The European Commission's science and knowledge service

Joint Research Centre

European Commission

EU Country Overview

Beatriz Acosta / Pietro Caloprisco

6th Int. Hydrogen Infrastructure Workshop
Boston, September 11-12, 2018

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OUTLINE

- EU Policy Initiatives relevant to Hydrogen Infrastructure and Transportation
- Hydrogen Vehicles and Infrastructure deployment at the EU
- EU Research and Innovation Activities

EC DG for Mobility and Transport
Three Mobility Packages -1

The **1st Mobility Package 'Europe on the Move'[1]** (May 2017) is a wide-ranging set of initiatives putting Europe on the path towards zero emissions

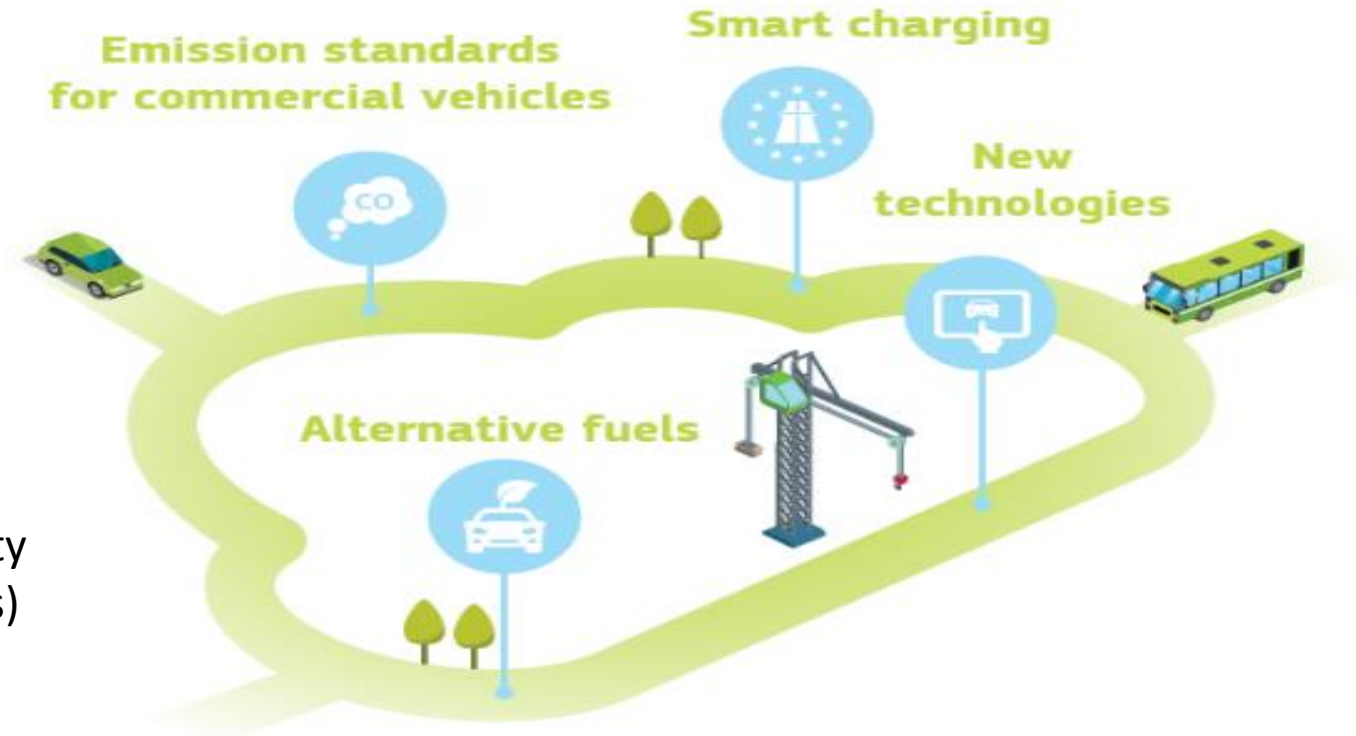
"The transition to low-emission mobility requires deployment and market acceptance of alternative fuel-powered vehicles."

…

"Journeys across Europe in electric vehicles should be straightforward: this means electric charging must be as easy as filling the tank."

…

"The Commission is actively encouraging electric mobility through legislation (e.g. EU-wide technical specifications) and investment."



[1] https://ec.europa.eu/transport/modes/road/news/2017-05-31-europe-on-the-move_en
https://ec.europa.eu/transport/sites/transport/files/mobility-package-factsheet-iii.pdf

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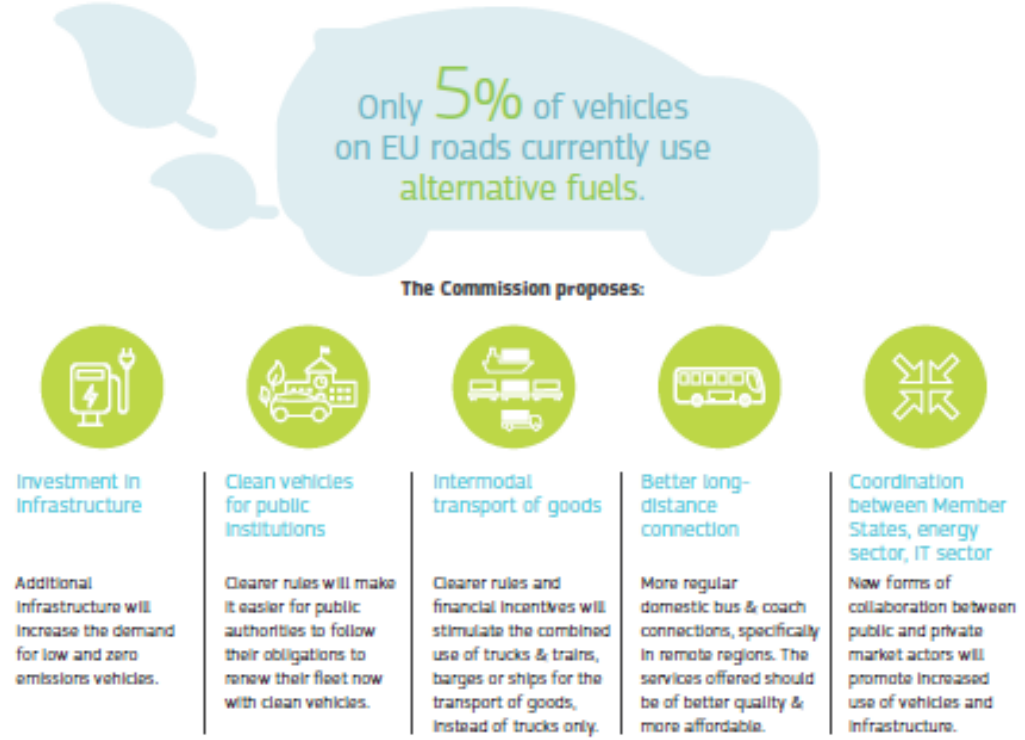
EC DG for Mobility and Transport
Three Mobility Packages - 2



The **2nd Mobility Package 'Clean Mobility'** (8th November 2017), presents an European Low-emission mobility strategy

- **Alternative Fuels Infrastructure Action Plan** and Assessment of the Member States National Policy Frameworks
  - COM(2017) 652 final. Communication from the Commission to the EP and to the Council on Alternative Fuels Infrastructure Action Plan
- **Clean Vehicle Directive** Proposal for a Directive of the EP and of the Council amending Directive 2009/33/EU on the promotion of clean and energy-efficient road transport vehicles;
- **Post-2020 CO_2 standards for Cars and Vans**: Proposal for a Regulation of the EP and of the Council setting emission performance standards for new passenger cars and for new light commercial vehicles.

https://ec.europa.eu/transport/modes/road/news/2017-11-08-driving-clean-mobility_en

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EC DG for Mobility and Transport
Three Mobility Packages - 3

The 3rd **Mobility Package 'Safe, Connected Clean Mobility'**[1] (18 May 2018)

- New road safety policy framework (2020-2030) with two legislative initiatives on **vehicle and pedestrian safety** and on **infrastructure safety management**;
- Legislative initiatives on **CO2 standards for heavy-duty vehicles**, on their aerodynamic and on tyre labelling;
- Proposal for a regulation on a **common methodology for fuels price comparison;**
- Strategic Action Plan for the **Development and Manufacturing of Batteries in Europe;**
- A EU strategy on **connected and automated mobility.**

[1] https://ec.europa.eu/transport/modes/road/news/2018-05-17-europe-on-the-move-3_en

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Status Directive 2014/94/EU

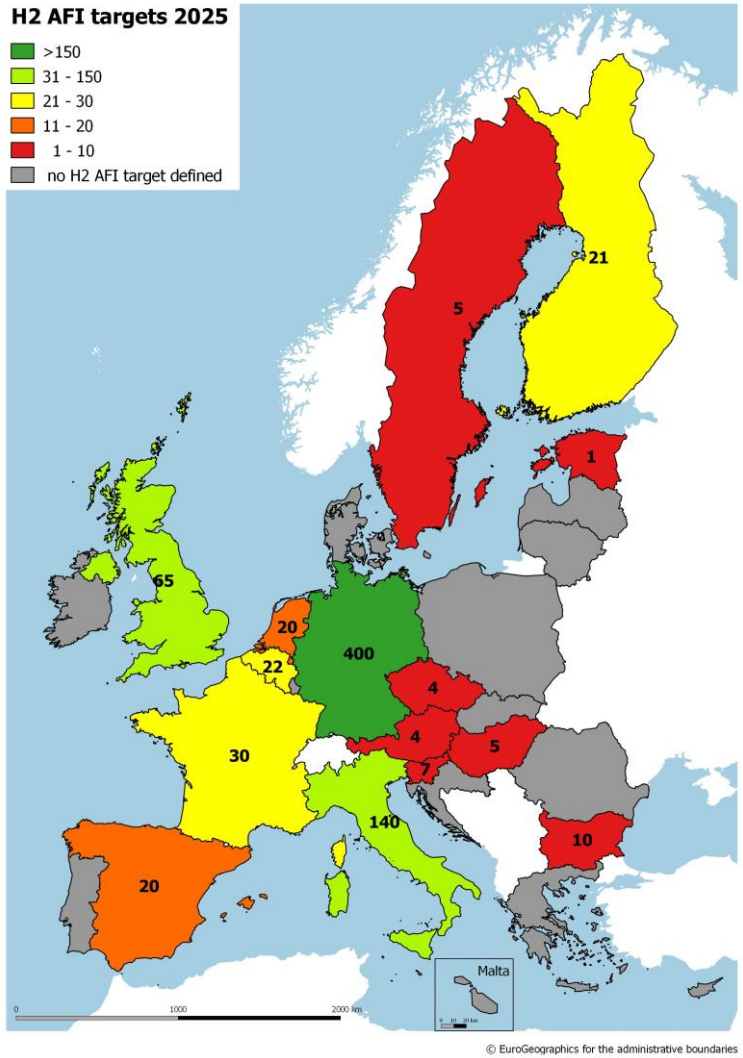
The **Directive 2014/94/EU**[1] of the European Parliament and of the Council of 22 October 2014 on the **deployment of alternative fuels infrastructure**

- ✓ Instead of setting targets to the Member States member states for electric, natural gas and hydrogen infrastructure to ensure a minimum EU-wide coverage for vehicles, the directive requests them to submit their **National Policy Frameworks**
- ✓ The NPFs shall outline **National Targets and Objectives, and Supporting Actions** for the development of the market as regards alternative fuels, including the deployment of the necessary infrastructure
- ✓ Member States shall notify their NPFs to the Commission by 18 November 2016

- ⇨ Detailed Assessment of NPFs, taking into account the objectives of EU-wide mobility, reduction of oil dependence, economic growth, and greenhouse gas emissions: SWD(2017) 365 final. Detailed Assessment of the National Policy Framework;
- ⇨ Commission has set the **Strategic Transport Forum** for exchange of good practices, high-level policy conclusions on state of play and future needs;
- ⇨ In 2019 the Commission will start to evaluate Directive 2014/94;
- ⇨ Member states shall submit to the Commission a report on the **implementation of its National Policy Framework** by 18 November 2019, and every three years thereafter;
- ⇨ The Commission shall submit a report to the EP and Council on the application of the Directive every three years starting 18 November 2020.

https://publications.europa.eu/en/publication-detail/-/publication/d414289b-5e6b-11e4-9cbe-01aa75ed71a1/language-en

Assessment of National Policy Frameworks– Hydrogen targets by 2025



- ✓ 15 Member states have addressed targets for Hydrogen
- ✓ At the moment refuelling stations are on main agglomerations
- ✓ Refuelling stations planned for 2025 on TNT-Core Networks
- ✓ Foreseen stations have been assumed to be equally distributed along the corridors.

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Action plan on Alternative Fuels Infrastructure

The Commission Analysis of the NPFs under Directive 2014/94/EU results in the following **estimates of infrastructure investment needs by Member States**, including the TEN-T core network corridors:

- ✓ *Electricity:* up to EUR 904 million by 2020.
- ✓ *CNG:* up to EUR 357 million by 2020 and up to EUR 600 million by 2025 for CNG road vehicles.
- ✓ *LNG*: up to EUR 257 million by 2025 for LNG road vehicles. For LNG for waterborne transport, up to EUR 945 million in the TEN-T Core Network Corridor seaports by 2025 and up to EUR 1 billion in the TEN-T Core Network Corridor inland ports by 2030.
- ✓ ***Hydrogen:* up to EUR 707 million by 2025.**

These proposals build on existing EU policies and funding opportunities such as

- ☞ Research, development and innovation projects under the **Horizon 2020 Programme**
- ☞ Ongoing EU-financed investment programmes, for example the **Connecting Europe Facility**
- ☞ the **European Energy Programme for Recovery** and other **European Structural Investment Funds** (ESIF)
- ☞ as well as funding through the **European Fund for Strategic Investments** (EFSI), where there are more projects related to energy than any other sector.

Communication from the Commission to the EP and to the Council on Alternative Fuels Infrastructure Action Plan COM(2017) 652 final and Member State fiches on the National Policy Frameworks.

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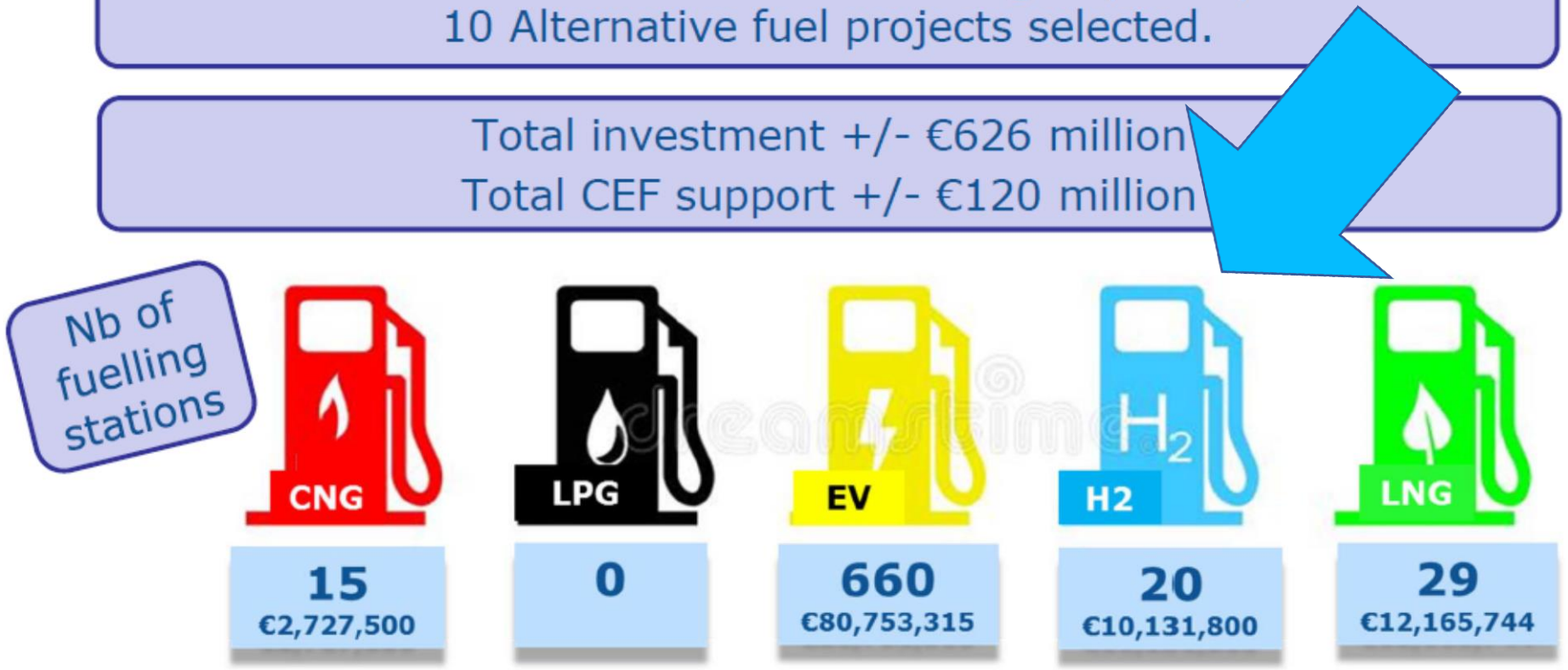
Co-financed programs -Connecting Europe facility

CEF Blending call 2017

Innovation and new technologies priority
10 Alternative fuel projects selected.

Total investment +/- €626 million
Total CEF support +/- €120 million



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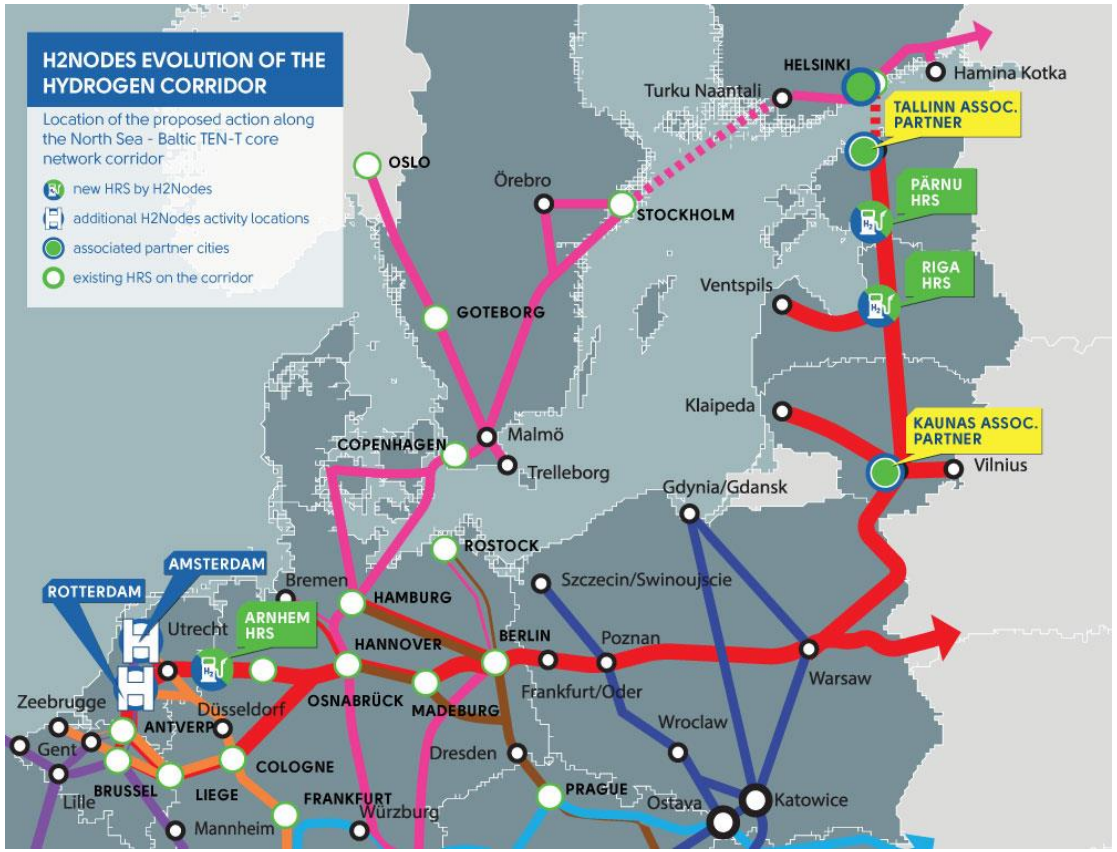
Co-funded RD&D programs - CEF



H2Nodes Action looks into planning and realizing a chain of HRS and boosting demand for fuel cell electric vehicle FCEV along the North Sea - Baltic core network corridor

Evolution of a European hydrogen refuelling station network by mobilizing the local demand and value chains

The focus is on market - sided innovation by real - life deployment and processes to boost market introduction

- ✓ Cooperation to connect HRS on North Sea - Baltic and Scandinavian - Mediterranean core network corridors;
- ✓ Mobilise local and regional actors across the value chain to drive the business case;
- ✓ Ensure a growing demand for hydrogen fuel by engaging organisations and individuals to became users;
- ✓ Procure and operate public transport units powered by fuel cells and other FCEVs for real life tests;
- ✓ Provide locally produced renewable hydrogen for the real life tests;
- ✓ Cooperation with Government Support Group for alternative fuels.

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Deploying Hydrogen for Transport in EU: Hydrogen platforms

Germany: http://h2-mobility.de/en/

Italy: https://www.mobilitah2.it/en

Netherlands: https://opwegmetwaterstof.nl/

Flanders (Belgium) and the Netherlands: https://www.waterstofnet.eu/nl

United Kingdom: http://www.ukh2mobility.co.uk/

Hydrogen, fuel cells and electro-mobility in European regions
http://hyer.eu/

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Co-funded RD&D programs - FCH-JU

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

FCH JU HRS objectives

- Reduce CAPEX & OPEX
- Reduce refueling time
- Increase reliability, safety and availability
- Facilitate the emergence of standards and protocols

DEMO PROJECTS

- 25 projects
- 655 M€ (253M€ public contribution, 402 M€ private)
- 70 (+20) HRSs serving ~ 2.000 FCEVs

RESEARCH PROJECTS

- 4 projects
- 18 M€ (14 M€ public contribution, 4 M€ private)
- Focus: HRS components

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Increasing the HRS network density

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

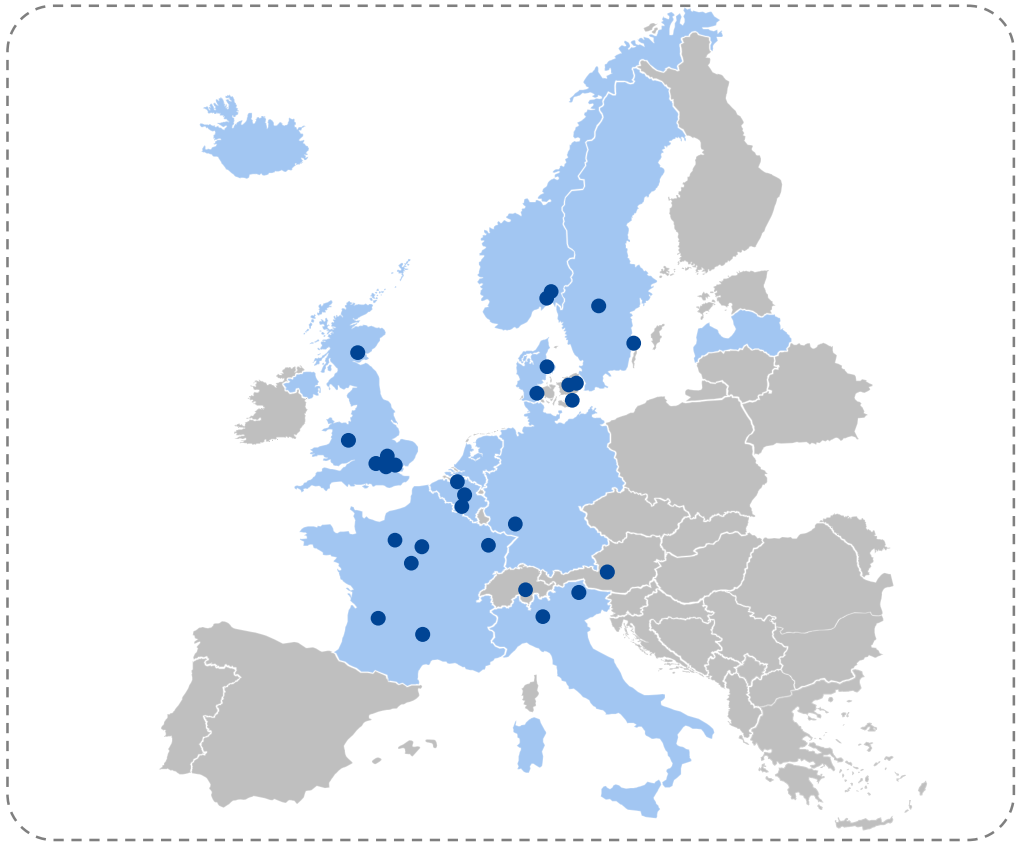
HRS demo projects overview

- 13 countries involved in HRS deployment

- 8 cars projects:
  - FCEVS: 1850
  - HRS: 67

- 6 bus projects:
  - FCEBs: 360
  - HRS: 26

- *4 MHVs projects*
  - *MHVs: 280*
  - *HRS: 10*



DEPLOYED PLANNED

Achievements

- >57,000 refueling operations in 2017
- > 120 tn H2 dispensed
- >70% renewable H2

Product ready for commercialization

- Refilling:
  - < 5 min for cars
  - < 10 min for buses
- >95 % average availability (82-99%)
- 70m2 for 200kg/day stations

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Improve HRS performance

FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

Focus

Components;

- Innovative compressor technology;
- Modular design

Goals

- Energy efficiency;
- System cost;
- Modularity;
- Increased capacity

Energy demand **< 6 kWh / kg H2**	
System cost *< €2,000/ (kg H2/day)*	
Noise *< 60 dB @5 m*	
Compression & Buffering Module *TRL from 3 to 5*	

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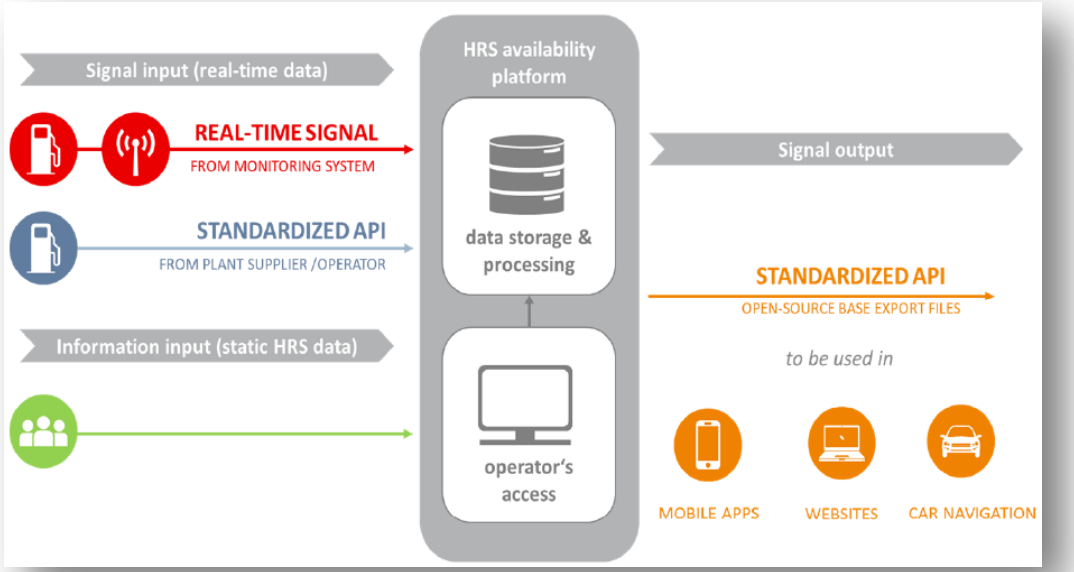
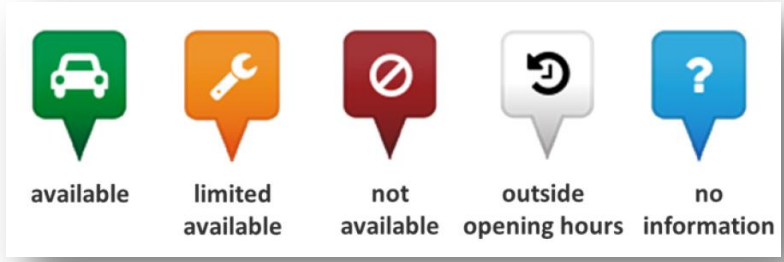
Improved customer experience

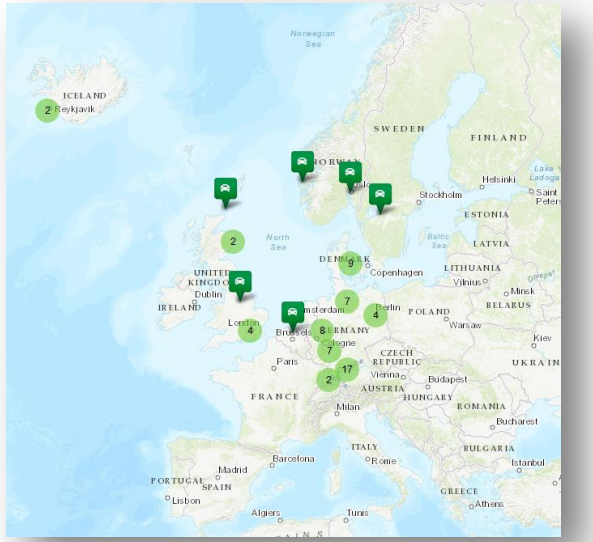
FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

HRS AVAILABILITY SYSTEM

Development of a system for HRS availability in the EU.







https://h2-map.eu/

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Other FCH-JU relevant activities

- **Fuel cells and hydrogen market and policy observatory**

  Establishment of an observatory with the aim of becoming a reference point for information about fuel cells and hydrogen technologies and applications.

- **Project CERTIFHY**

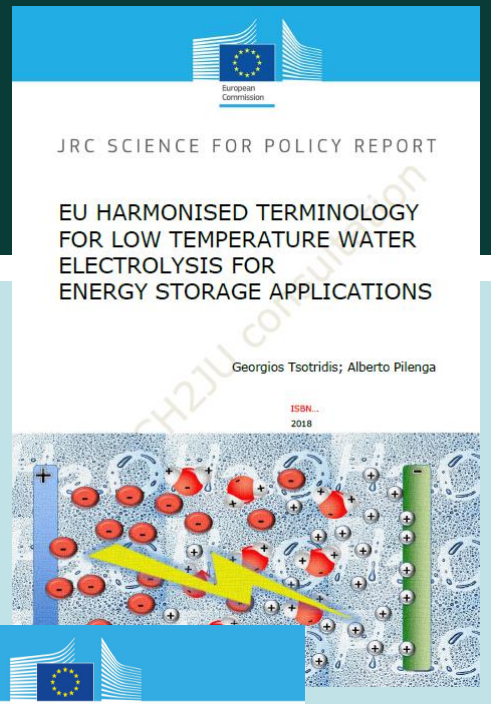
  Develop a common European-wide definition of green hydrogen, develop a hydrogen GO scheme deployable across Europe and a roadmap for its implementation.

Other: Relevant EU research

EU harmonised terminology for low temperature electrolysis

- JRC and 21 contributors from industry, academia and research organisations;
- Provides definitions of various “efficiency” terms (p.20): energy efficiency, current efficiency , water electrolysis efficiency, combined fuel cell and stack, and a detailed methodology of the derivation of the relevant efficiency equations;
- Submitted for FCH2JU consultation in spring 2018.

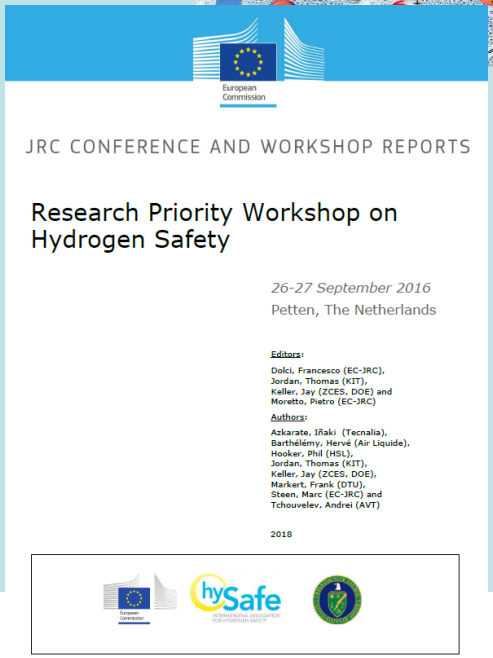
http://www.fch.europa.eu/sites/default/files/TERMINOLOGY_JRC_FINAL_GT.PDF



Hydrogen Safety Research Priority Workshop (IA HySafe, US-DoE and JRC)

19-20 September, 2018

☞ International experts from research and industry elaborate on R&D advancements of the last 2 years and identify gaps to be covered.



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Thanks

Any questions?

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