INTERNATIONAL PARTNERSHIP FOR
HYDROGEN AND FUEL CELLS IN THE ECONOMY

IPHE Country Update November 2018: Germany

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1. New Initiatives, Programs, and Policies on Hydrogen and Fuel Cells

7th Energy Research Programme:

The Federal Ministry for Economic Affairs and Energy has launched the 7th Energy Research Programme of the Federal Government of Germany. With this programme, the German Government wants to continue the promotion of research and development in the field of energy technologies. The programme offers a funding budget of €7B and has a focus on large-scale demonstration of innovative technologies, which can support the energy transition in Germany. This will include the production of hydrogen with water electrolysis systems for the demand of different sectors, like industries and energy supply. The target of those projects is to investigate the integration of large-scale hydrogen production and the development of a framework for the operation of the systems.

France – Germany Cooperation on Energy Transition:

The Ministers of Energy of France and Germany have announced the French-German cooperation to accelerate the energy transition of the European Union and the implementation of the Paris Climate Agreement. In this regard, France and Germany will also strengthen their cooperation on hydrogen within the European Commission's framework (SET plan and FCH JU), in particular between their respective research organizations. Regarding hydrogen deployment, France and Germany will look for synergies on their respective roadmaps in order to facilitate possible industrial cooperation.

FCH Reference in Government Coalition Agreement:

In the final Coalition Agreement of the German government includes FCH topics for the first time. Among other things, it is stated, that the NIP should be continued. In addition it is the declared target of the coalition, to reduce legal barriers for the production of green hydrogen.

Mission Innovation:

The Innovation Challenge #8 of Mission Innovation for renewable and clean hydrogen was launched in May of this year. Along with Australia and the European Union, Germany is co-lead of IC8. A 'deep-dive' workshop was held in Berlin in October to identify key barriers in the current production chain. The outcome of the workshop will be used for a work plan of IC8, which is under development at the moment. The next Mission Innovation Ministerial meeting will be held in Vancouver in May 2019.

2. Hydrogen and Fuel Cell R&D Update

The NOW has published a study funded by the National Innovation Programme (NIP) and commissioned by the Federal Ministry of Transportation and Digital Infrastructure on the industrialisation of water electrolysis. Within the study, a survey was conducted with all major manufactures of water electrolysis systems to get key parameters for the comparison of the supply and the demand for electrolysis systems for the German energy system in the future.

The main outcome is that the technology is ready for deployment. Manufactures are able to deliver up to 1 GW of capacity by 2020. For further industry uptake, market activation will be necessary through finding markets for green hydrogen and supporting the deployment of hydrogen production. In Germany, the regulatory framework does not fit well with the deployment targets. Hence, finding business cases for the production of hydrogen in Germany are challenging. The study is published in a long version in German and a short version in English. The study is available on the website of the NOW GmbH.

3. Demonstration, Deployments, and Workforce Developments Update

Fuel Cell Electric Vehicles:

The infrastructure for hydrogen refueling stations is expanding with the opening of new stations, mainly by the company H2 Mobility. At the end of November 2018, the network comprises 55 stations, and a further 39 stations are under construction and/or in the planning stage. By the end of 2019, there are to be 100 refueling stations available to support the market launch of fuel cell vehicles.

Beside the 400 fuel cell cars in operation in Germany, approximately 100 cars are set to be in operation by the end of 2018. More cars will follow in the beginning of 2019. While there is increased demand for FCEVs, production capacity limited the amount of deployments in 2018. The sale of the Hyundai Nexo and the Daimler GLC just started at the end of 2018. The purchase of fuel cell cars is supported by the NIP and the Ministry of Transportation.

Rail:

The first two fuel cell trains went into a regular operation on a track in Lower-Saxony in northern Germany. By 2021, there will be 14 trains operating in Lower-Saxony. The National Innovation Programme provided funding support for the development and deployment of the Alstom Coradia iLint trains.

Industry:

Within the Carbon2Chem project, a water electrolysis system was set in operation in September 2018. The Carbon2Chem project is focusing on using CO2 from steel production and renewable hydrogen from water electrolysis to produce chemicals as fuel or feedstock. The project and the 2MW alkaline water electrolysis system, which came on-line September 2018, are funded by the Federal Ministry of Education and Research.

4. Events and Solicitations

NIP General Assembly in Berlin 05.12 – 06.12.2018: Presentation and introduction to funded projects within the NIP 6th `Elektromobilität vor Ort´ conference of the federal Ministry for Transport and Digital Infrastructure on local electric mobility 26.03 – 27.03.2019 in Berlin

HANNOVER MESSE in Hannover from 01.04 – 05.04.2019: Hydrogen + Fuel Cell Europe – Europe's largest hydrogen and fuel cell exhibition

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

The second phase of the National Innovation Programme for Fuel Cell and Hydrogen Technology implemented in 2016 consists of two funding mechanisms. One mechanism addresses R&D projects directly linked to FCH topics. Several projects have been approved and look to support the market uptake by decreasing costs and increasing product lifetime. Single components as well as complete systems and production chains are supported within the approved projects. A brief overview of all projects will be given by the annual report of the NOW GmbH that will be published in the beginning of 2019.

The other funding mechanism within the NIP supports the deployment of FCH technologies. For example, this fund provided support for the deployment of about 100 FCEVs, as mentioned above. Furthermore, many of the refuelling stations in operation now were funded by the NIP. In some cases, these stations include the production of hydrogen by water electrolysis. An additional call was set up, to support the deployment of self-sufficient power supply for off-grid applications with fuel cell systems. Several projects under this topic were approved for funding within the NIP.

Regional projects will get an increasing focus in future funding projects within the funding guideline of market activation. Support for near-market projects is the next step in ramping up the market.

6. Regulations, Codes & Standards, and Safety Update

Several cities in Germany will likely have to ban diesel operated cars by mid-2019 to reach their emission targets. As the court decisions have not yet been made for all German cities, the impact on accelerating the deployment of electric vehicles including FCEVs is not clear.

Summary Country Update November 2018: Germany

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Support Mechanism
Fuel Cell Vehicles[1]	No target	Approx. 500 (November 2018)	-	Subsidy for purchase for fleets (NIP II 3rd Call) incl. construction of refueling infrastructure
FC Bus	No target	16 buses in operation (Nov. 2018)	Joint procurement in Europe, funded by JIVE, FCH-JU and NIP I and II	Subsidy for purchase (NIP II Call 2018) incl. construction/installation of refueling infrastructure
Fuel Cell Trucks[2]	No target	-	-	NIP R&D activities
Forklifts	No target	Approx.100 (Nov. 2018)	Industry Network Clean Intralogistics Net (CIN)	NIP market activation
H_2 Refueling Stations	**Target Number**	**Current Status**	**Partnerships, Strategic Approach**	**Support Mechanism**
70 MPa On-Site Production	No target	0 (Nov. 2018)	H2 Mobility	Subsidy for construction/installation for publicly accessible stations for road transport (NIP II call 2018) incl. on-site electrolyser
70 MPa Delivered	100 by 2020 400 by 2025	55 (Nov. 2018) 39 planed	H2 Mobility	Subsidy for construction/installation for publicly accessible stations for road transport (NIP II call 2018)

[1] Includes Fuel Cell Electric Vehicles with Range Extenders

[2] As above

35 MPa On-Site Production	No target	n.a.		Subsidy for construction/installation incl. on-site electrolyser in connection with FC bus procurement
35 MPa Delivered	No target	n.a.		Subsidy for construction/installation in connection with FC bus procurement
Stationary	**Target Number[3]**	**Current Status**	**Partnerships, Strategic Approach**	**Support Mechanism**
Small[4]	No target	1.900 funding approvals as of Nov. 2018		KfW programme 433 of the Ministry of Economy and Energy (BMWi), a combination of fix rate and performance-related subsidies
Medium[5]	No target	n.a.		
Large[6]	No target	n.a.		
District Grid[7]	No target	n.a.		
Regional Grid[8]	No target	n.a.		

[3] Targets can be units installed and/or total installed capacity in the size range indicated
[4] <5 kW (e.g., Residential Use)
[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)

Telecom backup	No target	>300 units as of Nov. 2018	Industry Network Clean Power Net (CPN)	Subsidy for procurement (NIP II call 2018)
H_2 Production	**Target[9]**	**Current Status**	**Partnerships, Strategic Approach**	**Support Mechanism**
Fossil Fuels[10]	No target	30 Mio. Nm^3/d		
Water Electrolysis[11] (PEM, Alkaline, SOEC)	No target	>30 projects >35 MW electrolyser capacity installed As of Nov 2018		Several R&D programmes and market activation within the NIP
By-product H_2	No target	4 Mio. Nm^3/d		
Energy Storage from Renewables	**Target[12]**	**Current Status**	**Partnership, Strategic Approach**	**Support Mechanism**
Power to Power[13] Capacity	No target	n.a.		

[9] Target can be by quantity (Nm^3, 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, Alkaline, SOEC)
[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

Power to Gas[14] Capacity	No target	>30 projects >35 MW electrolyser capacity installed As of Nov 2017	Strategy Platform Power to Gas	n.a.

[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)