



IPHE Country Update November 2015: Norway

The IPHE Secretariat requests each IPHE member submit a one-page narrative update on hydrogen and fuel cell (HFC) activities. Please only report actions and developments since the last Country Update and leave Sections blank if there have been no new developments.

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Covered Period	From May 2014

1. New Policy Initiatives on Hydrogen and Fuel Cell

The establishment of a national hydrogen strategy was requested by the Committee of Energy and Environment in January 2015. The strategy will become an integral part of the Government's Energy white paper to the parliament to be launched in spring 2016.

Upon the discontinuation of Transnova by the end of 2014, and the transfer of Transnova's activities to Enova, the responsibility for support schemes for climate efficient transport projects is now with Enova.

After negotiations concerning the National Budget for 2016, parliament has requested the government to establish a support scheme for hydrogen transport infrastructure via Enova.

2. Hydrogen and Fuel Cell R&D Update

There is a significant R&D activity in Norway, in particular at SINTEF (SINTEF Energy Research is an applied research institute dedicated to creating innovative energy solutions. For further information, please see: <https://www.sintef.no/en/sintef-energy/>) running 10+ EU-projects with support from the Fuel Cells and Hydrogen Joint Undertaking (FCH JU). Recent achievements include gas quality analysis of 8 Hydrogen Refuelling Stations (HRSs) in Europe within the project HyCoRA. Reported gas quality (www.h2protocol.com/) is well within the requirements and indicates room for reducing cost of hydrogen by simplifying and/or improving the purification and quality control systems. The work is currently being liaised with the US and Asia through the joint effort of ISO/ASTM (TC197/WG24/D03), aiming at combining SAE (ASTM D7601-11) and ISO sampling strategies into a harmonized standard. SINTEF presented the work in progress at the TC197 Plenary meeting in Torrance, CA, Dec 3-4 2015.

3. Demonstration and Deployments Update

In 2015, 3 new inter-regional (Norway-Sweden) projects involving deployment of FCEV and HRS have commenced: Green Drive Region, Blue Move and Smart Green Region Mid-Scandinavia.

4. Events and Solicitations

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

The fuel retailer UnoX has signed a Letter of Intent with electrolyser and HRS company NEL Hydrogen, aiming at building 20 HRSs by 2020, provided that public support is granted.



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Summary Country Update November, 2015: Norway

Transportation	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
Fuel Cell Vehicles ¹	No national target. Regional targets of minimum 300 by 2018	As of November 2015; 21 FCEVs	<ul style="list-style-type: none"> Oslo and Akershus Regional Hydrogen Strategy – Taxi fleet is prioritized, other fleets under support and development An initial fleet of approx. 20-30 vehicles Planned with public and private cars in Bergen, facilitated by CMR Prototech 	Subsidy for purchase; No vehicle taxation on FCEVs – permission to drive in public transport lanes, free passing on ferries and toll roads
FC Bus	No national target. Regional targets of 50 by 2020 100 by 2025 (Oslo and Akershus)	As of Nov. 17-2015, 5 FC buses on routes between Oslo and Akershus	Part of the FCH JU CHIC-project with 26 buses altogether in 5 European cities. Ruter is operator partner in Oslo-Akershus, subcontractor Unibuss. HRS is operated by Air Liquide.	<ul style="list-style-type: none"> Co-funding provided by Oslo, Akershus, Research Council Norway and Transnova
Fuel Cell Trucks ²	No national target.	None	City of Oslo is planning zero emission zones in inner city by 2019, the private sector is invited to deliver the solutions for 0-emission city distribution. Possible delivery in 2017. Norway's largest food retailer ASKO has taken the initiative to get the first fuel cell powered delivery truck on the road	Climate and energy strategy for Oslo, approved summer 2015
Forklifts	No national target	None	H2 project at Oslo Airport Gardermoen,	<ul style="list-style-type: none"> Supported by Akershus H2

¹ Includes Fuel Cell Electric Vehicles with Range Extenders

² As above



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			forklifts might be part of future fleet. Logistic hubs in Akershus defined as strategic potential in the regional strategy Low emission pilot project in Oslo Harbour is planned, forklifts might be part of future fleet.	Strategy Climate and energy strategy for Oslo, approved summer 2015
H ₂ Refueling Stations	Target Number	Current Status	Partnerships, Strategic Approach	Policy Support
70 MPa On-Site Production	15 stations in Oslo-Akershus by 2025*	3 stations in Oslo, Akershus (Lillestrøm) and Telemark (Porsgrunn),	It is encouraged for Public Private Partnership to be established	Subsidy for installation through Akershus Regional Strategy Subsidy for operation given for 2015-2016, not yet defined from 2017
70 MPa Delivered	Is partly included in on-site production station number, but not yet defined	2 stations, Økern and Gardermoen,	HRS with delivered H ₂ is planned in a scale-up phase until demand justifies investment for modularized On-Site production	Subsidy for installation through Akershus Regional Strategy Subsidy for operation given for 2015-2016, not yet defined from 2017
35 MPa On-Site Production	Approx. 3 stations by 2020, new station by 2017	1 station at Rosenholm, Akershus	FC bus fleet development -50 buses in 2020 –Akershus and 0-emission city distribution in Oslo (Alnabru)	Under planning
35 MPa Delivered	No target	None		



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Stationary	Target Number ³	Current Status	Partnerships, Strategic Approach	Policy Support
Small ⁴	Not yet defined		No specific strategy for stationary applications yet, but a few early-stage applications are identified	
Medium ⁵	Not yet defined			
Large ⁶	No target			
District Grid ⁷	No target			
Regional Grid ⁸	No target			
Telecom backup	No target			
H ₂ Production	Target ⁹	Current Status	Partnerships, Strategic Approach	Policy Support
Fossil Fuels ¹⁰	No target	?		
Water Electrolysis ¹¹ (PEM, Alkaline,	No target	All H ₂ comes from WE	Hydrogen production in Norway is planned to be solely originated from renewable energy and water electrolysis	

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)

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, Alkaline, SOEC)



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SOEC)				
By-product H ₂	No target	By-product from chlorine factory in Porsgrunn to HRS-station		
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)