclusion

- 1. Significant technical developments have been reached but much more is needed**
- 2. Marketplace frameworks are continuing to evolve with an increasing focus on commercial application and opportunities**
- 3. A group of countries are taking leadership roles in technological and market development while others are developing niche capabilities based on unique circumstances**
- 4. There are a number of global policy objectives where FCV and Hydrogen can contribute significantly**



# Thank You

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