



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update April 2017: European Commission

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Covered Period	November 2016 – April 2017

1. New Policy Initiatives on Hydrogen and Fuel Cell

- In November 2016, the European Commission adopted the package of legislative proposals called **Clean Energy for All Europeans** that implements the EU energy and climate policy post 2020. This package is now being analysed by the European Parliament and the Council. All documents are available here: <https://ec.europa.eu/energy/en/news/commission-proposes-new-rules-consumer-centred-clean-energy-transition>. The following elements are relevant for FCH technologies:
 - **New Renewable Energy Directive**
(http://eur-lex.europa.eu/resource.html?uri=cellar:3eb9ae57-faa6-11e6-8a35-01aa75ed71a1.0007.02/DOC_1&format=PDF) defines how the EU will achieve the binding target of 27% of renewables in the EU energy mix by 2030. Particular focus is on measures that will drive uptake of Renewable Energy Sources (RES), including (advanced) biofuels, electricity, and electricity based fuels in the transport sector. It is therefore very relevant for market uptake of renewable H₂ and Power-to-X.
 - **New Electricity Market Design Directive and Regulation**
(http://eur-lex.europa.eu/resource.html?uri=cellar:c7e47f46-faa4-11e6-8a35-01aa75ed71a1.0014.02/DOC_1&format=PDF;
http://eur-lex.europa.eu/resource.html?uri=cellar:9b9d9035-fa9e-11e6-8a35-01aa75ed71a1.0012.02/DOC_1&format=PDF) aim at creating the conditions for integrating high shares of variable RES inter alia by enabling liquid and well-functioning short-term electricity markets. The focus is on cross-border integration, capacity mechanisms, better inclusion of various flexibility options, and empowering consumers. Electricity storage is addressed thoroughly (including the definition of energy storage), hence the importance for H₂ and FC.
- **The Commission Staff Working Document on Electricity Storage**
(https://ec.europa.eu/energy/sites/ener/files/documents/swd2017_61_document_travail_service_part1_v6.pdf) has ample consideration of the role of H₂ as storage medium, within not only the electricity system, but also its unique potential for 'Sector Coupling'.
- **Integrated Strategic Energy Technology Plan (SET-Plan)**
(<https://ec.europa.eu/energy/en/topics/technology-and-innovation/strategic-energy-technology-plan>) Work continues on the 10 focus areas including preparation of implementation plans. There has been significant interest shown, mainly by the steel and chemical industry, in the use of electrolytic hydrogen under Action 6: Energy Efficiency and Competitiveness of Industry



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

2. Hydrogen and Fuel Cell R&D Update

- Study on "Early Business Cases for Power-to-Hydrogen in Europe" procured by the FCH 2 JU will be finalised by mid-2017. (NB: The focus of the study is on short-term (2017-2025) economic opportunities under the existing (or realistically anticipated) market conditions.)
- Study on "Business models and financing arrangements for stationary fuel cells" is also almost complete. It focuses on defining concrete market entry strategies that can enable stakeholders to unlock the market opportunity for stationary fuel cells in Europe. Once completed, the outcomes of both studies will be shared with IPHE members.
- International outreach for JRC-led harmonisation of test approaches for fuel cells for automotive applications: US-DoE involvement through national labs (LANL, NREL, ANL) together with industry (GM, Ford, Ballard) in the establishment of a harmonised test hardware.
- 2nd plenary meeting CEN-CENELEC TC6 Hydrogen Energy Systems (November 2016) decided on a distribution of work and work structure: (JRC liaison)
 - WG 1: Terms and Definitions
 - WG 2: Guarantees of Origin
 - Ad hoc group 1: Safety – Use of Hydrogen in the Public Domain
 - Ad hoc group 2: Interface Electrolyser to the e-grid
 - Joint ad hoc group 3 (with CEN TC 234): Interface to the Gas Grid
- CEN/TC 234 Workshop on hydrogen in natural gas (H2NG) took place on 29.03.17 (JRC liaison)

3. Demonstration and Deployments Update

Three flagship projects of note under the umbrella of the FCH 2 JU are:

- 1) large scale validation of fuel cell bus fleets (JIVE, <http://www.fch.europa.eu/project/joint-initiative-hydrogen-vehicles-across-europe>);
- 2) demonstration of large-scale rapid response electrolysis to provide grid balancing services and to supply hydrogen markets in the steel industry via 6MW PEM electrolyser (H2Future; <http://www.fch.europa.eu/project/hydrogen-meeting-future-needs-low-carbon-manufacturing-value-chains>); and,
- 3) demonstration of 4MW Pressurized Alkaline Electrolyser for Grid Balancing Services (Demo4Grid, <http://www.fch.europa.eu/project/demonstration-4mw-pressurized-alkaline-electrolyser-grid-balancing-services>)

All launched at the beginning of 2017.

4. Events and Solicitations

- The 2017 Call for Proposals of the FCH 2 JU was published in January 2017 (<http://www.fch.europa.eu/page/call-2017>). EUR 116 M are earmarked for financing 24 topics across transport, energy and cross-cutting pillars.
- The FCH 2 JU in cooperation with Shift2Rail JTI will organise a workshop on FCH technologies in the rail sector on 15/05/2017 in Brussels. More information available here: <http://www.fch.europa.eu/event/hydrogen-trains-real-alternative-electrification>
- The FCH 2 JU is organising a workshop on Maritime and port applications in Valencia, Spain on 15-16/06/2017. More information can be found here: <http://www.fch.europa.eu/event/workshop-maritime-and-port-applications>
- December 2016: JRC-ISO TC 197 Strategic Planning Meeting "H2 @Market" with two topics: *Multi-Fuel Stations* and *Power to Large Scale Hydrogen* – a report is being prepared. There is an increasing global interest for multi-fuel stations



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

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

The total budget of the FCH 2 JU for the period 2014-2020 is EUR 665 M, or on average EUR 95 M/year, covering R&I activities.

Beyond FCH 2 JU, other EU instruments such as TEN-T/CEF or H2020 (Energy Challenge, SME instrument etc.) do provide some ancillary financing. However, this financing is on competitive basis (where FCH have to compete with other technologies). As a result, we estimate the EU level funding for FCH technologies at some EUR 100 M/year on average in the 2014-2020 timeframe.



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

Summary Country Update April, 2017: European Commission

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
Fuel Cell light duty Vehicles ¹	No target	Some 1700 planned, of which 280 deployed (through FCHJU)	<ul style="list-style-type: none"> Addressed through FCH 2 JU Demo projects 	<ul style="list-style-type: none"> Subsidy per vehicle in demo projects
FC Bus	No target	206 planned (through FCH JU) of which 41 deployed (of which 5 discontinued)	<ul style="list-style-type: none"> Addressed through FCH 2 JU Demo projects 	<ul style="list-style-type: none"> Subsidy per vehicle in demo projects
Fuel Cell Trucks ²	No target	3 planned	<ul style="list-style-type: none"> Addressed through FCH 2 JU Demo projects. As of today marginal activity in this area 	<ul style="list-style-type: none"> Subsidy per vehicle in demo projects
Forklifts	No target	265 planned of which 115 deployed	<ul style="list-style-type: none"> Addressed through FCH 2 JU Demo projects 	<ul style="list-style-type: none"> Subsidy per vehicle in demo projects
H ₂ Refueling Stations	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support

¹ Includes Fuel Cell Electric Vehicles with Range Extenders

² As above



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

70 MPa On-Site Production	No target	In total 72 HRSs for road transport (buses + cars) planned, of which 20 deployed <ul style="list-style-type: none"> • 1 x 350 Delivered • 5 x 350 Onsite prod. • 4 x 700 Delivered • 7 x 700 Onsite prod. • 2 x 350/700 Delivered • 1 x 350/700 Onsite 	• Addressed through FCH 2 JU Demo projects	• Fixed amount of subsidy per HRS installation
70 MPa Delivered	No target		• Addressed through FCH 2 JU Demo projects	• Fixed amount of subsidy per HRS installation
35 MPa On-Site Production	No target		• Addressed through FCH 2 JU Demo projects	• Fixed amount of subsidy per HRS installation
35 MPa Delivered	No target		• Addressed through FCH 2 JU Demo projects	• Fixed amount of subsidy per HRS installation
Stationary	Target Number ³	Current Status	Partnerships, Strategic Approach	Policy Support
Small ⁴	No target	3200 planned of which 900 deployed	• Medium-scale deployment through FCH 2 JU demo project	• Fixed amount of subsidy per unit

³ Targets can be units installed and/or total installed capacity in the size range indicated

⁴ <5 kW (e.g., Residential Use)



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

Medium ⁵	No target	14 of which 7 deployed incl. uninterrupted power	• • Small-scale demo projects via FCH 2 JU	• Funding dependent on power level
Large ⁶	No target	2 planned of which one deployed (in China)	• Small-scale demo projects via FCH 2 JU	• Funding dependent on power level
District Grid ⁷	No target			
Regional Grid ⁸	No target			
Telecom backup	No target	9 deployed		
H₂ Production	Target⁹	Current Status	Partnerships, Strategic Approach	Policy Support
Fossil Fuels ¹⁰	No target	Out of scope of the FCH 2 JU		
Water Electrolysis ¹¹	No target	11 planned (excl. HRS) of		

⁵ 5kW – 400 kW (e.g., Distributed Residential Use)

⁶ 0.3MW – 10 MW (e.g., Industrial Use)

⁷ 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)

⁸ 30MW plus (e.g., Grid Storage and Systems Management)

⁹ Target can be by quantity (Nm³, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target

¹⁰ Hydrogen produced by reforming processes

¹¹ Please indicate if targets relate to a specific technology (PEM, Alkiline, SOEC)



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

(PEM, Alkaline, SOEC)		which 7 deployed		
By-product H ₂	No target			
Energy Storage from Renewables	Target¹²	Current Status	Partnership, Strategic Approach	Policy Support
Power to Power ¹³ Capacity	No target			
Power to Gas ¹⁴ Capacity	No target			

¹² Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity

¹³ Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity

¹⁴ Operator has the opportunity to provide the stored energy in the form of hydrogen back to the energy system through multiple channels (e.g., merchant product, enriched natural gas, synthetic methane for transportation, heating, electricity)