



INTERNATIONAL PARTNERSHIP FOR HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update May 2016: FRANCE

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1. New Policy Initiatives on Hydrogen and Fuel Cell

- French legislation related to the energy transition includes hydrogen technologies in the areas of Energy and Transport (Article 121). The French government has to provide to the French Parliament a development plan on renewable energy storage through decarbonized hydrogen by August 2016.
- Government Report on the Hydrogen-Energy Sector: This reports evaluates the various challenges of the H₂-energy sector and puts forward concrete measures to support the rapid industrial development of the most mature and applicable technologies that respond to the objectives of the energy transition. (May 4, 2016). (http://www.cgedd.developpement-durable.gouv.fr/IMG/pdf/010177-01_rapport_cle2be959.pdf).
- Regulations: Revised regulations on the installation of hydrogen fueling infrastructure for forklift vehicles when the quantity of hydrogen present within the establishment concerns the mode of the declaration for the topic n° 4715 came into effect January 1, 2016 (December 23, 2015). (<https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000031672427&dateTexte=&categorieLien=id>)
- The French-German Office for Renewable Energy (OFAEnR) changed name and broadened its sphere of activity related to energy transition. Five main avenues of work are identified; three relate to wind, solar energy and biogas, the fourth relates to the electricity networks and meters, services systems, energy markets, support mechanisms; and, the fifth concentrates on the energy efficiency and the flexibility of the system. These new activities cover storage, renewable heat, “power-to-gas” and “power-to-heat”, hydrogen, mobility, etc...(April 2016)
- Publications:
 - Position Paper on Hydrogen by the Agence de l'Environnement et de la Maîtrise de l'Energie (ADEME) (<http://www.ademe.fr/hydrogene-transition-energetique-l>)
 - Guide on safety and security for hydrogen refueling stations and vehicles by the (ADEME) (<http://www.ademe.fr/sites/default/files/assets/documents/guide-securite-h2-vehicules-station-service-8506.pdf>)
 - Article by L'Association Française pour l'Hydrogène et les Piles à Combustible (AFHYPAC) in the magazine « Bulletin du Droit de l'Environnement Industriel » n°60 December 2015 *Hydrogen, it is today!* The article focuses on the existing French regulations regarding hydrogen production and the implication of the European directive UE n° 2010/75 And recommends RCS to facilitate the deployment of hydrogen technologies in France.



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2. Hydrogen and Fuel Cell R&D Update

- High Temperature Electrolysis System (SOEC): CEA has taken a significant step forward with the development and experimental qualification of a small-scale integrated system. Comprising of one single stack of 25 cells, it produces up to 2.5 Nm³/h of hydrogen in electrolysis mode with efficiency above 99% (HHV), including the balance of plant components and the provision of steam at the inlet. When no steam is available, the overall efficiency was above 79% HHV.

3. Demonstration and Deployments Update

- Energy Storage
 - (MHyRABEL) (Coordinator: Société de Développement et de Gestion des Energies Renouvelables (SODEGER): Mission hydrogène pour la régulation, l'assistance au réseau et à la mobilité à partir des éoliennes lorraines (Mission Hydrogen for the Control, Network Support, and Mobility from the Winds of Lorraine).
The goal is to increase the value of wind energy through the generation of renewable hydrogen. Based on the principle of power-to-gas, the project aims to produce renewable hydrogen for mobility or heating using electricity from the wind farm in Audunois. There are two phases to the project: first phase will consist in identifying and assessing uses (e.g., applications of hydrogen in mobility, heating, and lighting); and, the second phase will focus on implementation. (December 2015)
- Power to Gas
 - Jupiter 1000 (Coordinator: GRT Gas, 30M€)
This project aims to develop a power to methane demonstration project using electrolyzers (alkaline and PEM) at Fos sur Mer.
<http://www.jupiter1000.com/en/projet.html>
- Mobility
 - HYPE
This is the first FC Taxi Fleet (Hyundai FCEVs) in Paris, using the H2 refuelling station (HRS) opened in Paris December 7, 2015. Five FCEVs are driving in Paris, increasing to 70 taxis during 2016. Almost 100,000 km have been driven as of the end of April.
 - HYWAY
This project is the first fleet deployment of 50 RE-FCEVs using 2 HRS in Grenoble and Lyon area following the French national implementation plan proposed by H2 Mobility France consortium. The publically accessible HRS, installed and operated by Air Liquide, opened in Grenoble on January 22, 2016 on the Gaz Electricité de Grenoble site. It is the first multi alternative fuels refuelling station in France (H2, fast charge for battery electric vehicles, and natural gas for NG vehicles). The second HRS of the Hyway project, installed by McPhy Energy and operated by GN Vert a subsidiary of ENGIE, has opened in Lyon on February 1, 2016 on a Compagnie Nationale du Rhône (CNR) site.



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- H2ME (FCH JU)
This project, funded by FCH JU, will deploy 3 new HRS in France (Sarreguemines, Rodez and Paris).
The first Kangoo ZE-H2 vehicle was delivered to Braley (a French waste management company) in France under H2ME.
The hydrogen refuelling station Sébazac (near Rodez) will open around the end of 2016 with hydrogen production on site planned from June 2017. This project also includes the deployment of a large electrolyser from Areva H2Gen that will use renewable electricity provided by hydro power from the local French Department of Aveyron, which produces about 12% of the national hydro-power electricity. (April 2016)
- Clean hydrogen bicycles for urban areas
La Poste is testing 12 bicycles with electric assistance, propelled by fuel cells in Anglet, Aquitaine. Pragma Industries produce the fuel cells.

4. Events and Solicitations

- “Hydrogen: What are the new uses within the framework of the energy transition?”, May 18, 2016, Paris (http://www.agrion.org/sessions/agrion-fr-hydrogene_transition.htm)
- “Hydrogen: A society question?” June 21, 2016, Orme des Merisiers, Saclay <http://itese.cea.fr/fr/Evenements/2016/SeminaireSHS/index.php>
- 4th Hydrogen in territories event: June 29-30, Grenoble (<http://www.afhypac.org/actualites/evenements/detail-8/>)
- Electromobility days, September 23-24, Grenoble
- 2nd Materials Issues for Fuel Cells and Hydrogen Technologies: From innovation to industry. September 19-21, 2016, Grenoble
- Energy storage technologies by power to fuels and chemicals event, December 5-6, 2016, Grenoble

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

- Call for proposal by Ministries of Environment and Economy on “hydrogen in the territories” launched May 2016.
Demonstration projects are expected to cover various typologies where hydrogen technologies could have an impact: metropolis & dense urban area; rural territories attached at urban communities of small size; territories sub urban or intermediate urban area of medium size; isolated territories; and, airport and harbor zones.
(<http://www.developpement-durable.gouv.fr/IMG/pdf/AAP-territoires-hydrogene.pdf>)



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Summary Country Update May 2016: France

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
Fuel Cell Vehicles ¹	1,000 by 2020	As of April 16 ~110	• National Implementation Plan based on a cluster model approach	• Subsidy for purchase (national government initiative on electrical vehicle, European projects)
FC Bus	No target	As of April 16 0	• European project 3E Motion with 5 Buses in Cherbourg by 2017	• Subsidy for purchase (European project)
Fuel Cell Trucks ²	No target	As of April 16 1	• Partnership La Poste, Renault Trucks and Symbio FCell	
Forklifts	No target	As of April 16 ~60		
H ₂ Refueling Stations ³	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
70 MPa On-Site Production	100 by 2020 (share between types of HRS to be fixed)	As of April 16 0		
70 MPa Delivered		As of April 16 2		
35 MPa On-Site Production		As of April 16 0		
35 MPa Delivered		As of April 16 5	• National Implementation Plan based on a cluster model approach	• Subsidy for installation and operation

¹ Includes Fuel Cell Electric Vehicles with Range Extenders

² As above

³ Public and semi-public (private HRS: 5)



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Stationary	Target Number ⁴	Current Status	Partnerships, Strategic Approach	Policy Support
Small ⁵	No target	As of April 16 8 units installed		
Medium ⁶	No target	As of April 16 1 unit installed		
Large ⁷	No target			
District Grid ⁸	No target			
Regional Grid ⁹	No target			
Telecom backup	No target			
H ₂ Production	Target ¹⁰	Current Status	Partnerships, Strategic Approach	Policy Support
Fossil Fuels ¹¹	No target			
Water Electrolysis ¹² (PEM, Alkaline,	No target			

⁴ Targets can be units installed and/or total installed capacity in the size range indicated

⁵ <5 kW (e.g., Residential Use)

⁶ 5kW – 400 kW (e.g., Distributed Residential Use)

⁷ 0.3MW – 10 MW (e.g., Industrial Use)

⁸ 1MW – 30 MW (e.g., Grid Stability, Ancillary Services)

⁹ 30MW plus (e.g., Grid Storage and Systems Management)

¹⁰ Target can be by quantity (Nm³, kg, t) and by percentage of total production; also, reference to efficiency capabilities can be a target

¹¹ Hydrogen produced by reforming processes

¹² Please indicate if targets relate to a specific technology (PEM, Alkaline, SOEC)



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SOEC)				
By-product H ₂	No target			
Energy Storage from Renewables	Target¹³	Current Status	Partnership, Strategic Approach	Policy Support
Power to Power ¹⁴ Capacity	No target	100 kWe	<ul style="list-style-type: none"> • Myrte platform in Corsica connected to the grid 	
Power to Gas ¹⁵ Capacity	No target		<ul style="list-style-type: none"> • Jupiter 1000 project aiming at 1 MWe by 2018 	

¹³ Can be expressed in MW of Installed Capacity to use the electricity from renewable energy generation, and Annual MWh of stored energy capacity

¹⁴ Operator has an obligation to return the electricity stored through the use of hydrogen back to electricity

¹⁵ 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)