



**FUEL CELLS AND HYDROGEN**  
JOINT UNDERTAKING

# ***Hybalance workshop***

**Bart Biebuyck**  
**08 10 2019 Brussels**

The HyBalance logo, featuring the word 'Hy' in a stylized blue font with a horizontal line above it, followed by the word 'Balance' in a grey sans-serif font.

**HyBalance**

# Strong public-private partnership with a focused objective

A combined private-public of 1.85 billion Euro has been invested to bring products to market readiness by 2020



## FUEL CELLS AND HYDROGEN JOINT UNDERTAKING



Industry grouping  
>130 members  
50% SME



Research grouping  
70 members



### Energy

H<sub>2</sub> production  
and distribution  
H<sub>2</sub> storage  
F/C for CHP



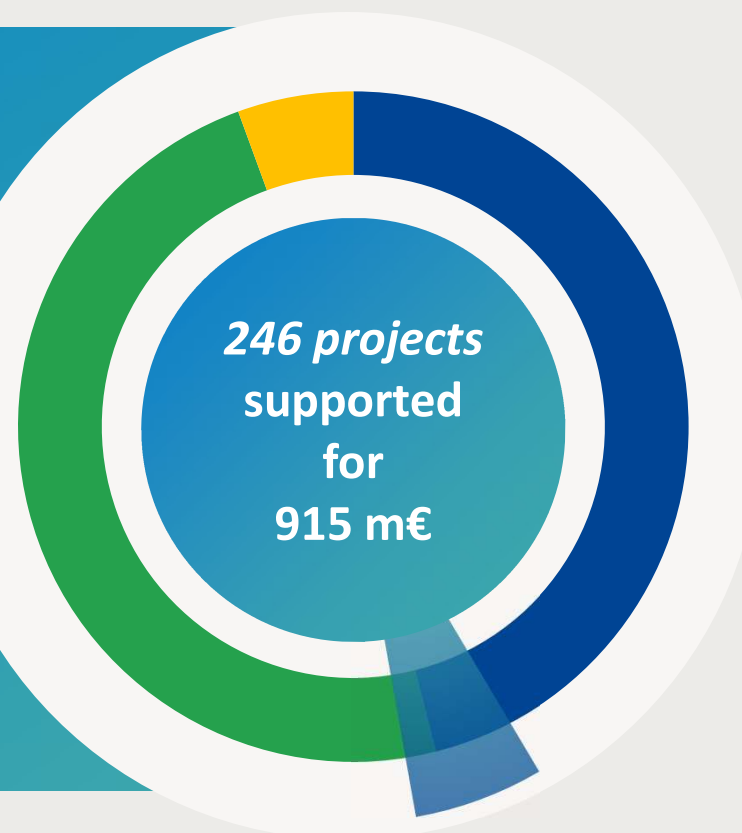
### Transport

Road vehicles  
Non-road vehicles  
Refueling infra  
Maritime, rail and  
aviation applications



### Cross-cutting

standards, safety,  
education, consumer  
awareness, ...



47 %



428 million euros  
136 projects

42 %



388 million euros  
66 projects

6 %



53 million euros  
40 projects



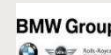
5 %

46 million euros  
4 projects



Similar leverage of other sources of funding: 935 m€

Besides CO<sub>2</sub> abatement, deployment of the hydrogen roadmap also cuts local emissions, creates new markets and secures sustainable employment in EU



## 2050 hydrogen vision



~24%

of final energy demand<sup>1</sup>



2

~560 Mt

annual CO<sub>2</sub> abatement<sup>2</sup>



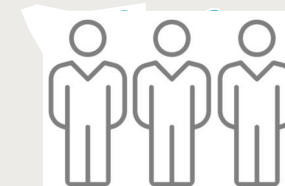
~EUR 820bn

annual revenue (hydrogen and equipment)



~15%

reduction of local emissions (NO<sub>x</sub>) relative to road transport



~5.4m

jobs (hydrogen, equipment, supplier industries)<sup>3</sup>



1 Including feedstock 2 Compared to the reference technology scenario 3 Excluding indirect effects

SOURCE: Hydrogen Roadmap Europe team

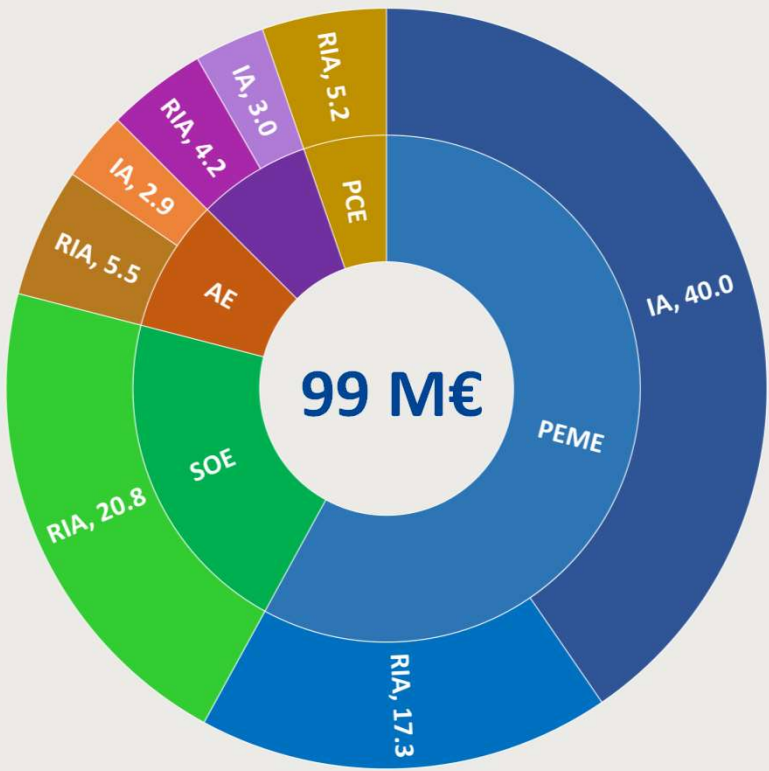
# Clean H<sub>2</sub> production and industry

# Electrolysis demonstrations for energy storage and greening of Industry



Continues support to develop higher capacity electrolyzers led to cost reduction and increased interest by industry

Electrolysers, M€ FCH JU support



30 Projects



HRS



Steel industry

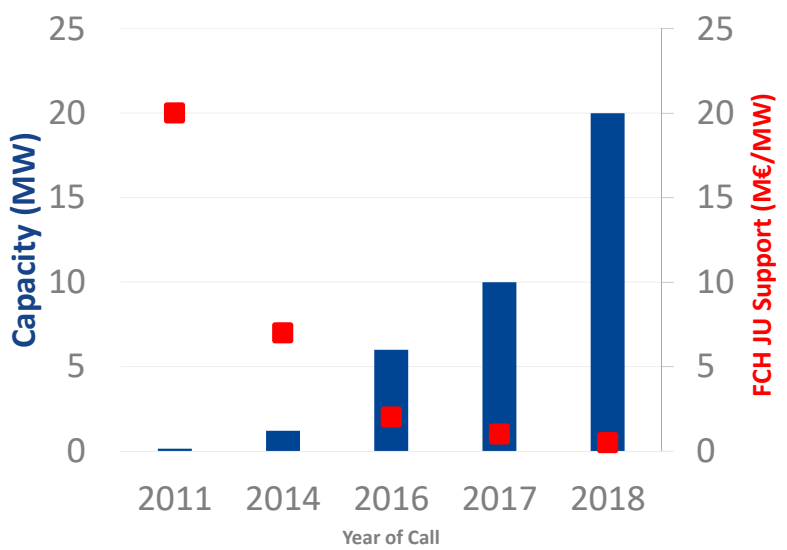


Refineries



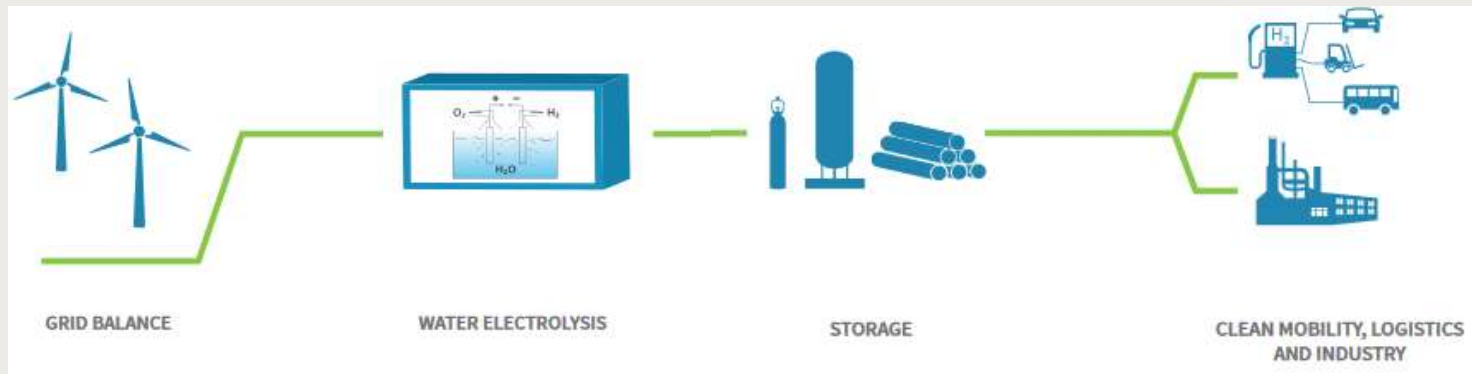
Food industry

Electrolyser Demo Projects



# 2014: Greening light Industry & Transport

The Hybalance Project: Producing green H<sub>2</sub> from wind, feeding metal industry and bus fleet



HyBalance



Co-ordinated by Air Liquide

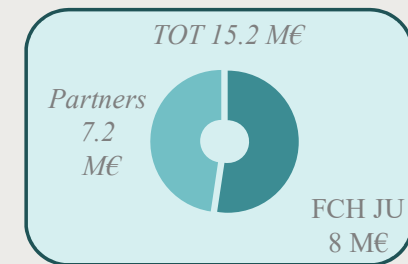
1.2 MW PEM electrolyser by Hydrogenics

Installed in Hobro, Denmark

Commissioned February 2018

Feeding light industry (sinter metal, Hobro) and buses (Aalborg)

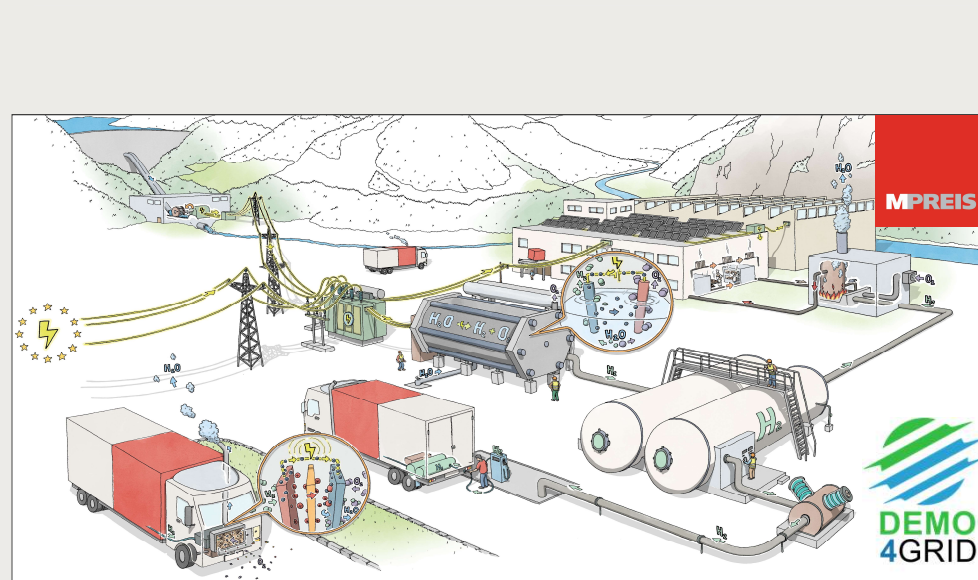
Receiving support from the FCH JU but also ForskEL (Danish framework)





# Big industries are discovering the potential of Hydrogen (1/2)

Thanks to FCH-JU research projects the costs of electrolyzers decreased and became interesting for big industries to invest



## 3.4 MW electrolyser at MPREIS (bakery plant) in Völs

- The green H<sub>2</sub> is produced from hydro-electricity (from Alps)
- 1<sup>st</sup> phase: it is used to heat the ovens to bake the bread
- 2<sup>nd</sup> phase: distribution by using H<sub>2</sub> trucks

**DURATION: 2017-2022; project 7.74 M€ (2.93 M€ by FCH-JU)**



<https://www.demo4grid.eu/>

## 6 MW electrolyser at VOESTALPINE (steel plant) in Linz

- The green H<sub>2</sub> is produced from hydro-electricity (from Alps)
- It is used to produce steel in this way the industry can make a first step towards CLEAN STEEL

**DURATION: 2017-2021; project 18 M€ (12 M€ by FCH-JU)**

<https://www.h2future-project.eu/>

## Big industries are discovering the potential of Hydrogen (2/2)

Thanks to FCH-JU research projects the costs of electrolyzers decreased and became interesting for big industries to invest



### 10 MW electrolyser at SHELL in Köln

- The green H<sub>2</sub> is produced from curtailed wind energy due to a full electricity grid.
- The produced H<sub>2</sub> will be injected in their current H<sub>2</sub> stream used for desulfurization; later to be used in fuelcell vehicles

**DURATION: 2018-2022; project 16 M€ (10 M€ by FCH-JU)**



(Website under preparation)



### 150/30kW Reversible electrolyser, Salzgitter

- To operate a high-temperature Electrolyser as reversible generator (rSOC, reversible Solid Oxide Cell) in the industrial environment of an integrated iron and steel work.
- The system is flexible to produce either H<sub>2</sub> or electricity.

**DURATION: 2016-2019; project 4.5 M€ (100% by FCH-JU)**

(<http://www.green-industrial-hydrogen.com/home/>)

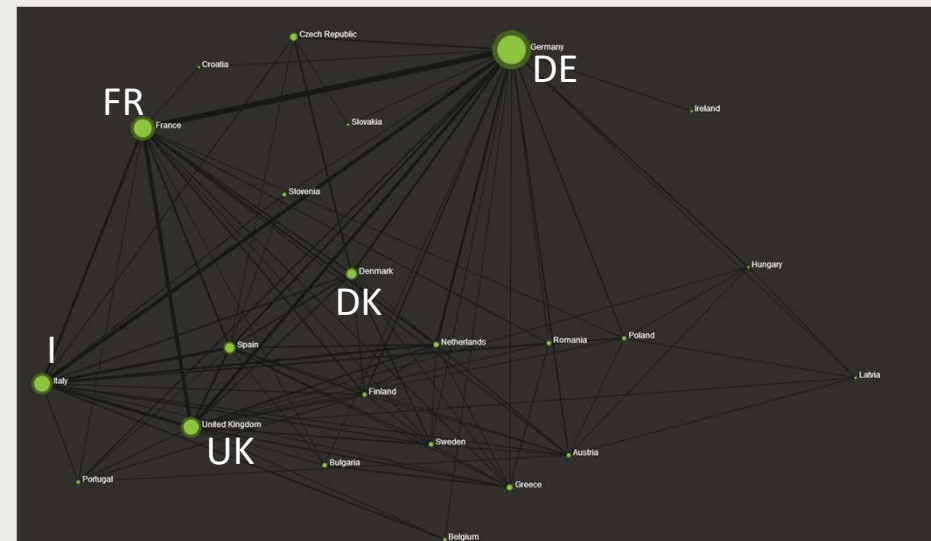


# PEM electrolysis: Number of publications, patents, etc. 2004 - 2017

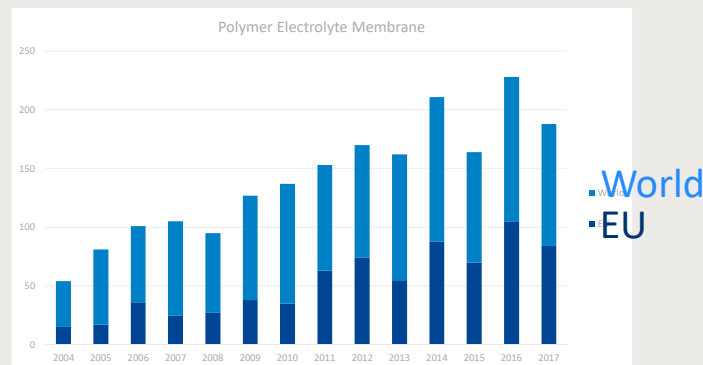
<https://fch.europa.eu/page/tools-innovation-monitoring-tim>



EU 823, US 430, China 270, JPN 193,  
S. Korea 143

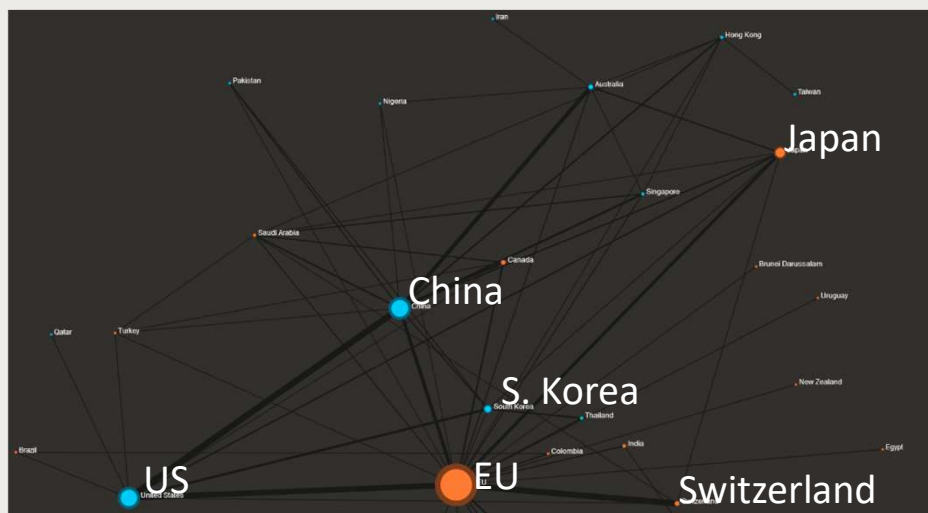


DE 224, FR 136, I 116, UK 111, DK 62

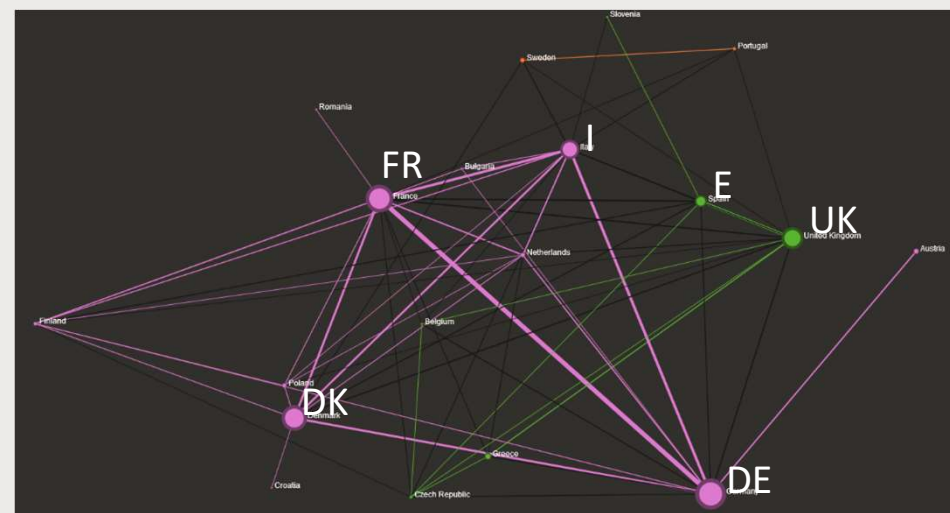


# SOE electrolysis: Number of publications, patents, etc. 2004 - 2017

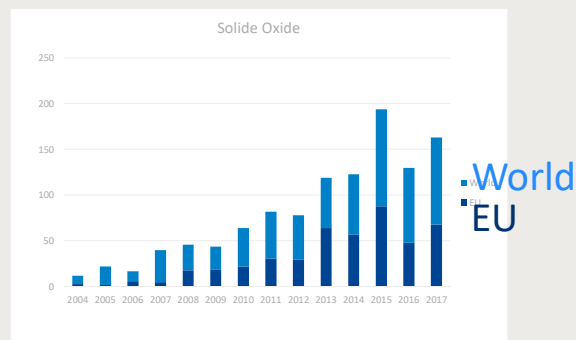
<https://fch.europa.eu/page/tools-innovation-monitoring-tim>



EU 508, China 255, US 246, JPN 121, S. Korea 74



DE 117, FR 103, DK 94, UK 79, I 69, E 40



# Developing an EU wide Guarantees of Origin Scheme for Hydrogen

Two definitions: one for Green and one for Low-Carbon Hydrogen – more than 70,000 GOs issued already



## Four production plants included in the pilot scheme which have been already audited

Air Liquide, Port Jerome (SMR +CCS)



Colruyt Group, Halle (Electrolysis +RE)



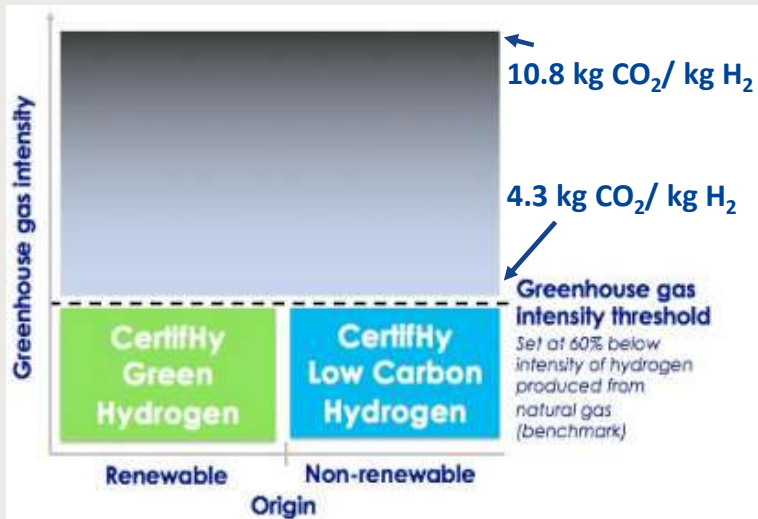
Air Products, Rotterdam (by product H2 from Chlor-alkali process)



Uniper, Flakenhagen (Electrolysis + RE and methanation)



## Two labels are defined for hydrogen



Name	GSRN	Installed Capacity (MW)	Commissioning Date	Domain	Fuel	Technology
Eoly H2 Production Plant	643002406971000037	8,50	2017-10-23	CertifHy	F01000000 - Renewable	W010101 - Hydrogen/Water electrolysis/Low temperature/Main-product
MEB Rotterdam	643002406971000068	2 000,00	1983-01-01	CertifHy	F01000000 - Renewable	W020001 - Hydrogen/Chlor-alkali electrolysis/By-product
Port Jerome	643002406971000051	4 200,00	2007-07-01	CertifHy	F02000000 - Fossil, F01000000 - Renewable	W030201 - Hydrogen/Steam methane reforming/With CCS or CCU/Main-product
WindGas Falkenhagen	643002406971000044	32,13	2013-08-01	CertifHy	F01000000 - Renewable	W010101 - Hydrogen/Water electrolysis/Low temperature/Main-product

<https://cmo.grexel.com/Lists/PublicPages/Statistics.aspx>

## Next:

Expanding the GO scheme to all Member States and establish one central GO scheme.

It is important that many countries join this platform

# European Hydrogen Safety Panel (EHSP) initiative

Expert group on hydrogen safety assisting the FCH 2 JU at project and programme level



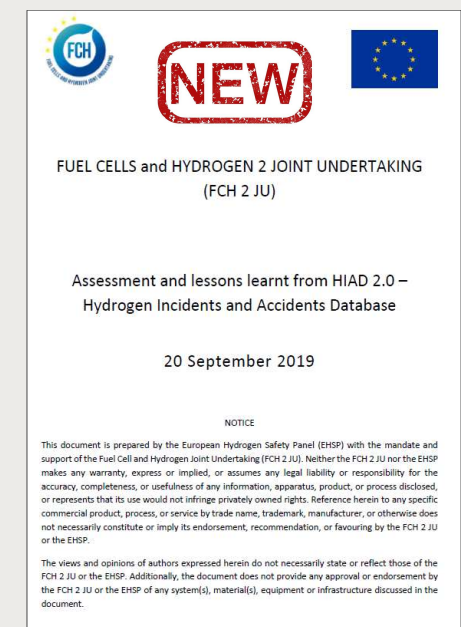
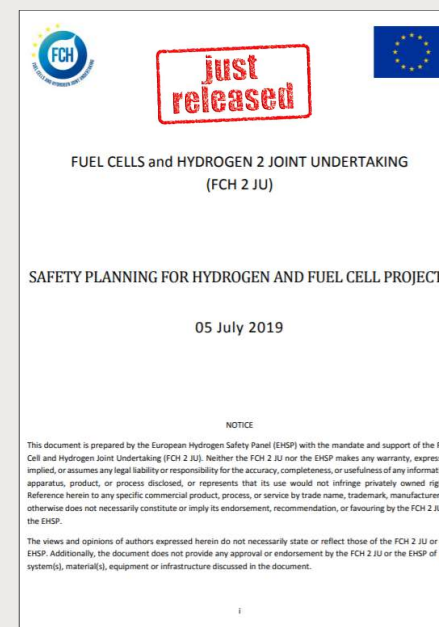
## EHSP Launched and running!



**17 experts from industry & research**

Assuring that H2 safety is adequately handled  
Promoting and disseminating H2 safety culture

**The EHSP released the first 2 reports on:**  
- Safety planning in FCH projects  
- Lessons learnt from HIAD



**Projects are encouraged to cooperate with  
the European Hydrogen Safety Panel !!!**



## NEXT

Yearly program review days and stakeholder forum



Program Review days  
19 & 20 Nov. 2019

Stakeholder Forum  
21 Nov 2018

Charlemagne building Brussels,  
Belgium



# HORIZON EUROPE Partnership: CLEAN HYDROGEN EUROPE

Mid June 2019 agreement by EU council, commission and Parliament to propose a council regulation



## Objectives

The overall objective of the initiative is to create a strong, innovative and competitive European clean hydrogen sector, fully capable of underpinning Europe's energy transition by accelerating the market entry of technologies based on 'near-zero carbon' hydrogen and delivering a wide range of socio-economic benefits.

The new partnership should be able to **channel cross-sectoral collaboration** and thus capitalise and build on the current momentum of FCH 2, which involves a growing number of entities whose core business is not related to hydrogen. It should **involve more energy companies** (e.g. transmission and distribution system operators, operators of power plants, utilities), **the waterborne and rail transport industry**, and more representatives of **the industrial sectors** that could benefit from the use of 'near-zero carbon' hydrogen (chemical, steel, refineries, etc.) in order to reflect the revised strategic orientation more fully and incentivise further uptake of hydrogen technologies in the broader energy system. Given the need to address the acceptance of hydrogen technologies, it will also be important to have representatives **of civil society and NGOs**.

## Next Steps

- **Impact assessment (on-going) =>** Open public consultation for European partnerships  
[https://ec.europa.eu/info/law/better-regulation/initiatives\\_en](https://ec.europa.eu/info/law/better-regulation/initiatives_en)
- Judgement on the type of partnership ~March 2020 (indicative)
- Council regulation in 2<sup>nd</sup> half 2020 (indicative)
- New partnership starts Jan. 2021 (indicative)





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**For further information**

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