



FUEL CELLS AND HYDROGEN
JOINT UNDERTAKING

***EU ongoing
transition to Clean
Hydrogen and Fuel
Cells***

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14/05/2020



European Green Deal

Improving the well-being of people by making Europe climate-neutral and protecting our natural habitat



“The European Green Deal is our new growth strategy. It will help us cut emissions while creating jobs.”

Ursula von der Leyden, President of the European Commission



“We propose a green and inclusive transition to help improve people’s well-being and secure a healthy planet for generations to come.”

Frans Timmermans, Executive Vice-President of the European Commission



European Green Deal

European Commission Communication and Roadmap (December 2019)



EU industry needs ‘climate and resource frontrunners’ to develop the first commercial applications of breakthrough technologies in key industrial sectors by 2030. Priority areas include clean hydrogen, fuel cells and other alternative fuels, energy storage.

Partnerships with industry & Member States will support research & innovation on transport, including batteries, clean hydrogen, low-carbon steel making, circular bio-based sectors and the built environment.

The regulatory framework for energy infrastructure should foster the deployment of innovative technologies and infrastructure, such as smart grids, hydrogen networks or carbon capture, storage and utilisation, energy storage, also enabling sectorial integration.

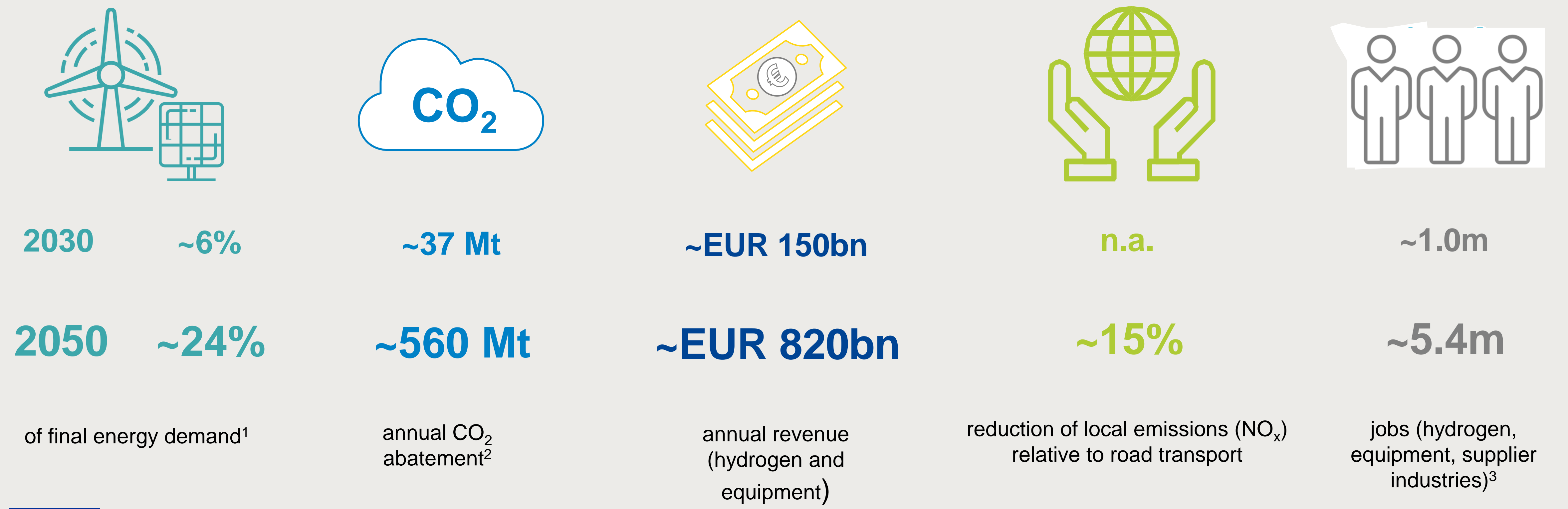




Besides CO₂ abatement, deployment of hydrogen technologies also cuts local emissions, creates new markets and secures sustainable employment in EU



2030 - 2050 EU industry hydrogen vision



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

SOURCE: Hydrogen Roadmap Europe (2019)

FCH JU: Strong Public-Private Partnership with a focused objective

EU Institutional Public-Private Partnership (IPPP), led by industry



Fuel Cells & Hydrogen Joint Undertaking (FCH JU)



Industry grouping
About 130 companies
50% SME



European
Commission



Research grouping
About 70 institutions



To implement an *optimal research and innovation programme* to bring FCH technologies to the point of market readiness by 2020

FCH JU programme implementation (2008-2019)

A combined Public-Private investment of over 2 billion EURO to bring products to market readiness by 2020



Energy

- Hydrogen production and distribution
- Hydrogen storage for renewable energy integration
- Fuel cells for power & combined heat & power generation



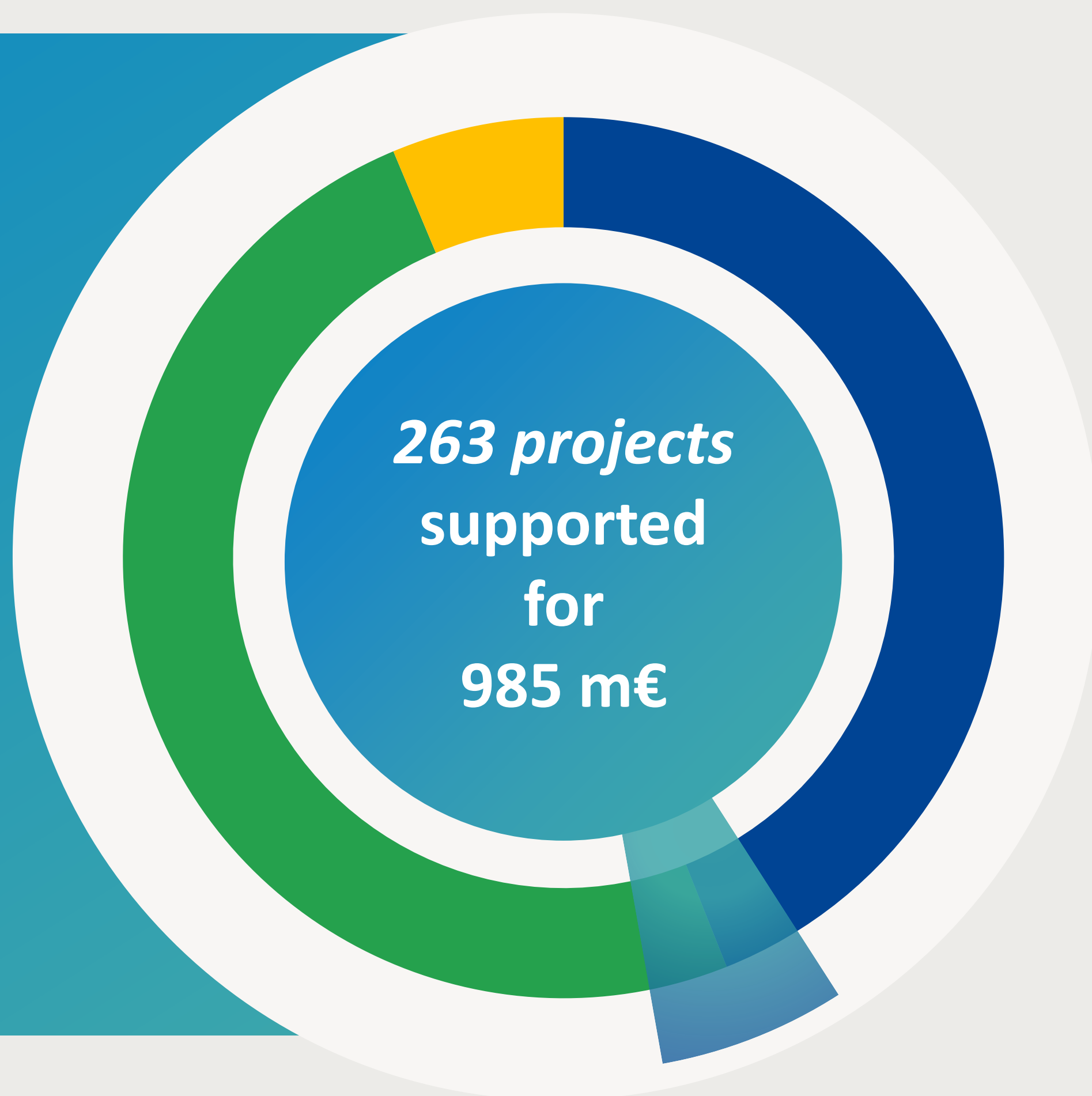
Transport

- Road vehicles
- Non-road vehicles and machinery
- Refuelling infrastructure
- Maritime rail and aviation applications

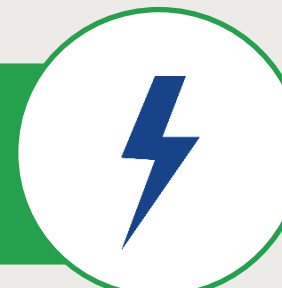


Cross-cutting

- E.g. 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 b€

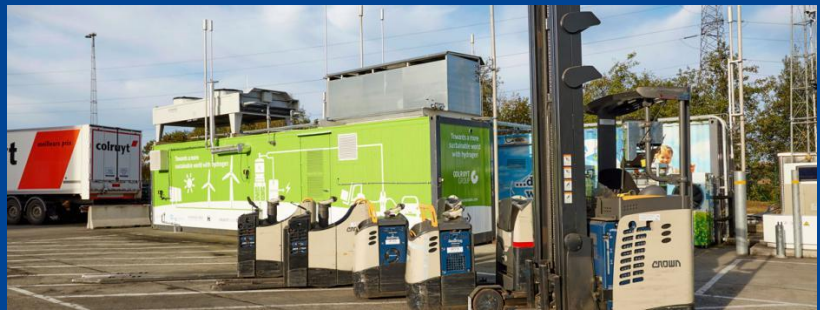


FCH JU electrolysis projects over time (32 projects for 114m€)


EU is now world-leader in electrolysis systems (TIM* database: EU has most patents and publications in this field)



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



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



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



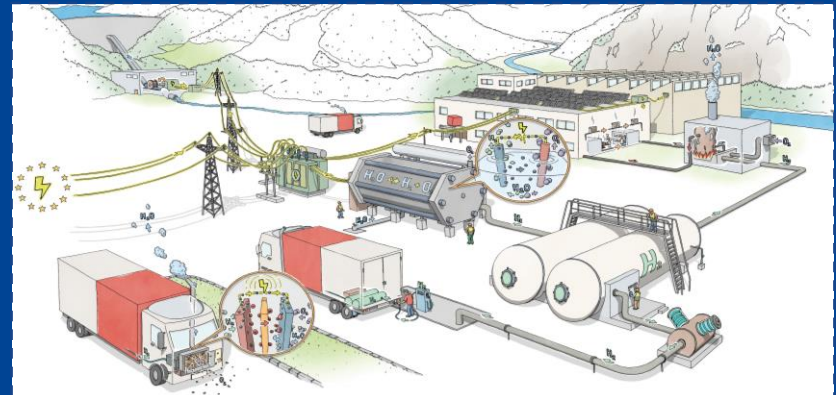
Project: Djewels
Place: The Netherlands
Date: 2018
Electrolyser: McPhy (ALK)
Funding: 11 m€




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€



NEXT:
2020-2025: 100 MW
Green Deal call
By 2030: GW scale



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

Developing an EU wide Guarantees of Origin Scheme for Hydrogen

Two definitions: one for Green and one for Low-Carbon/Clean Hydrogen – more than 70,000 GOs issued during the pilot



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

Air Liquide, Port Jerome (SMR +CCS)



Colruyt Group, Halle (Electrolysis +RE)



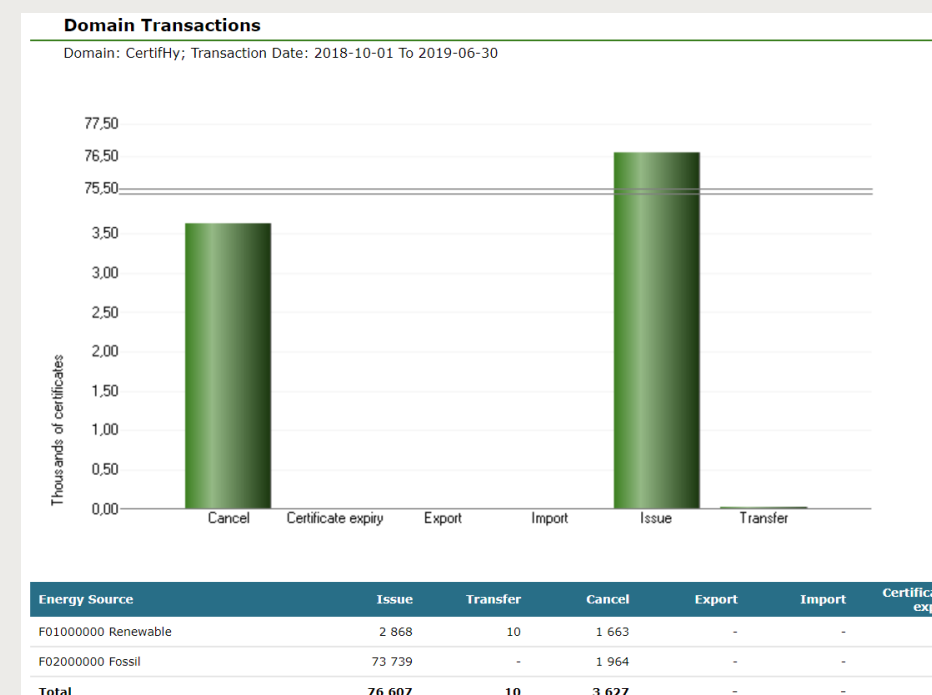
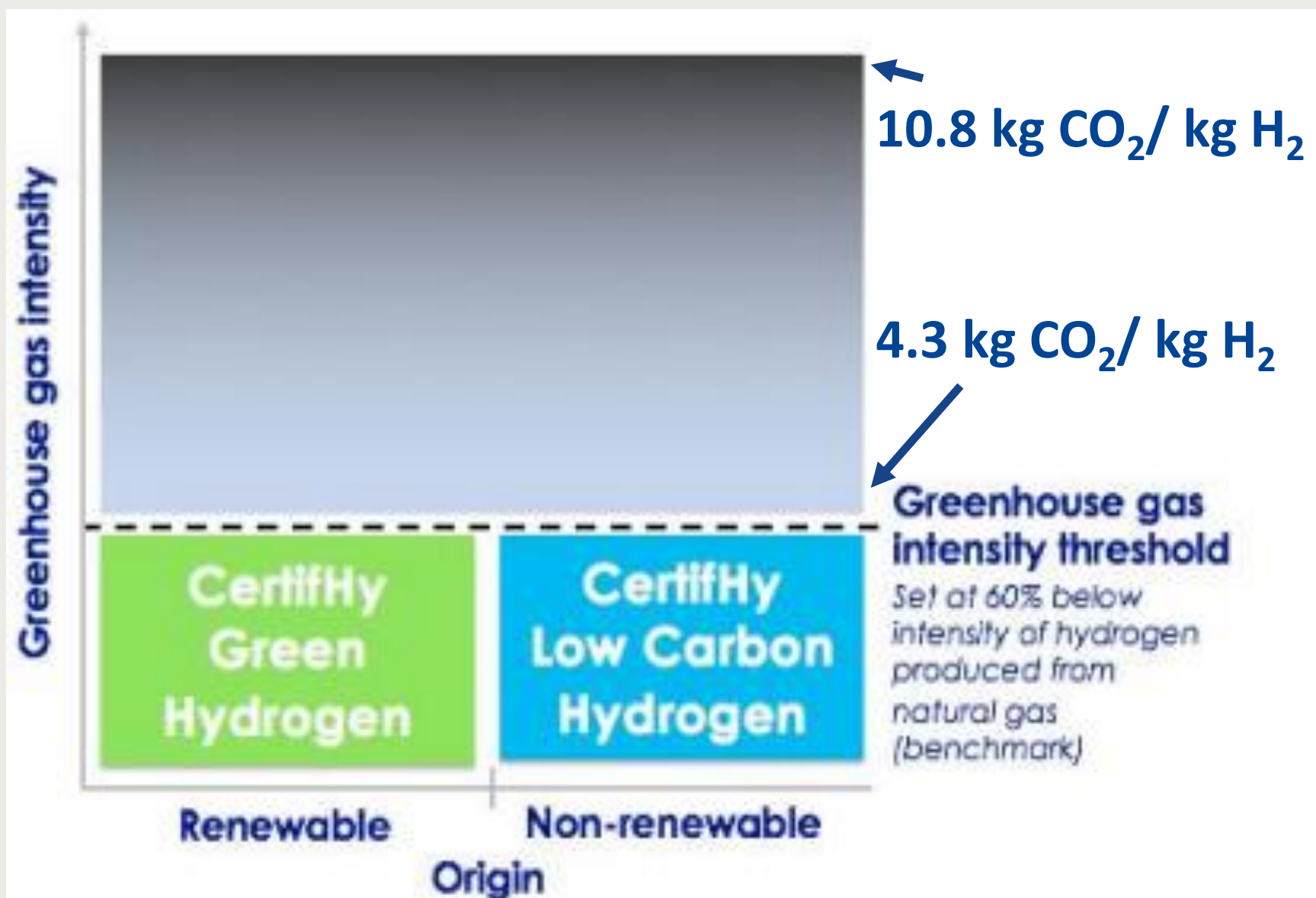
Air Products, Rotterdam (by product H2 from Chlor-alkali process)



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 EU-wide GO scheme (REDII Directive implementation)

Orkney Islands: Europe's first Hydrogen territory

Blueprint for other territories which consider hydrogen to decarbonise



A hydrogen territory in Scotland: hydrogen production, storage, transportation and utilization for heat, power and mobility.

2016-2021

**FCH Funding:
~5M€**



HySeas III: the world's first zero emission, sea-going ferry. Demonstrate a circular economy model for the local production of H2 fuel

2017-2021

**H2020 Funding:
~9.3M€**



FCH JU support to policy/initiatives

Supporting the market deployment and reinforcing the European competitive strengths

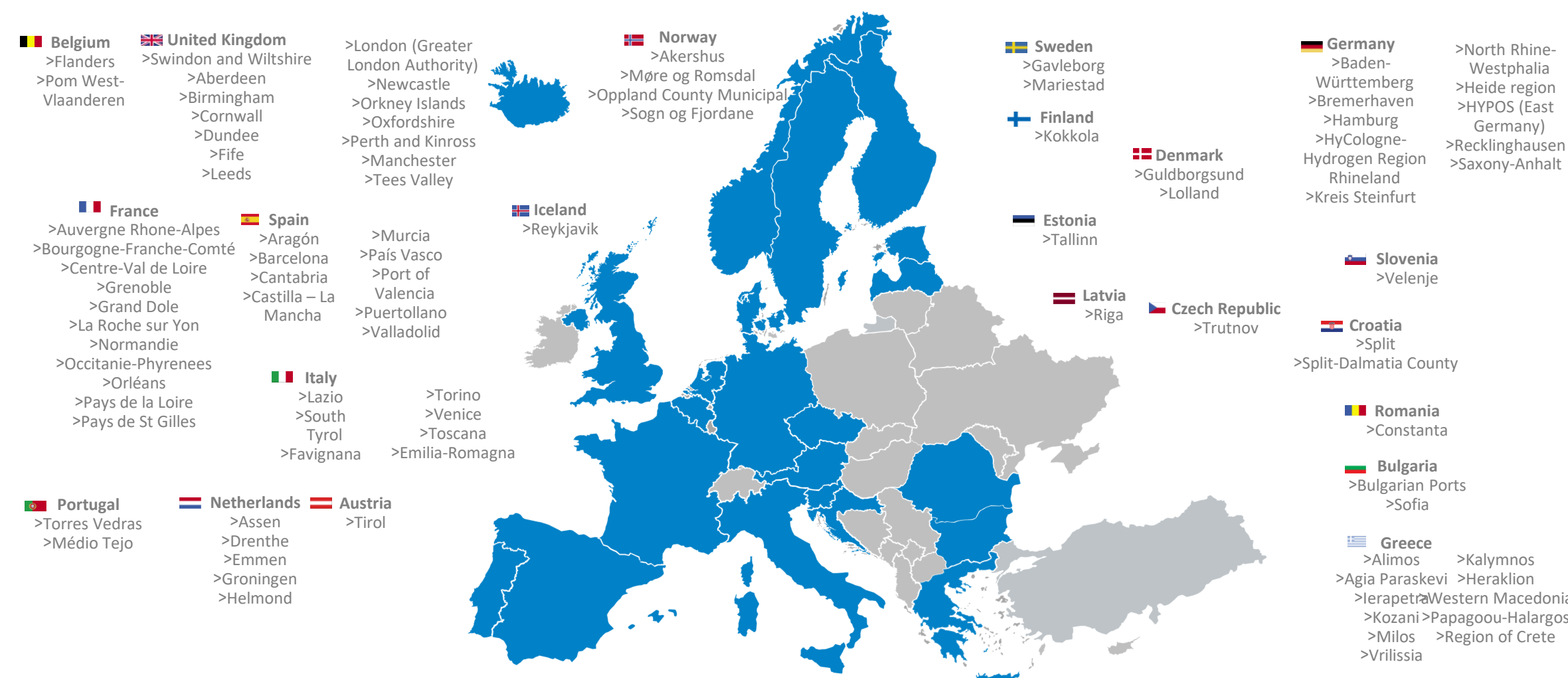


<https://www.fch.europa.eu/page/about-initiative>

<https://www.fch.europa.eu/page/FCH-value-chain>

FCH JU Regions Initiative

Supporting regions and cities in assessing various FCH applications



FCH JU Value Chain Initiative

Study on value chain and European competitiveness



Predecessor of: • H2Valley (2019 call topic) **Fact-based input to the IPCEI/industrial Strategy**

• PDA (2019-2020) <https://www.fch-regions.eu/>

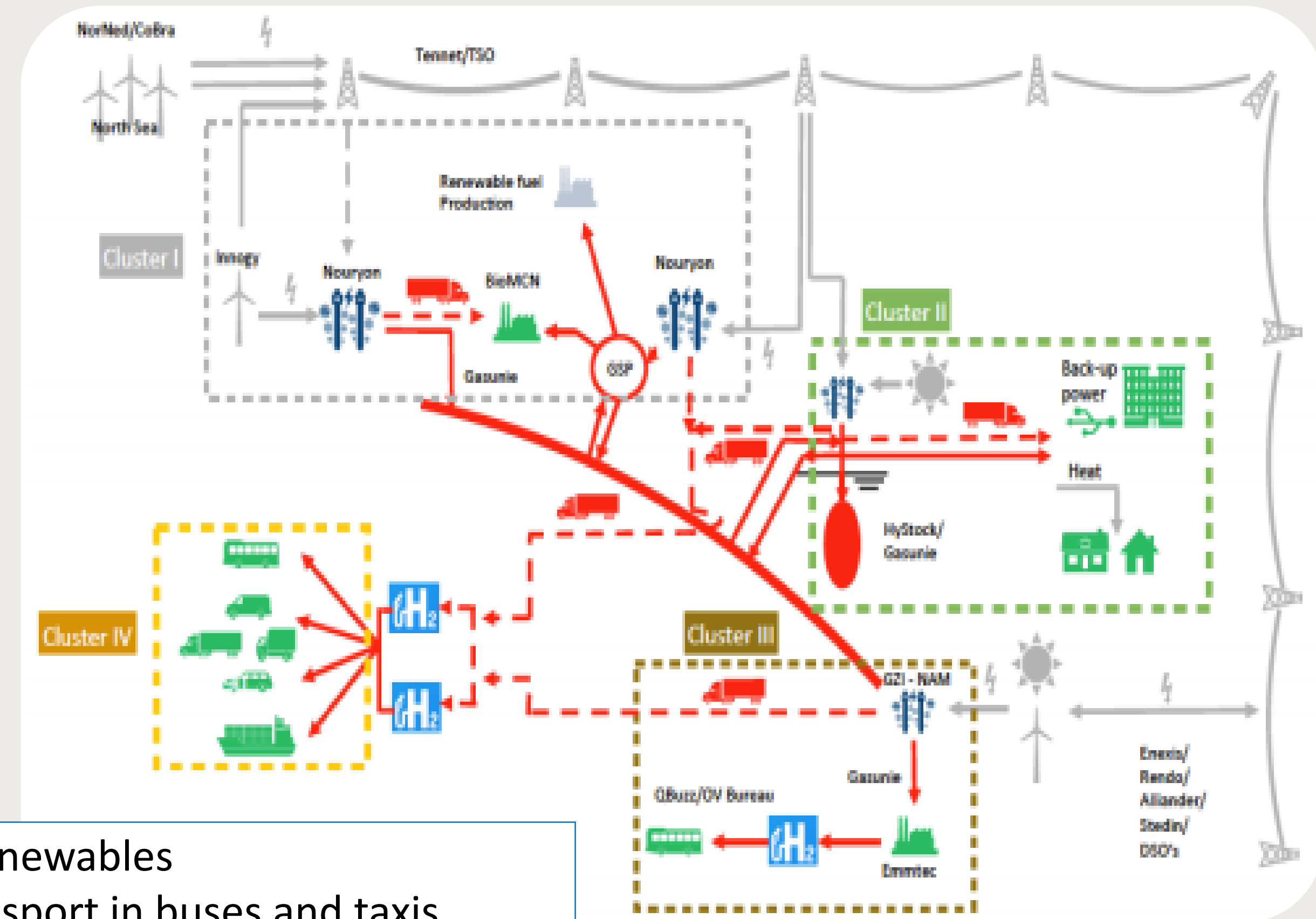
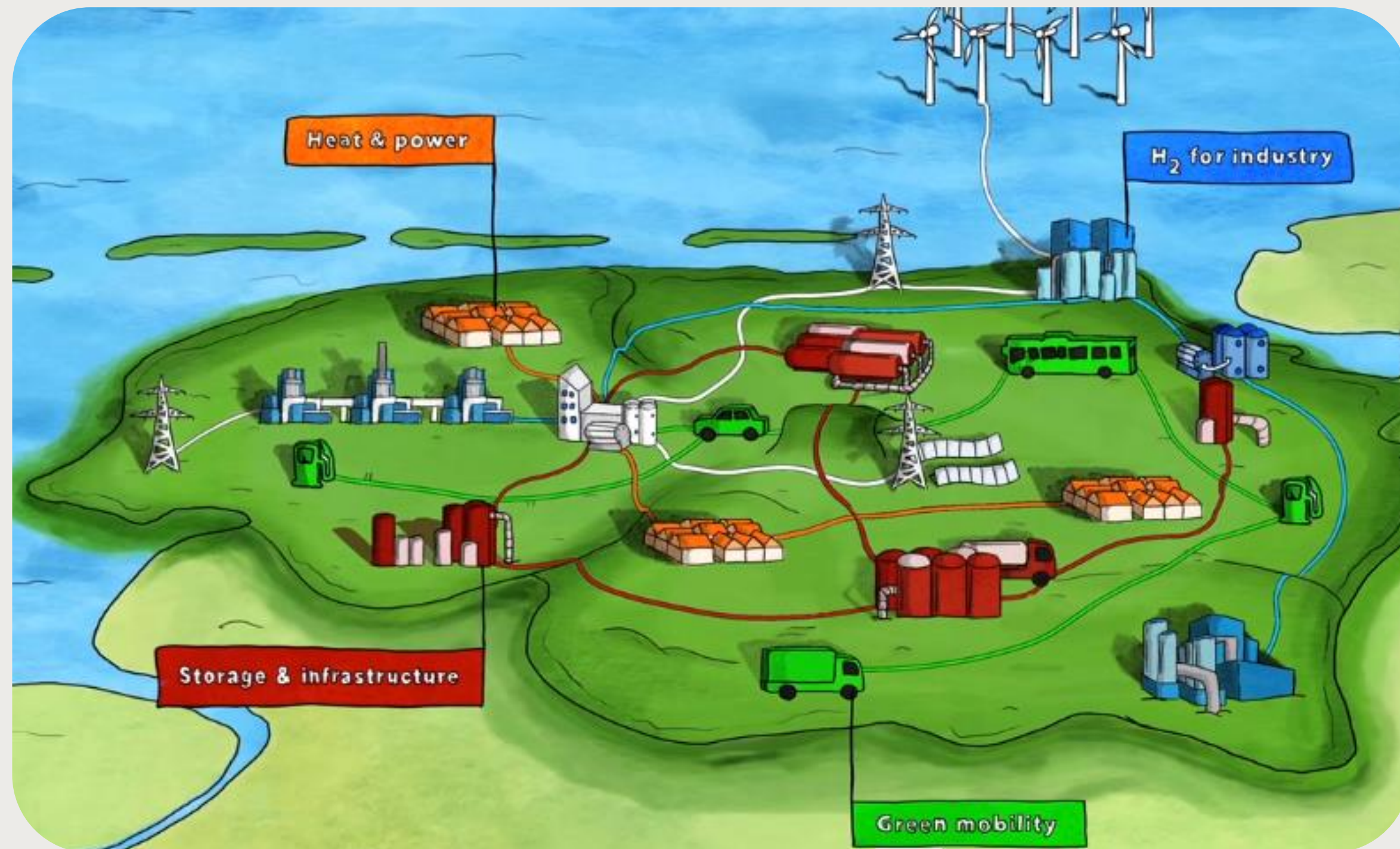
• EHV-S3P (H2 Valleys Partnership)

<https://www.hydrogen4climateaction.eu/>



H2 Valley: HEAVENN project

North of the Netherlands to demonstrate the full hydrogen valley concept (H2 for sectoral integration)



- H2020 Funding: EUR 20 m
- Total Cost: ~EUR 100 m

- Hydrogen production from renewables
- Use of hydrogen for road transport in buses and taxis
- Use of hydrogen for ships
- Use of hydrogen as feedstock for chemical industry

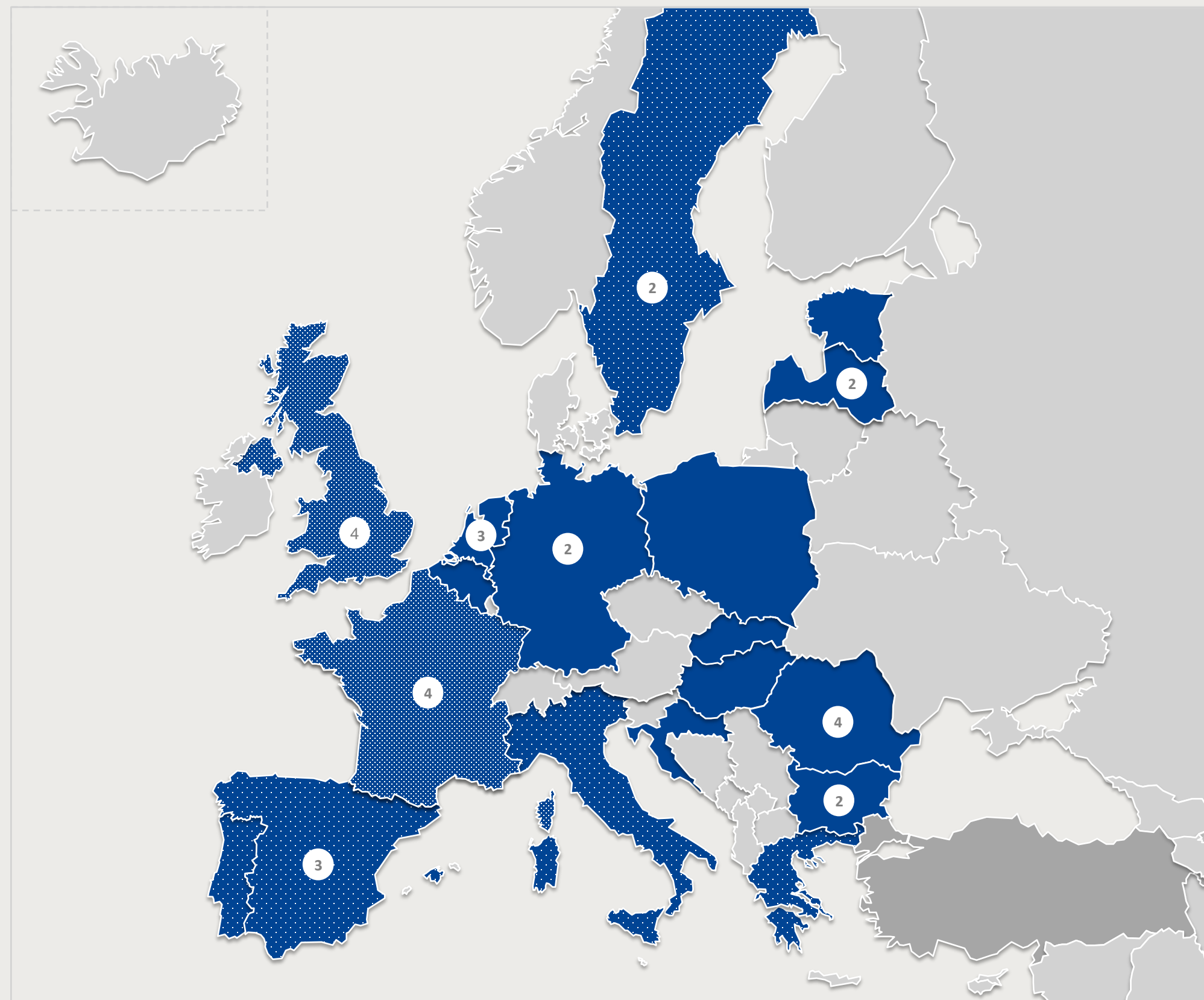


Project Development Assistance (PDA) for Regions

Pilot PDA focused on Regions and specially targeted towards the EU13 regions

At least 10 PDAs to be selected + Observer group

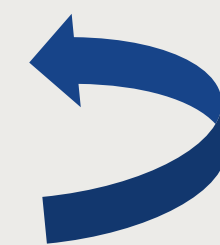
WINNERS SOON TO BE ANNOUNCED



PROJECT DEVELOPMENT ASSISTANCE FOR REGIONS



- **EHV-S3P** with 11 (out of 35) Expressions of Interest
- 13 EOI from **EU13** → **IMPORTANT TO FOLLOW UP**



Great opportunity to enlarge EHV partnership, bringing on-board and sharing learnings with 'less FCH ready' but highly interested EU13 regions 12



(International) Hydrogen Valley Platform

Renewable and Clean Hydrogen Challenge (IC8) under  MISSION INNOVATION



Mission Innovation



- IC8 Launched in May 2018  CEM9/MI-3
- 15 countries + EU 
- Objective: "To accelerate the development of a global hydrogen market by identifying & overcoming key technology barriers to the production, distribution, storage, and use of hydrogen at GW scale"
- Scope:
 - focused multinational research & large scale demonstration efforts
 - from both public & private sectors
 - industry-directed breakthroughs within the next 3 years
 - renewable & clean hydrogen
 - 4 activity streams: making, sharing, using hydrogen & cross-cutting issues
- Co-lead 'countries': Australia, EU & Germany

The Hydrogen Valley Platform

Timeline: January to December. Key milestones: Landing page online (April), Data request open (June), Final platform goes live (November).

A Global Information Sharing Platform,

- developed by the Fuel Cells and Hydrogen Joint Undertaking at the initiative of the Mission Innovation IC8 Member States
- will provide comprehensive **information on large-scale hydrogen flagship projects**, also known as Hydrogen Valleys

The platform can be accessed at: www.h2v.eu. Have a look at it right now!

[SIGN UP HERE FOR UPDATES](#)

Our Mission

- is to advance the **clean energy transition**
- is to promote the emergence and the implementation of **hydrogen projects**
- is to **raise awareness** among policy makers

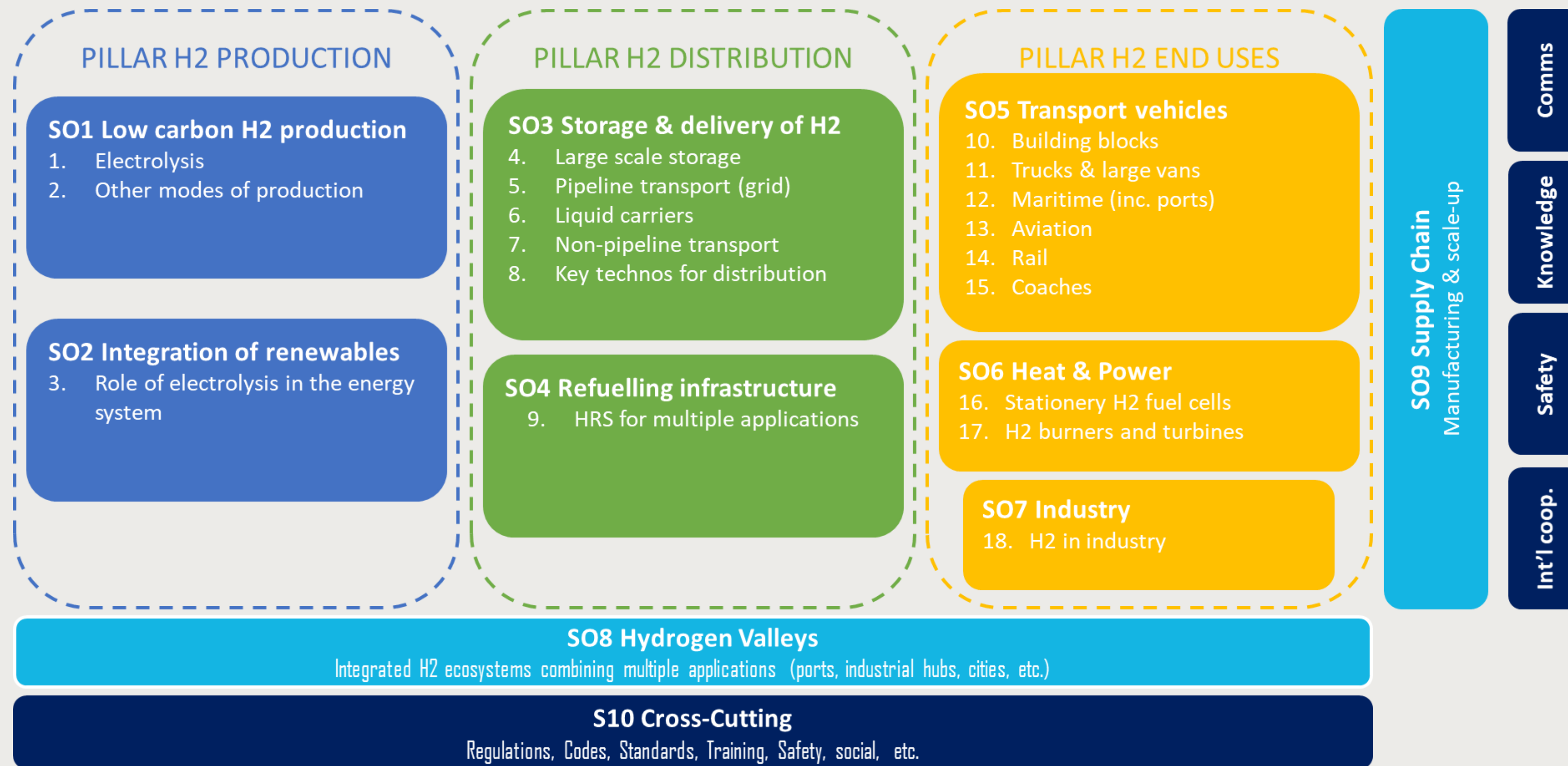


- H2 Valleys' concept picked up world wide
- EU/EC/FCHJU in the lead also in terms of gathering and sharing lessons learnt

Clean Hydrogen Partnership (2021-2030)

Proposed objectives for Clean Hydrogen Partnership

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

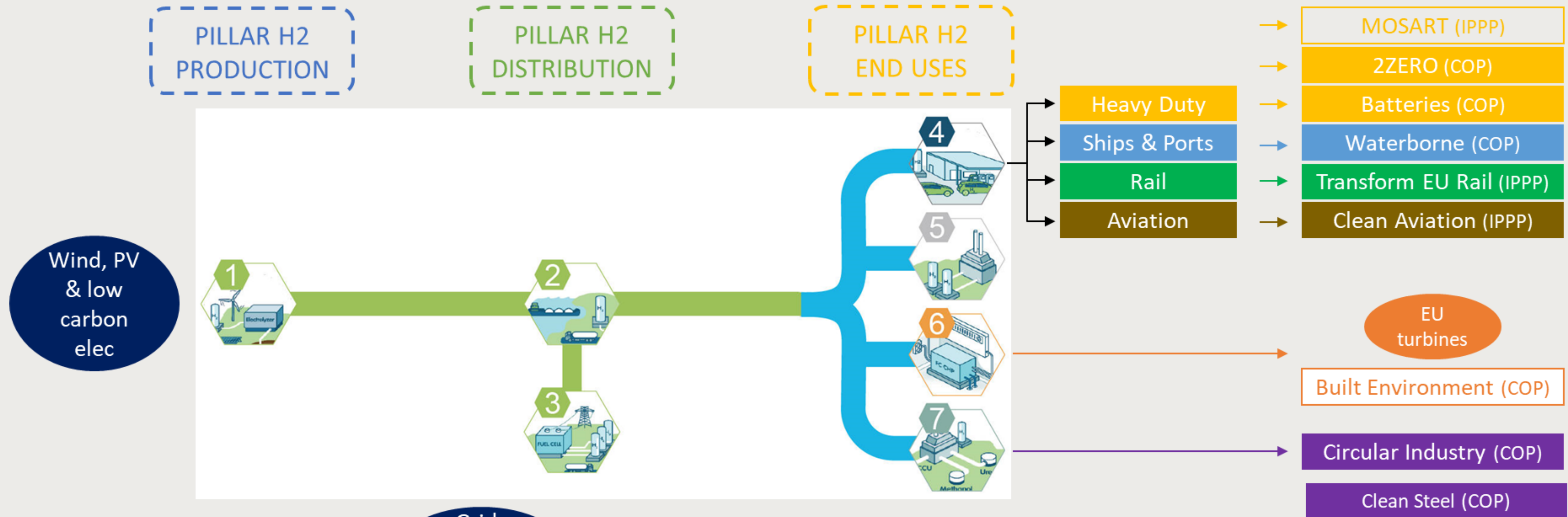


Important to **keep the ECO-system together** (production → end-users incl. transport)

Cooperation with other sectors



Looking to complementarities and cooperation with other partnerships => mainly in the transport area



- Clean Energy Transition (COF)
- EIT Climate
- EIT Raw material

- Legend**
- Complementarity + wish of active coordination
 - Complementarity + exchange of information
 - No PPP but wish of active coordination

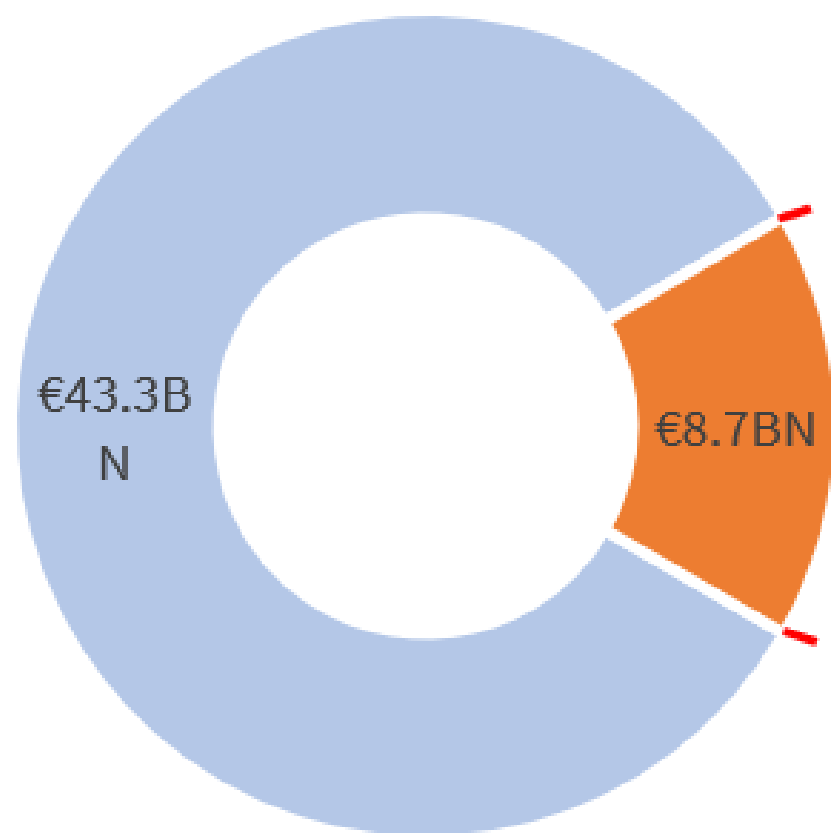


Proposed a €2.6 bill program for Clean Hydrogen Partnership

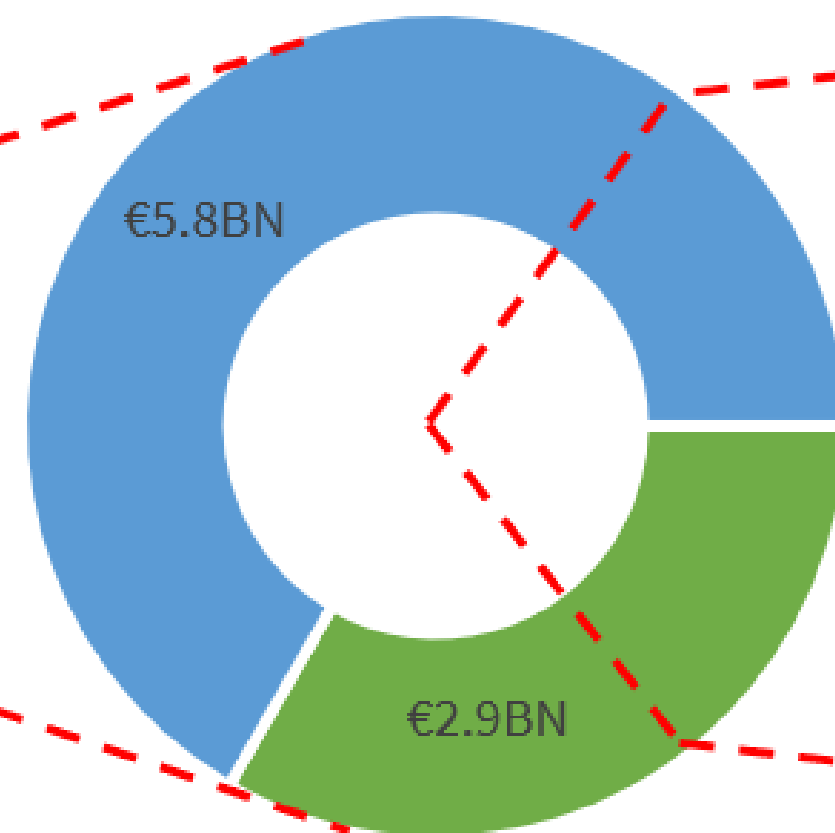


Industry requests an EU public contribution of €2.9 bill (€1.3 bill for Clean H2 JU) to unlock a nearly €50 bill by Industry & MS

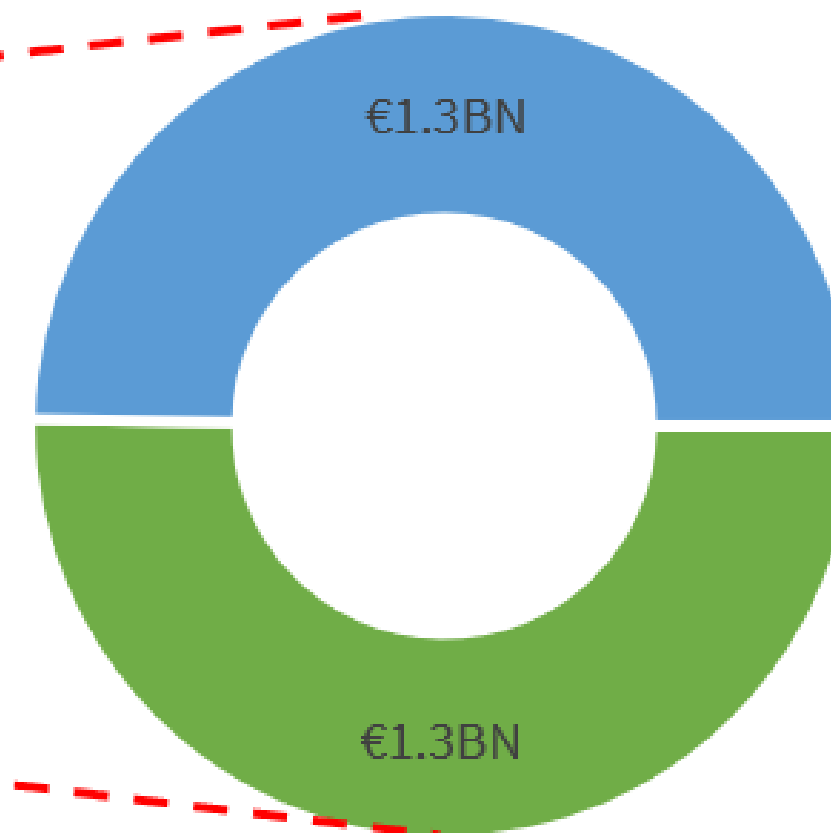
€52B total investment for the 2030 vision



€8.7B of investment triggered by EC 2021-2027



Clean Hydrogen for Europe



■ Industry & Member State investment
■ EU public private effort

■ Industry contribution
■ Public contribution

■ Industry contribution
■ Public contribution

Request to double JU budget (0.665 → €1.3 BN):

- expensive heavy duty, industry feedstock
- demo's in Eastern and Central Europe

Public support today for the sector:

China: 4 €/capita/yr.

Japan: 3 €/capita/yr.

US: 0.75 €/capita/yr.

EU: 0.5 €/capita/yr. (EU + M/S)

Doubling JU budget => 0.7 €/capita/yr. (EU+M/S)

→ still lowest public support vs US, China, Japan

Doubling the budget is the minimum to achieve the objectives of the Green Deal and to keep EU leadership. In addition a stronger involvement of the Member States and regions will be required as well as a strong international cooperation role for the EC together with the next partnership.



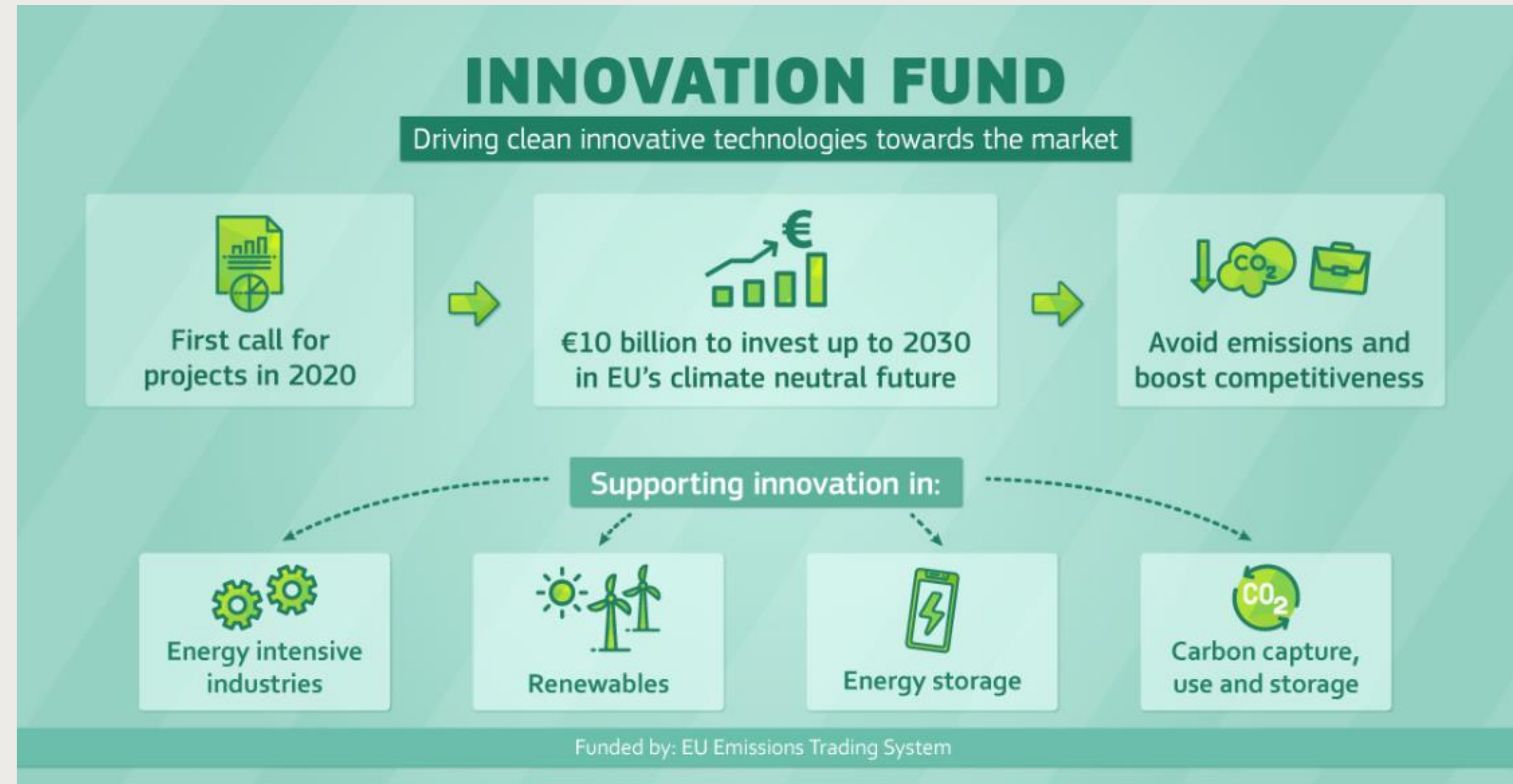
Other EU instruments...

Other European Funding instruments for hydrogen

Depending on the project seize and goal, the right funding instrument should be chosen



CEF for large infra-structure roll out
(DG MOVE/INEA)



ETS money funds clean technologies
(DG CLIMA/INEA)

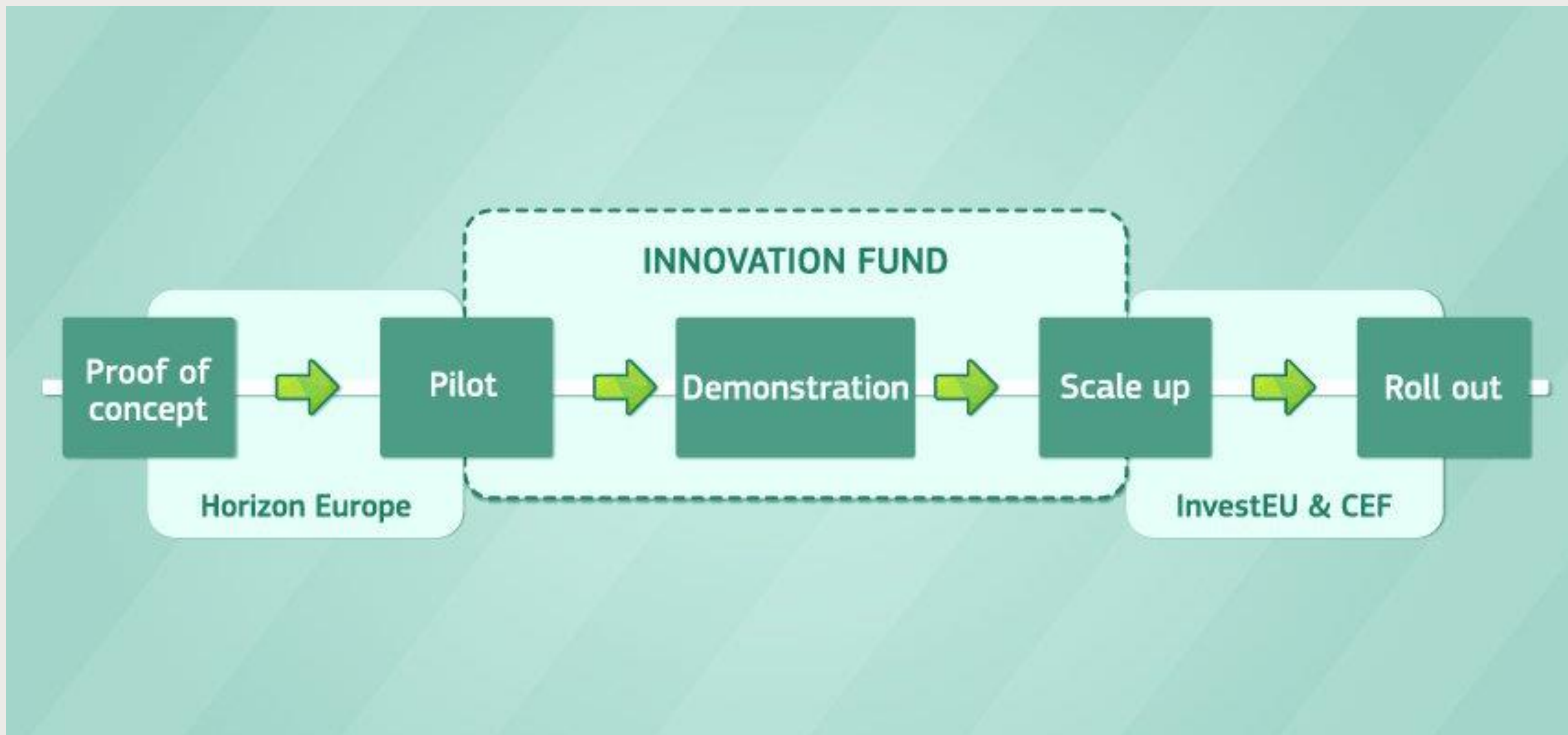


INNOVATION FUND

How does it relate with other EU funding schemes? Creating synergies!



Combination of EU funds possible



- InvestEU
- Horizon Europe
- Enhanced European Innovation Council (EIC) pilot
- InnovFin Energy Demo Project
- Connecting Europe Facility for the roll-out of key infrastructure
- ETS Modernisation Fund
- Cohesion Fund (ESIF)
- National R&I programmes for low-carbon technologies
- Private capital



IPCEI on hydrogen spurs huge industry interest (DG GROW/DG COMP)

Important Project for Common European Interest (IPCEI)



IPCEI

Hydrogen
for Climate Action



Important Project for Common European Interest

Very Significant KPIs

11 projects presented

- ❖ 65 billion € total investment
- ❖ 35 Mio tons of CO₂ savings per year
- ❖ 30 GW of Renewable Energy capacity
- ❖ 120.000 Hydrogen powered vehicles
- ❖ 1300 Hydrogen refueling stations
- ❖ 22 Member states covered

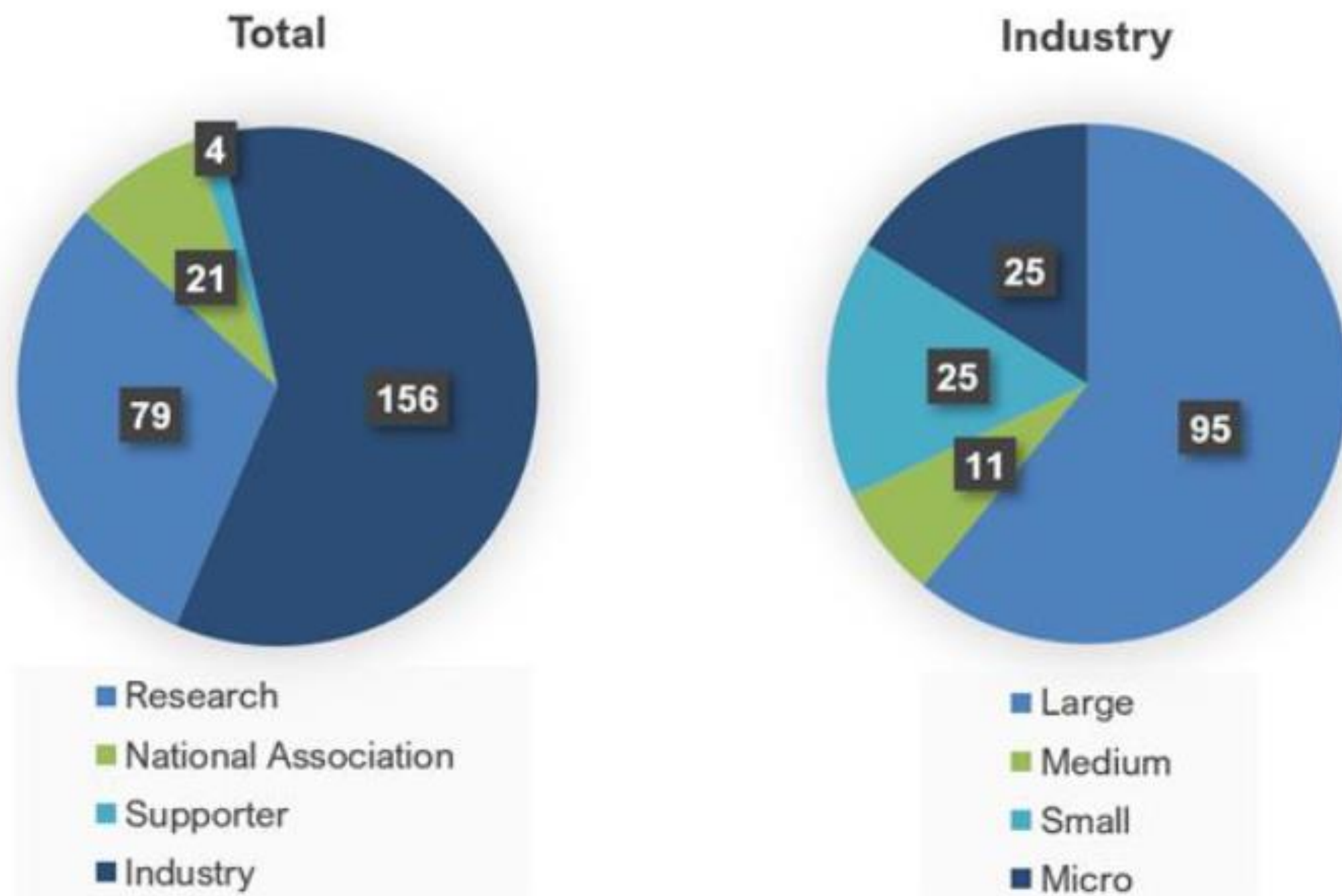


<https://www.hydrogen4climateaction.eu/>

H2 for Economic Recovery (post COVID-19)

Who will be affected and what is at risk?

Hydrogen Europe members: a representation of the sector



Hydrogen Technologies and Systems: recognised as Key Strategic Value Chain in Europe

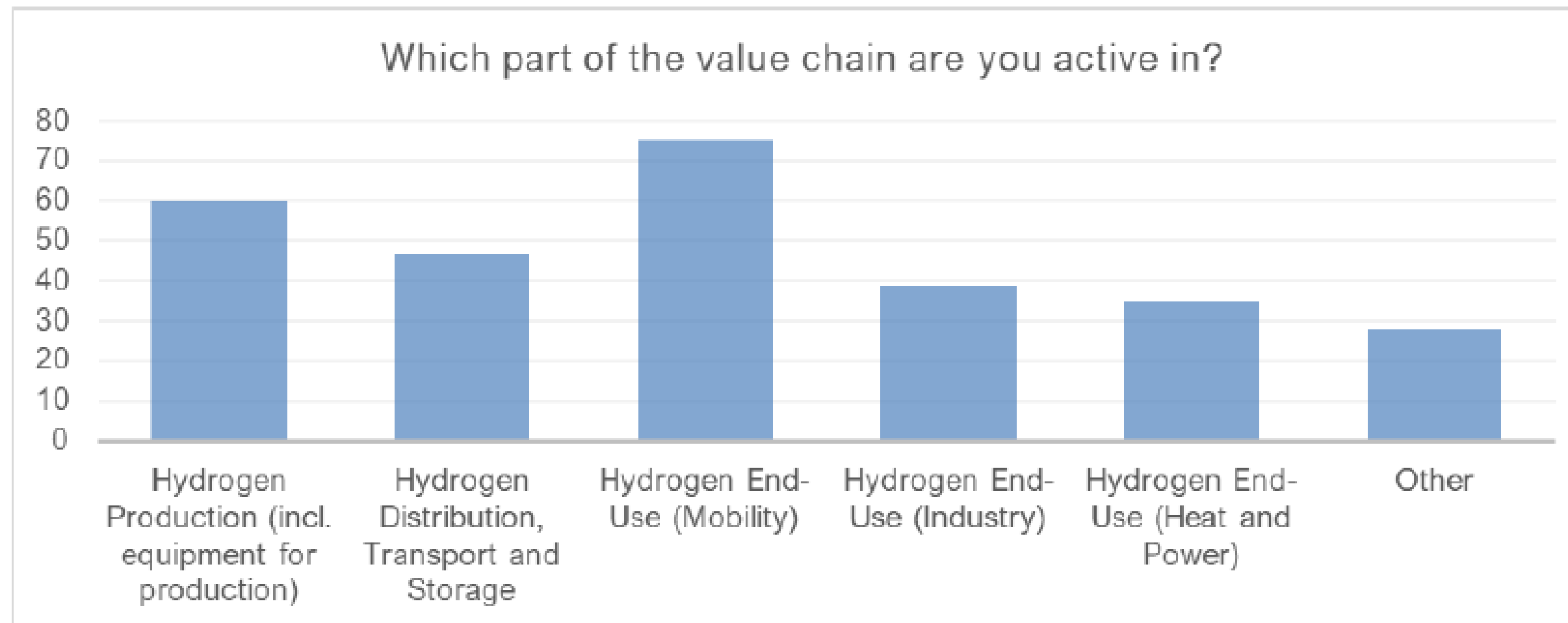
This will change because of the Covid-19 pandemic.

But, sector still in starting block and growing fast.

Our analysis suggests that:

- **Current market net worth – 2bn EUR**
- **Short-term: Investments at risks total 15bn EUR (in the short term)**
- **Long-term: 120-130bn EUR**

How will the COVID-19 affect the sector



1. Revenues are set to decrease by 50%,
2. Disproportionately affecting SMEs (decrease of 55%) vs 42% decrease for large companies.
3. As a result, the companies in the sample said that they require a total of EUR 196.667.600 in compensation/financial support in order to keep all employees in hydrogen and hydrogen related activities working in 2020 alone.

**Extrapolating the survey results to the whole sector (estimated 280 companies)
total financial support needed to preserve the workplaces around EUR 450 million**

What can be done? 5 Actions



1. Provide clear and immediate signals that, despite the current crisis, European Climate and Environmental objectives will be maintained and even raised.
2. **Link bailouts / financial support to strong commitments** in terms of **decarbonisation** in the short term and medium term (5-10 years).
3. Directly support the hydrogen value chain by providing liquidity for temporary short falls due to revenue loss in value of **EUR 450-500 million**.
4. **Doubling the budget** of the next **partnership on Clean Hydrogen** with and scope.
5. Immediately **unlock first commercial markets for green hydrogen** through market incentives.





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JOINT UNDERTAKING

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