



FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

The FCH JU: Implementing EU R&I policies on H₂ and Fuel Cells

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Strong public-private partnership with a focused objective

A combined private-public funding of about 2b€ has been invested to bring products to market readiness by 2020



FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

Industry grouping
>150 members
50% SME

European Commission

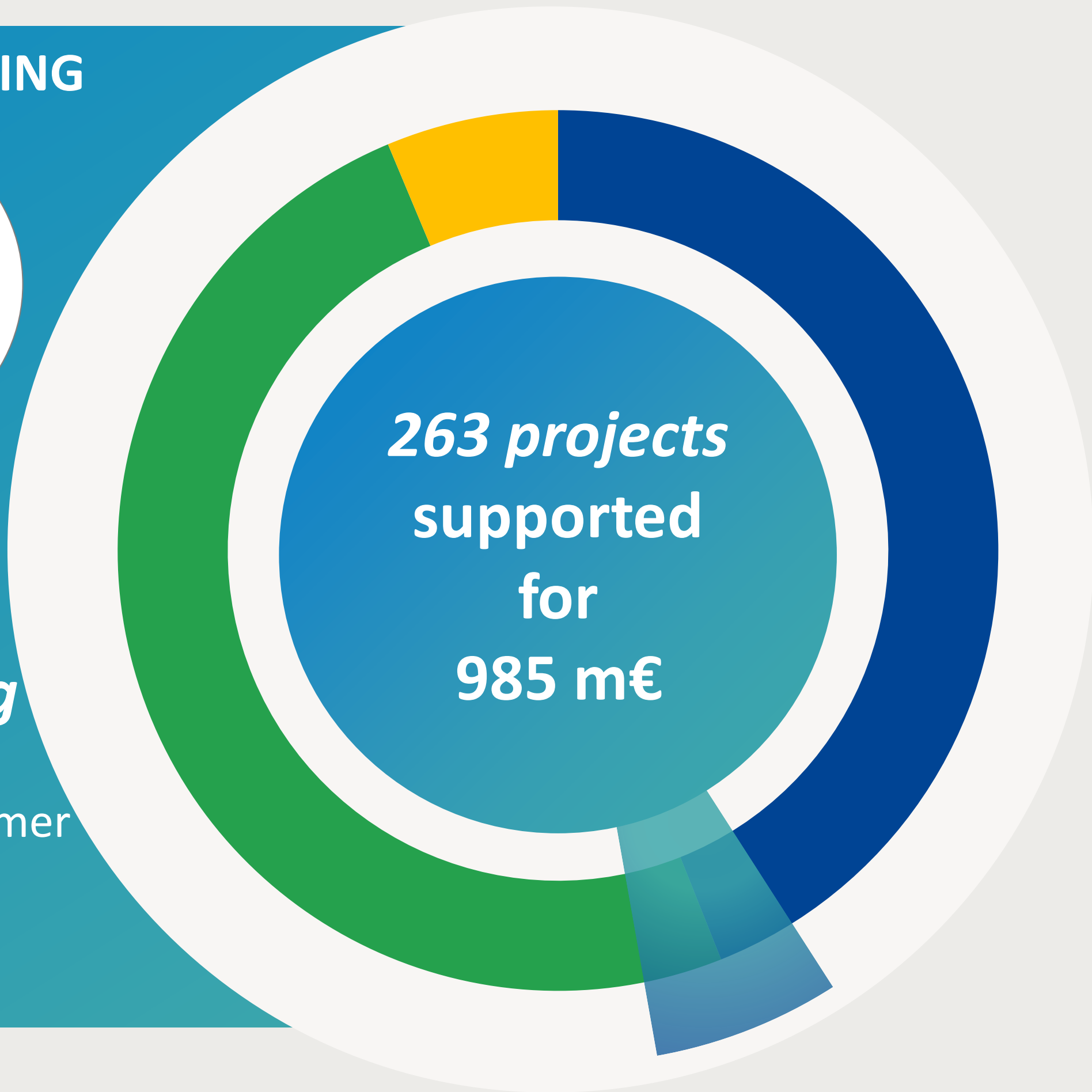
Research grouping
78 members



Energy
H₂ production and distribution
H₂ storage
FCs for CHP

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

Cross-cutting
standards, safety, education, consumer awareness, ...



46 %

457 million euros
145 projects

41 %

404 million euros
70 projects

6 %

58 million euros
43 projects

7 %

66 million euros
5 projects



Similar leverage of other sources of funding: 1.005 b€

H2 Production: emphasis on renewable H2 from electrolysis

In 8 years advanced LT electrolyser capacity increased 100x & FCH JU support per kW installed reduced 50x

Project: Don Quichot
Place: Belgium
Date: 2011
Electrolyser: Hydrogenics (PEM)
Funding: 5.0 m€



0.15 MW

1.2 MW

Project: Haeolus
Place: Norway
Date: 2017
Electrolyser: Hydrogenics (PEM)
Funding: 5.0 m€



2.5 MW

3.4 MW

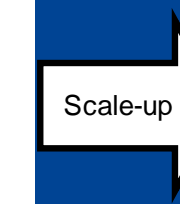
Project: H2future
Place: Austria
Date: 2016
Electrolyser: Siemens (PEM)
Funding: 12 m€



6.0 MW

10 MW

Project: Djewels
Place: The Netherlands
Date: 2018
Electrolyser: McPhy (ALK)
Funding: 11 m€



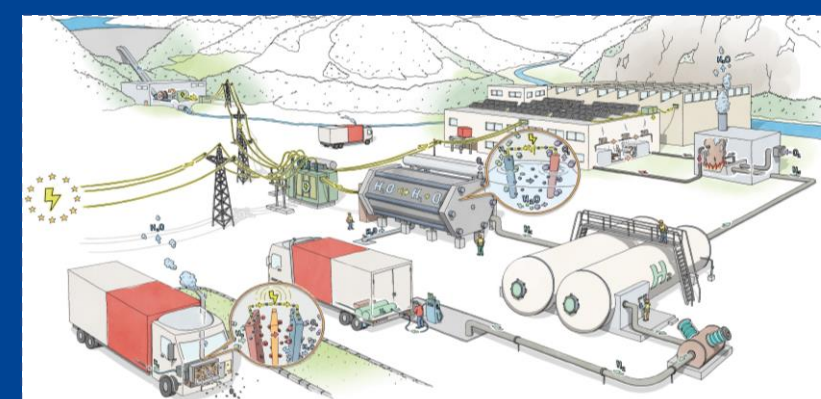
20 MW → 60MW

100 MW

Project: Hybalance
Place: Denmark
Date: 2014
Electrolyser: Hydrogenics (PEM)
Funding: 8.0 m€



Project: Demo4grid
Place: Austria
Date: 2016
Electrolyser: IHT (ALK)
Funding: 2.9 m€



Project: Refhyne
Place: Germany
Date: 2017
Electrolyser: ITM (PEM)
Funding: 10 m€



The European Green Deal call for proposals includes a topic to install a 100MW Electrolyser.
Call timing: OPEN



H2 Production: emphasis on renewable H2 from electrolysis



In 5 years advanced HT electrolyser capacity increased 20x & FCH JU support per kW installed reduced 10x

PAUL WURTH BECOMES NEW
LEAD INVESTOR AND
TECHNOLOGY PARTNER OF
SUNFIRE



Rotterdam
Neste Biorefinery
2019
2.4MW



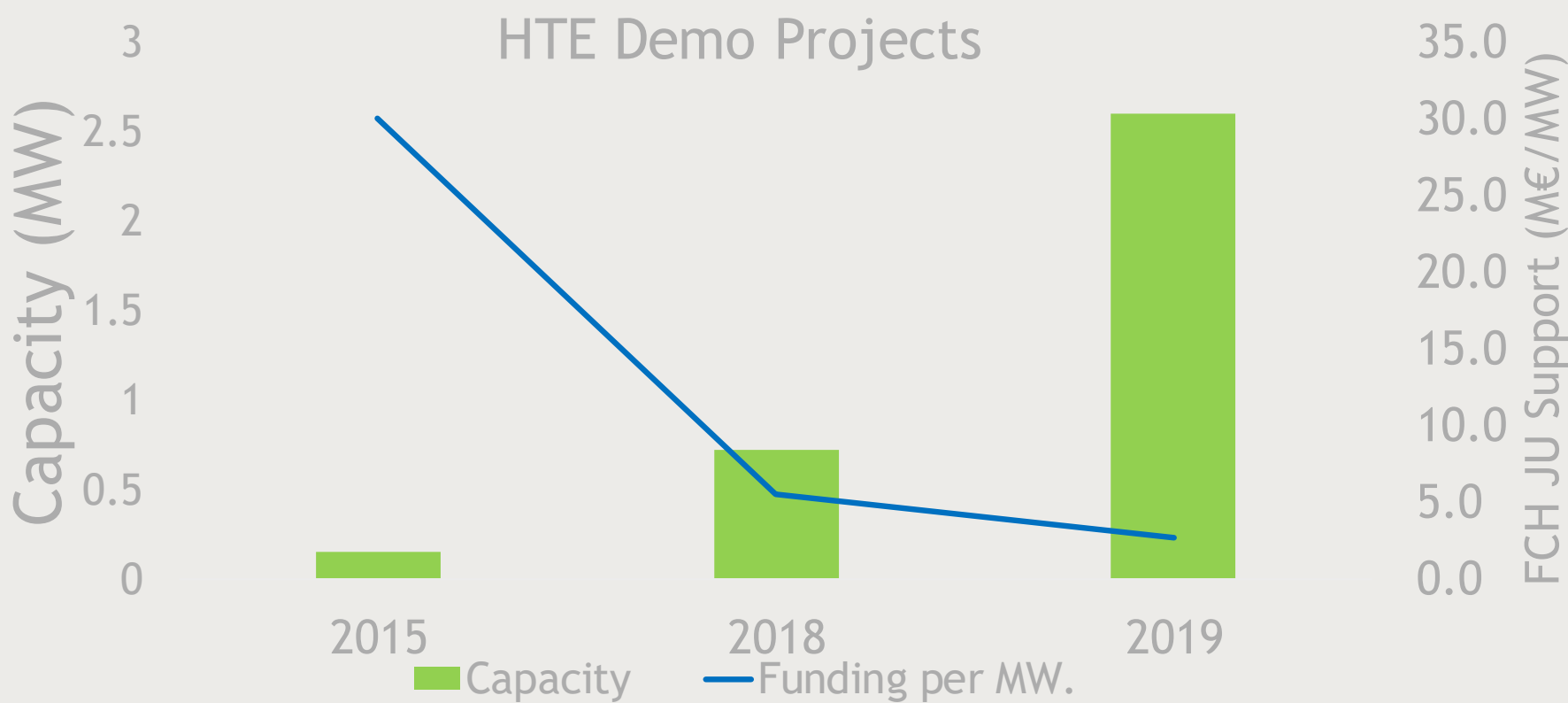
NESTE INVESTS IN SUNFIRE,
LEADING TECHNOLOGY
DEVELOPER OF HIGH-
TEMPERATURE ELECTROLYSIS
AND POWER-TO-X-SOLUTIONS



Saltzgitter
Iron and Steel Works
2018
720kW



Saltzgitter
Iron and Steel Works
2015
150kW



FCH-JU has projects related to many different modes of Transport

Heavy duty transportation is discovering hydrogen thanks to the huge performance improvements of fuel cells

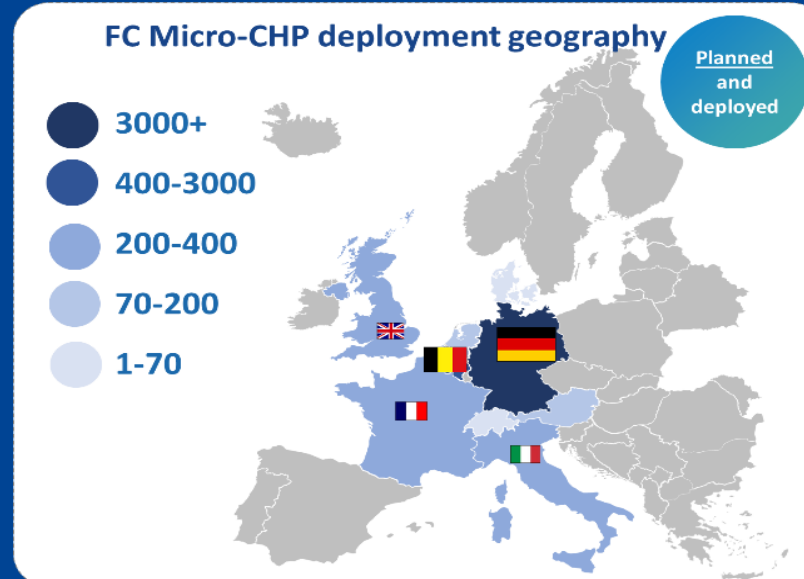


Stationary FC systems generating heat and power installed across EU

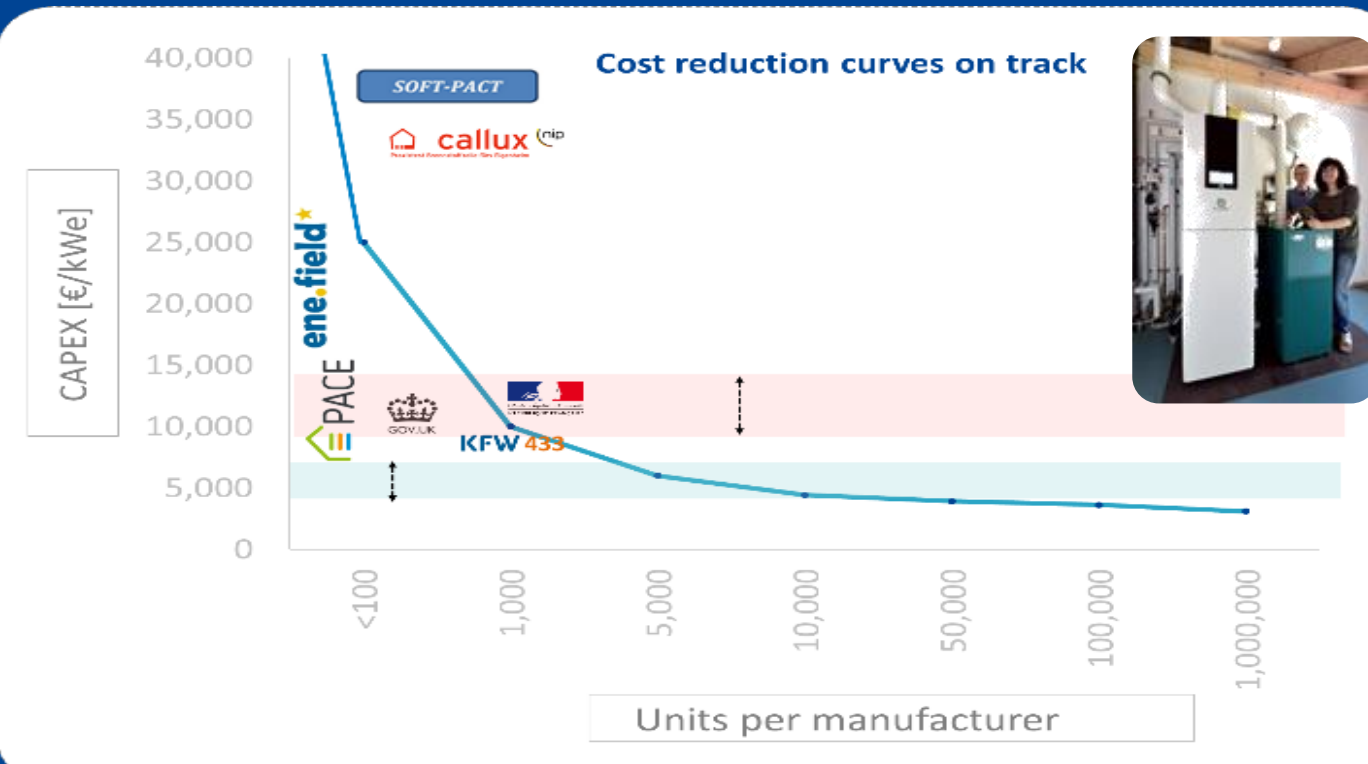


Depending on the application fuel cells in the range from 1kW up to 2MW can be selected

0.5~1.5
kW



<http://www.pace-energy.eu/>



Thousands of units deployed in various EU countries

- >1 MWe capacity installed; >5 million operating hrs.
- Cost reduced drastically through various projects
- National authorities start own subsidy scheme (e.g. >1,000 units deployed by a German scheme)

DURATION: 2016-2021 with FCH JU Funding: ~34M€

50~200
kW



175kW SOFC in waste water treatment plant, Turin Italy

Area will guarantee the supply of around 30% of the site electrical consumption, and almost 100% of the thermal requirement.

DURATION: 2015-2020 with FCH JU Funding: ~4.5M€

1 ~ 2
MW



2MW plant at Ynnovate, Yingkou (province Liaoning), China

Design, build and operate a 2 MW power generator, with full integration of heat and power with an existing chlorine production plant. Fully automated way of operation + remote control

DURATION: 2015-2018 with FCH JU Funding: ~5.5M€

Cross- cutting: Supporting activities for market uptake



Cross-cutting

Projects



Regulations,
codes and
standards



Education and
training



Safety



Social
awareness
& public
acceptance



Sustainability



Databases &
Monitoring

Other activities

Regulations, Codes and Standards Strategy Coordination Group (RCS SCG)

Collaboration with the Joint Research Center (JRC)

European Hydrogen Safety Panel (EHSP)

Initiatives: FCH Regions, FCH Observatory...

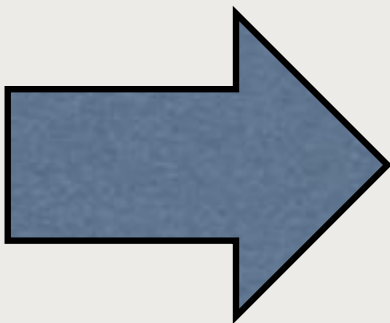
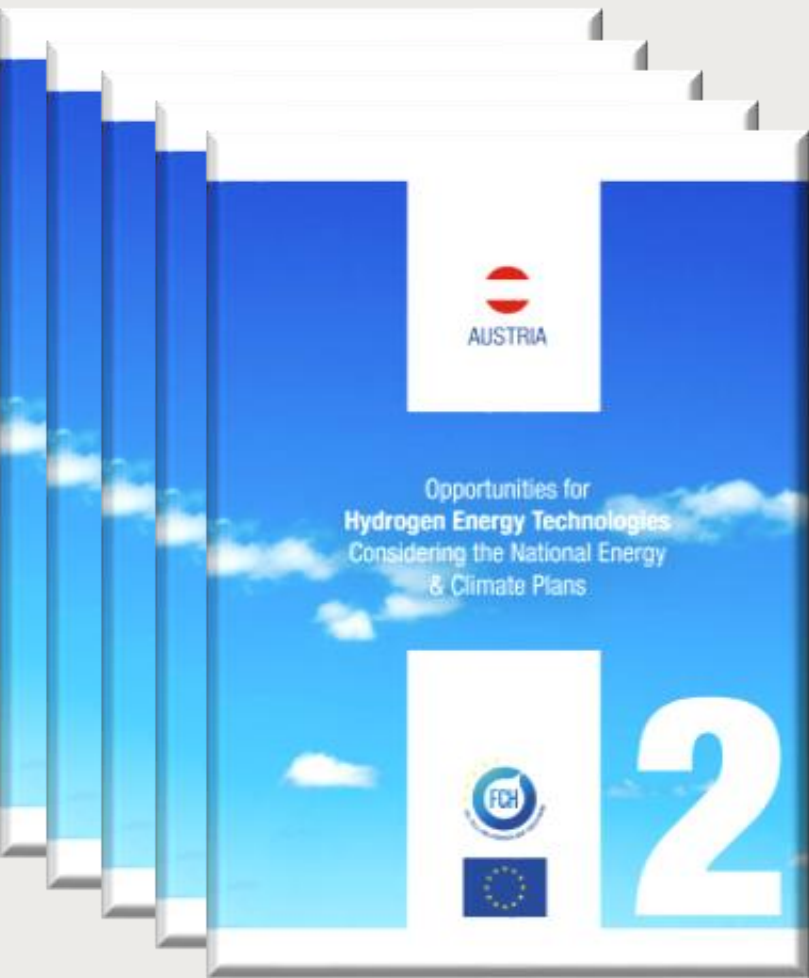
Funding and financing support services

Studies, ..., ... ,...

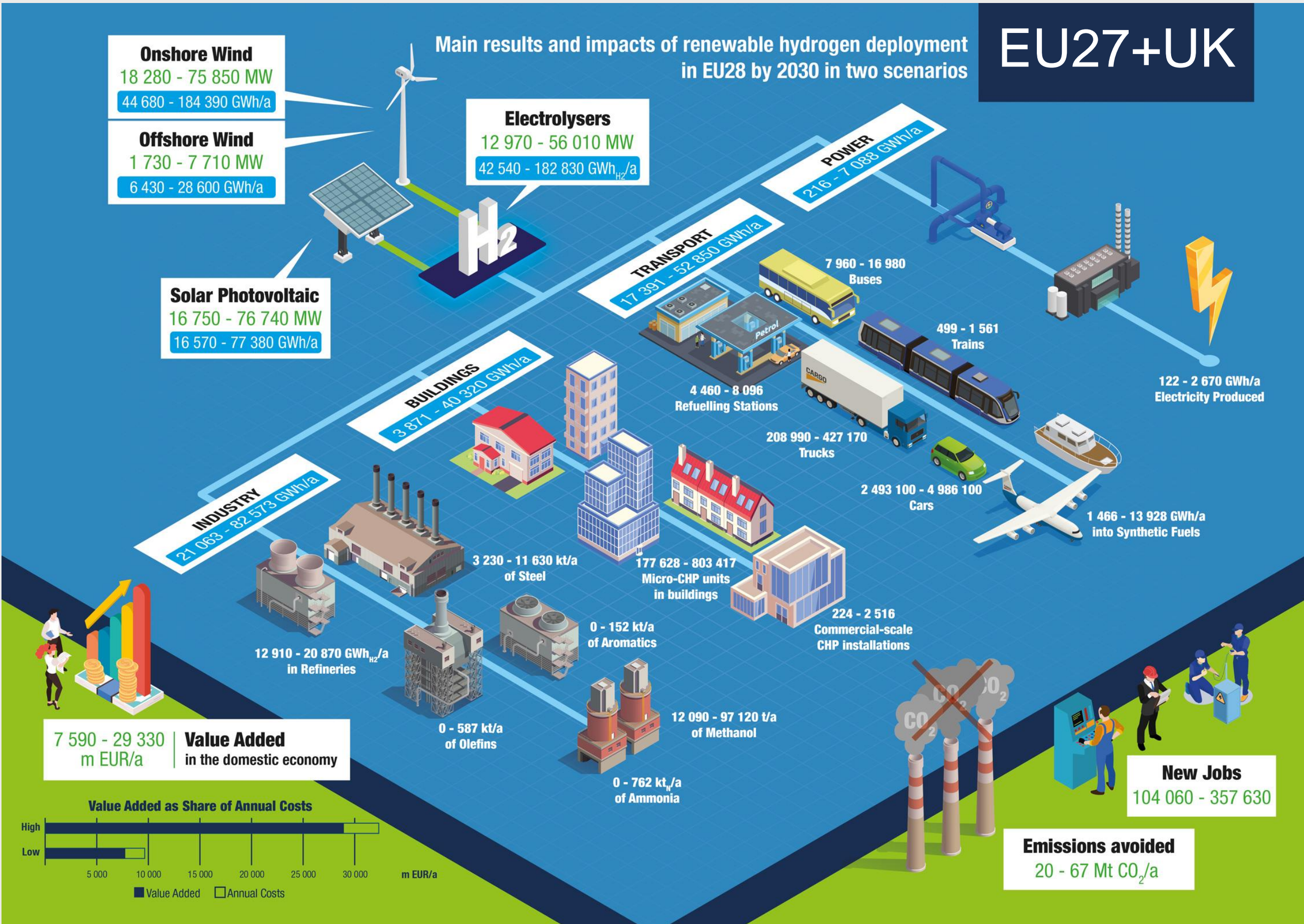


Opportunities from the inclusion of Hydrogen in NECPs

EU27+UK NECPs were analyzed on the national opportunities for hydrogen deployment by 2030.



<https://www.fch.europa.eu/publications/opportunities-hydrogen-energy-technologies-considering-national-energy-climate-plans>



In EU27+UK by 2030 depending on the scenario, 13-56 GW of electrolysers (4800Hrs full load) are needed reducing 20-67MtCO₂/a, creating 7.5-29 bn € added value and 104k-358k jobs.

Developing an EU wide Guarantees of Origin (GO) 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

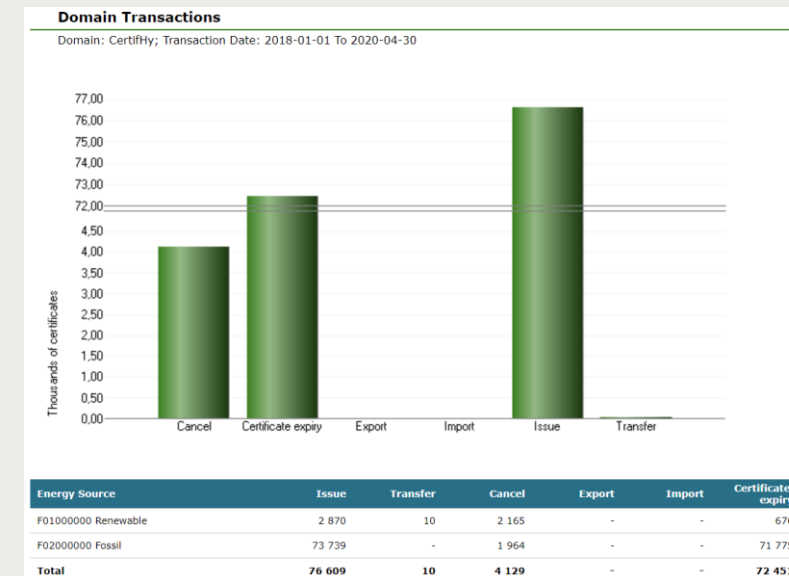
Air Liquide, Port Jerome (SMR +CCS) Colruyt Group, Halle (Electrolysis +RE)



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

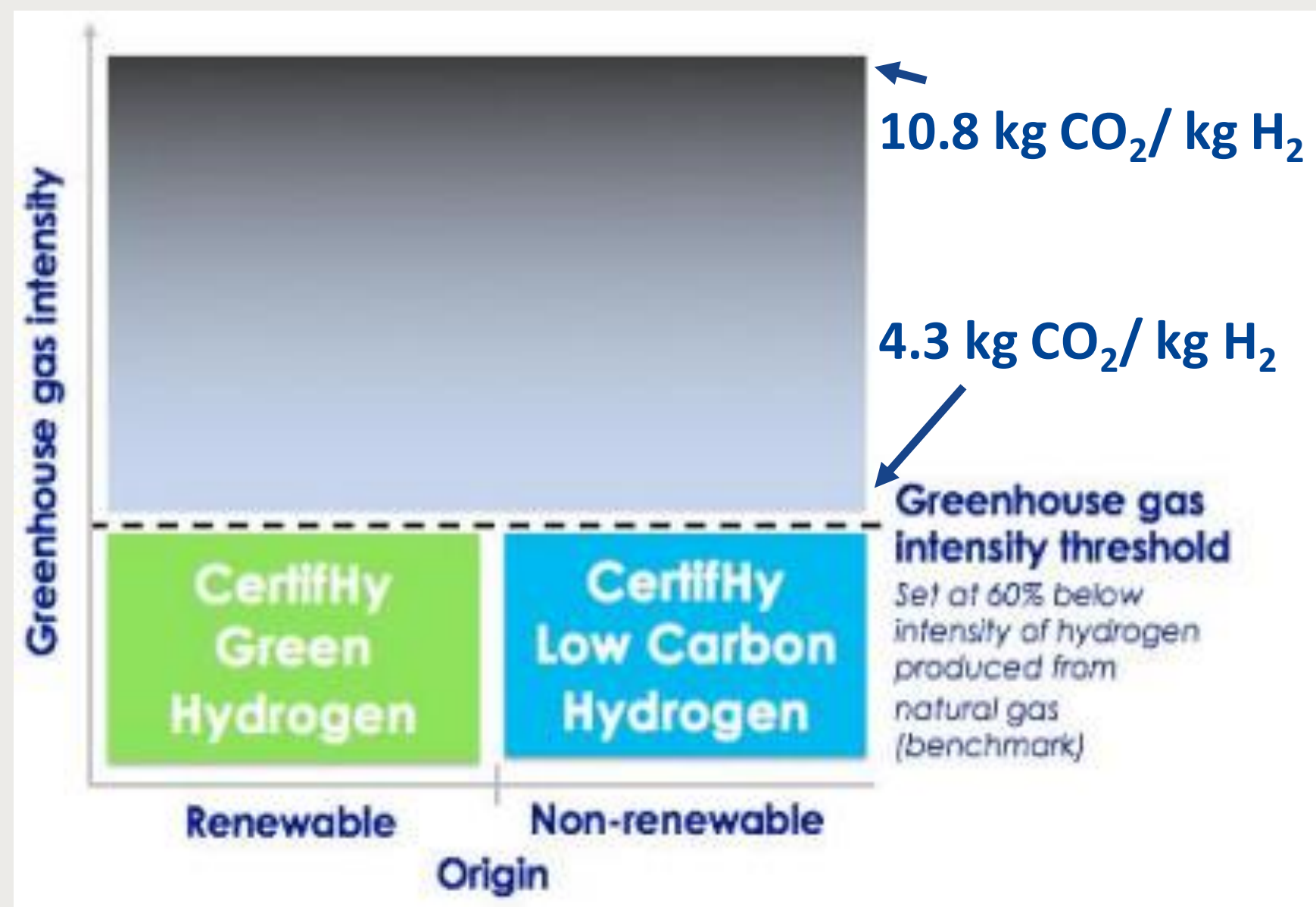


Uniper, Flakenhagen (Electrolysis + RE and methanation)



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

Two labels are defined for hydrogen



On-going actions:

- (1) Certifhy3: Setup of a platform for piloting a GO scheme for hydrogen across Europe. <https://www.certifhy.eu/>
- (2) IPHE taskforce on Hydrogen Production Analysis (H2PA);

EU Hydrogen Strategy of 8th July 2020

Objectives in 3 phases with the Hydrogen Alliance to support the investment agenda



Phase 1: 2020-2024

- **6GW** of renewable H₂ electrolyzers
- 1 million tonnes renewable H₂
- Replace **existing** H₂ **production**
- Regulation for liquid H₂ markets
- Planning H₂ infrastructure

Phase 2: 2025-2030

- **40GW** renewable H₂ electrolyser
- 10 million tonnes renewable H₂
- New applications in steel & transport
- H₂ for electricity balancing purposes
- Creation of “Hydrogen Valleys”
- Cross-border logistical infrastructure

Phase 3: 2030-2050

- H₂ technologies matured and deployed at large scale in hard to abate sectors.
- Expansion of hydrogen-derived synthetic fuels
- EU-wide infrastructure network
- An open international market

Clean Hydrogen Alliance to support the EU investment agenda



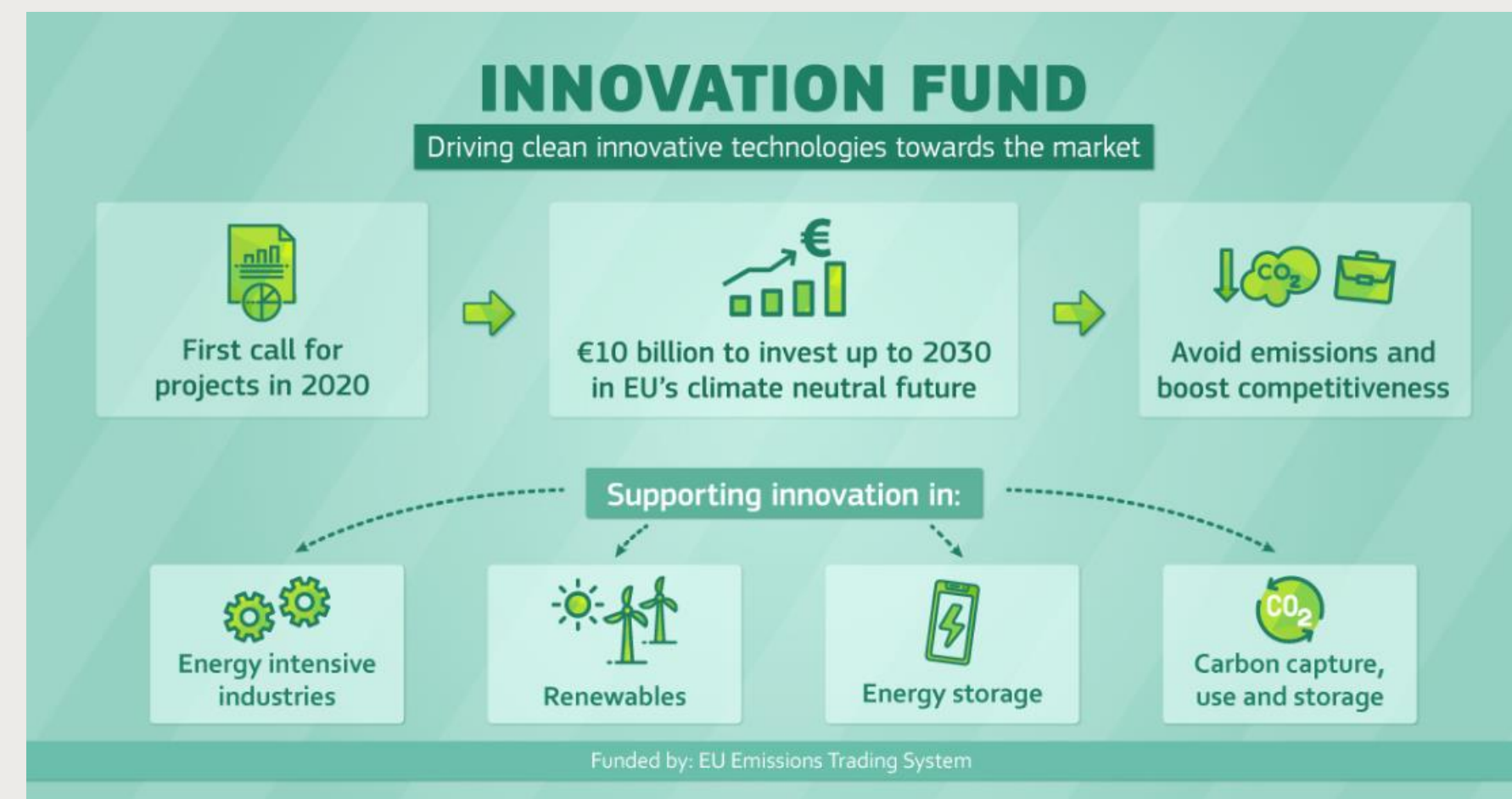
Future European Funding opportunities for hydrogen

Depending on the project seize and goal, the right funding instrument should be chosen, FCH can help you!



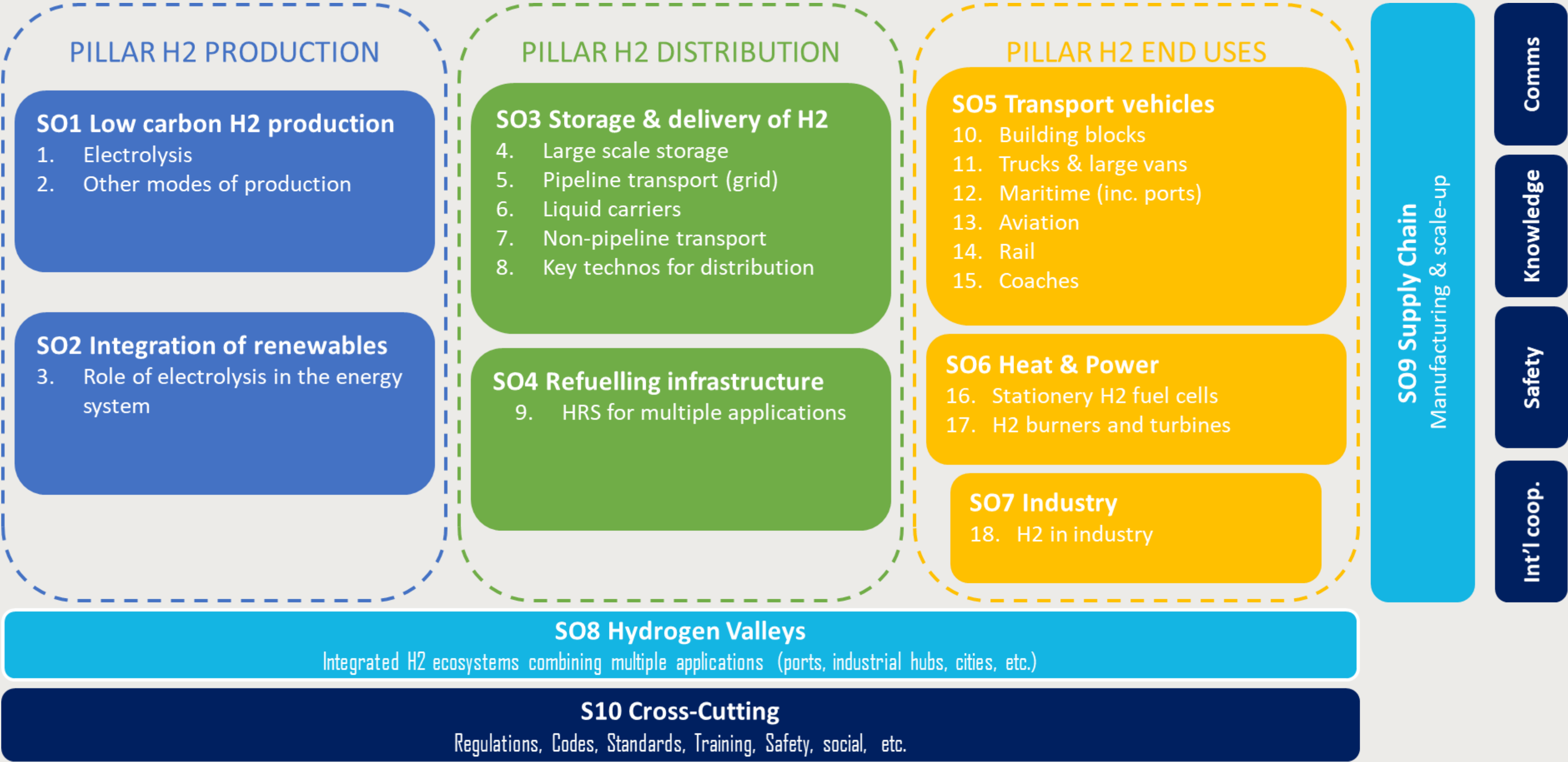
Next partnership: CLEAN HYDROGEN

- Channel cross-sectoral collaboration
- Involve more energy companies
- Include waterborne and rail transport industry
- The industrial sectors (chemical, steel, refineries, etc.)
- Include civil society and NGOs.



Proposed objectives for Clean Hydrogen Partnership

3 main pillars: H₂ production, distribution and end-uses next to supply chain, H₂ valleys and cross-cutting.



Important to remain the Knowledge hub for Hydrogen



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