



**FUEL CELLS AND HYDROGEN**  
JOINT UNDERTAKING

***The importance of  
Hydrogen Valleys  
from an EU and  
global perspective.***

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**18 / 08 / 2021 Virtual**



# Strong public-private partnership with a focused objective

A combined private-public of **more than 2 billion Euro** has been invested to bring products to market readiness



## FUEL CELLS AND HYDROGEN JOINT UNDERTAKING



**Industry grouping**  
>270 members  
50% SME



**Research grouping**  
±100 members



### Energy

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



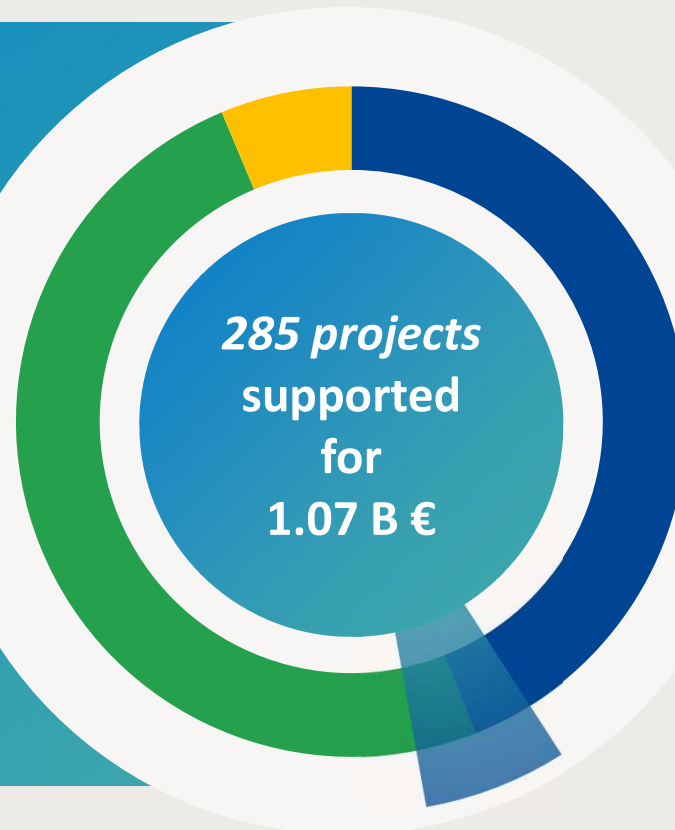
### Transport

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



### Cross-cutting

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



**45 %**



481 million euros  
153 projects

**41.4 %**



443 million euros  
77 projects

**6.3 %**



67 million euros  
48 projects

**7.3 %**



79 million euros  
7 projects



Similar leverage of other sources of funding: 1.08 B €

# Overview of FCH JU activities in Israel



- FCH JU Contribution: 0.87 M€
- 3 Beneficiaries
- 3 Projects

## Projects



## Beneficiaries



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

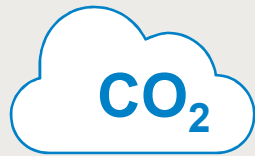


## 2050 hydrogen vision



**~24%**

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



**~560 Mt**

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



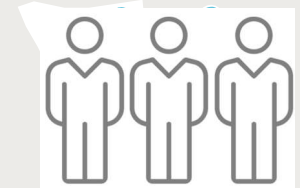
**~EUR 820bn**

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

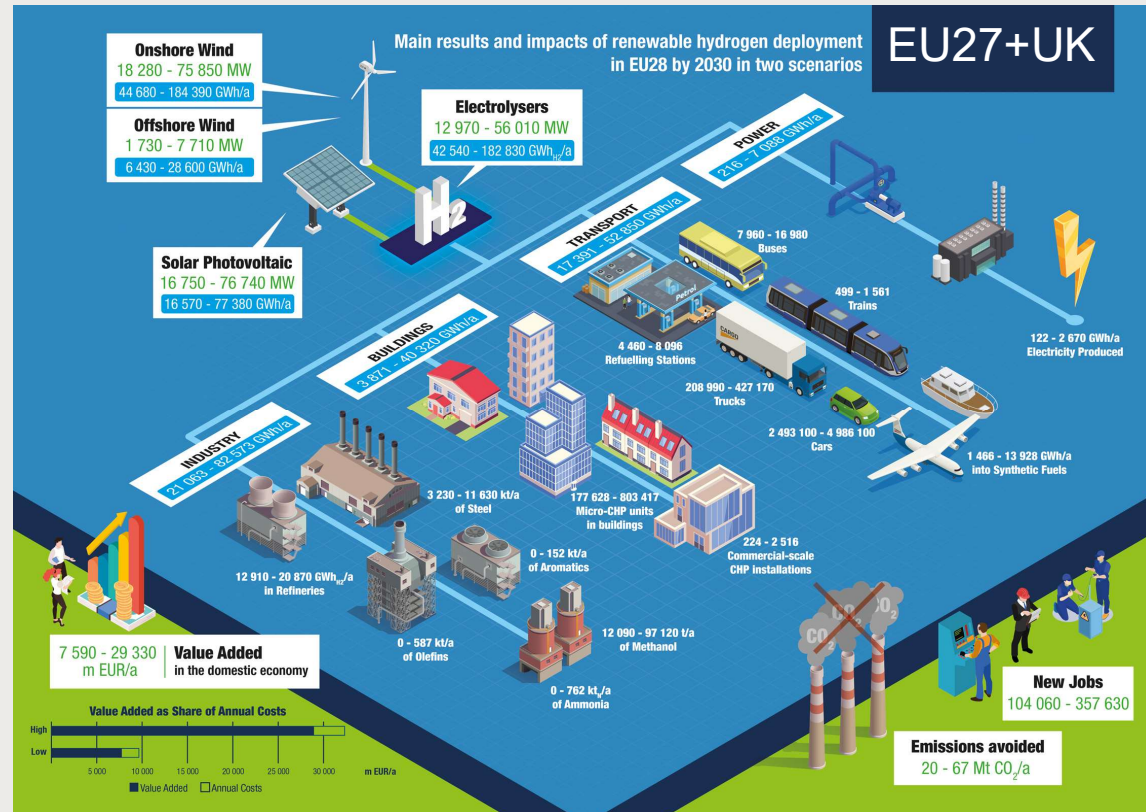
SOURCE: Hydrogen Roadmap Europe team

# 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 20-67MtCO<sub>2</sub>/a, creating 7.5-29 bn € added value and 104k-358k jobs.

# EU Hydrogen Strategy of 8<sup>th</sup> July 2020

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



## Phase 1: 2020-2024

- **6GW** of renewable H<sub>2</sub> electrolyzers
- 1 million tonnes renewable H<sub>2</sub>
- Replace **existing** H<sub>2</sub> **production**
- Regulation for liquid H<sub>2</sub> markets
- Planning H<sub>2</sub> infrastructure

## Phase 2: 2025-2030

- **40GW** renewable H<sub>2</sub> electrolyser
- 10 million tonnes renewable H<sub>2</sub>
- New applications in steel & transport
- H<sub>2</sub> for electricity balancing purposes
- Creation of "Hydrogen Valleys"
- Cross-border logistical infrastructure

## Phase 3: 2030-2050

- H<sub>2</sub> 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





## What is it?



- Launch on 8<sup>th</sup> July 2020
- Mission to create a project pipeline for a massive role-out of EU Clean Hydrogen technology
- Involving all active stakeholders in the clean hydrogen ecosystem, bringing together supply and demand

The blueprint estimates investments of  
**€430 billion by 2030**

Hydrogen Production

Transmission & Distribution

Mobility Applications

Industrial Applications

Energy Applications

Residential Applications







# Examples of Hydrogen valleys in Europe today

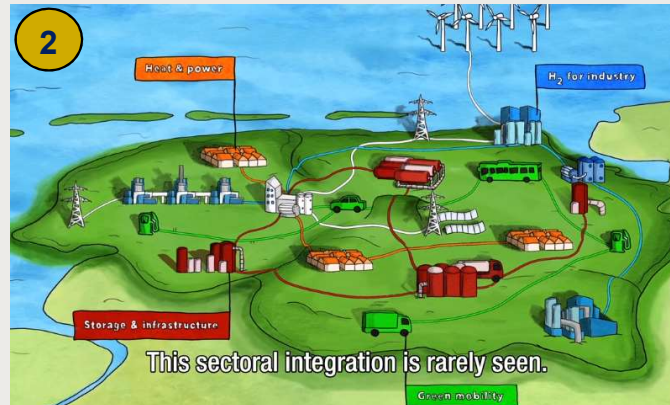


Its scope is system integration: Production of renewable H<sub>2</sub>, storage, distribution and end use (transport, stationary & industry)



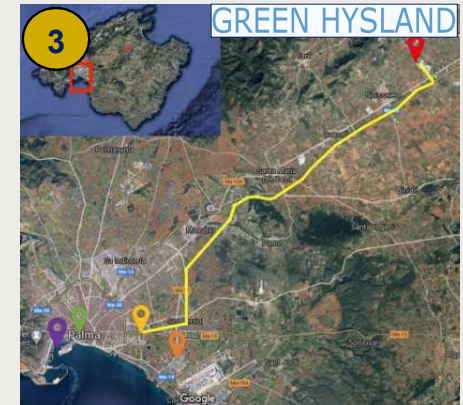
## Orkney's Island (Scotland):

- H<sub>2</sub> production by wind on Islands
- Storage and transportation by truck
- Use: heat (school), power (ferries) & mobility (municipality cars)



## North Netherlands (Groningen):

- 31 partners (public + private)
- Electrolysis for green H<sub>2</sub> production,
- H<sub>2</sub> Mobility: buses, passenger cars and trucks
- H<sub>2</sub> Refueling stations
- E-Kerosene for aviation
- H<sub>2</sub> for an inland water transport barge
- Domestic Heat applications
- Underground H<sub>2</sub> storage (Hystock)



## Hydrogen Island (Spain)

- H<sub>2</sub> production from solar
- H<sub>2</sub> injection in gas-grid
- Use: heat (hotel, municipality buildings), power (port of Palma), mobility (buses)



**Future Possible (cross border) H<sub>2</sub> valleys:** Ports, Airports, Industrial hubs, Logistical hubs, A H<sub>2</sub> city (or area)

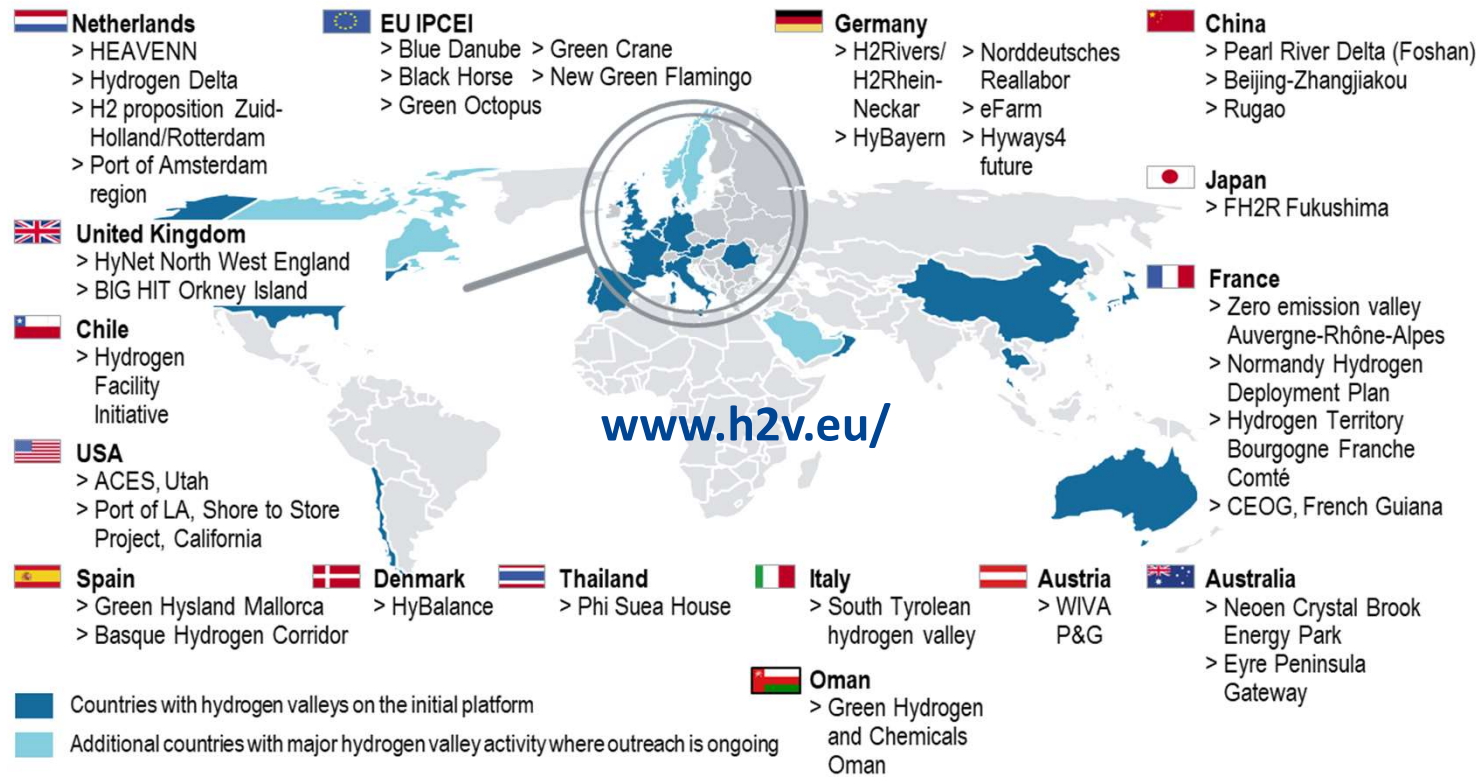
# Hydrogen Valleys have become a global phenomenon

Integrated projects are emerging all around the world

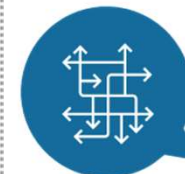


The Hydrogen Valley Platform offers a variety of insights into projects globally and also provides a way to connect

## A fast-growing landscape of globally leading projects ...



## ... featured on the new platform



> 34 valleys from 19 countries



> 3,500 data points



10 in-depth best-practice profiles

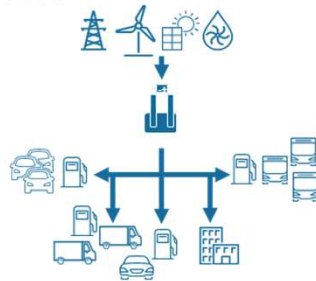
# Different projects, common themes

We see three basic archetypes of Hydrogen Valleys



## Archetype 1:

Local, small-scale & mobility-focused

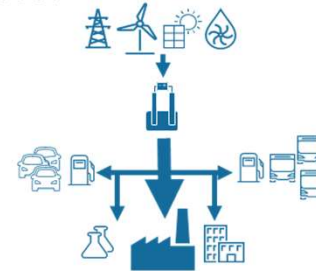


- > Local (green) hydrogen production projects serving mobility applications
- > Key focus is on aggregating consumption volumes and sharing refuelling infra (e.g. HRS)
- > Legacy of mobility/electrolyzer demo projects
- > Mostly led by public-private initiatives

**Examples:** Hyways For Future (Germany), Zero Emission Valley Auvergne-Rhône-Alpes (France), Hydrogen Valley South Tyrol (Italy)

## Archetype 2:

Local, medium-scale & industry-focused

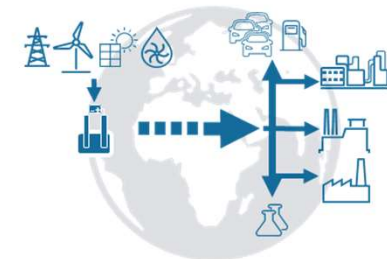


- > Local (green or blue) hydrogen production projects centered around 1-2 large off-takers as "anchor-load", smaller mobility off-takers as add-on
- > Making use of existing infra around industrial plants, often replacing grey H2 supply
- > Mostly led by private sector

**Examples:** Basque H<sub>2</sub> Corridor (Spain), Advanced Clean Energy Storage (USA), HyNet North West England (UK)

## Archetype 3:

Larger-scale, international and export-focused



- > Large-scale projects with low-cost (green or blue) production, ultimately aiming for long-distance hydrogen transport to large off-takers abroad
- > Focus on connecting supply and demand internationally
- > Mostly led by private sector

**Examples:** Eyre Peninsula Gateway (Australia), Blue Danube (IPCEI), Green Crane (IPCEI)



# Collaboration with MI's Clean Hydrogen Mission

The platform will be updated and further improved



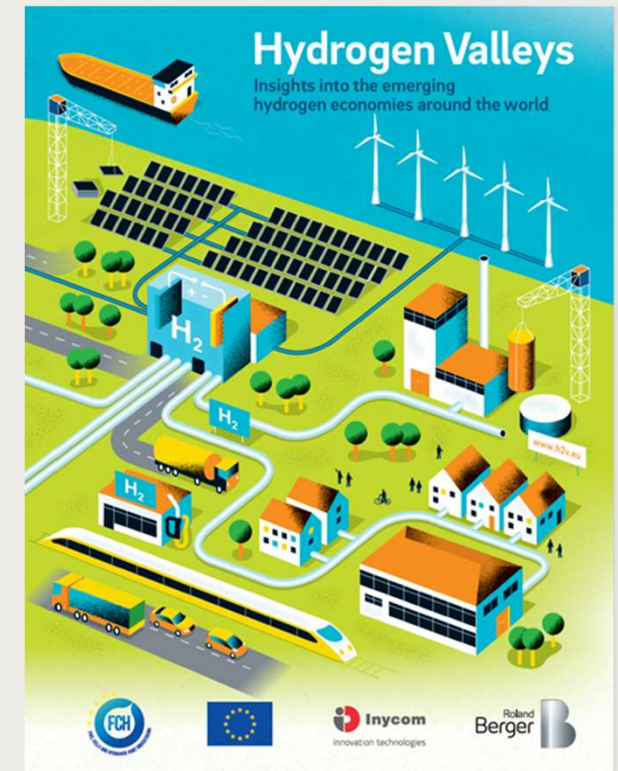
The Final Report with key insights of Phase 1 is available on our website

## Key Remaining barriers:

- > Obtaining **public funding support** to close the remaining funding gaps
- > Finding green hydrogen off-takers and signing long-term contracts to make projects bankable
- > Ensuring **Technology readiness** of all fuel cells and hydrogen applications required
- > Ensuring adequate **legal regulatory support** (carbon pricing, standardization, fast permitting, etc)

Alongside M.I. 2.0 **Clean Hydrogen Mission** the initiative will continue

- > **Further development and enhancement** of the Mission Innovation Hydrogen Valley Platform funded through the FCH-JU



[https://www.fch.europa.eu/sites/default/files/documents/20210527\\_Hydrogen\\_Valleys\\_final\\_ONLINE.pdf](https://www.fch.europa.eu/sites/default/files/documents/20210527_Hydrogen_Valleys_final_ONLINE.pdf)

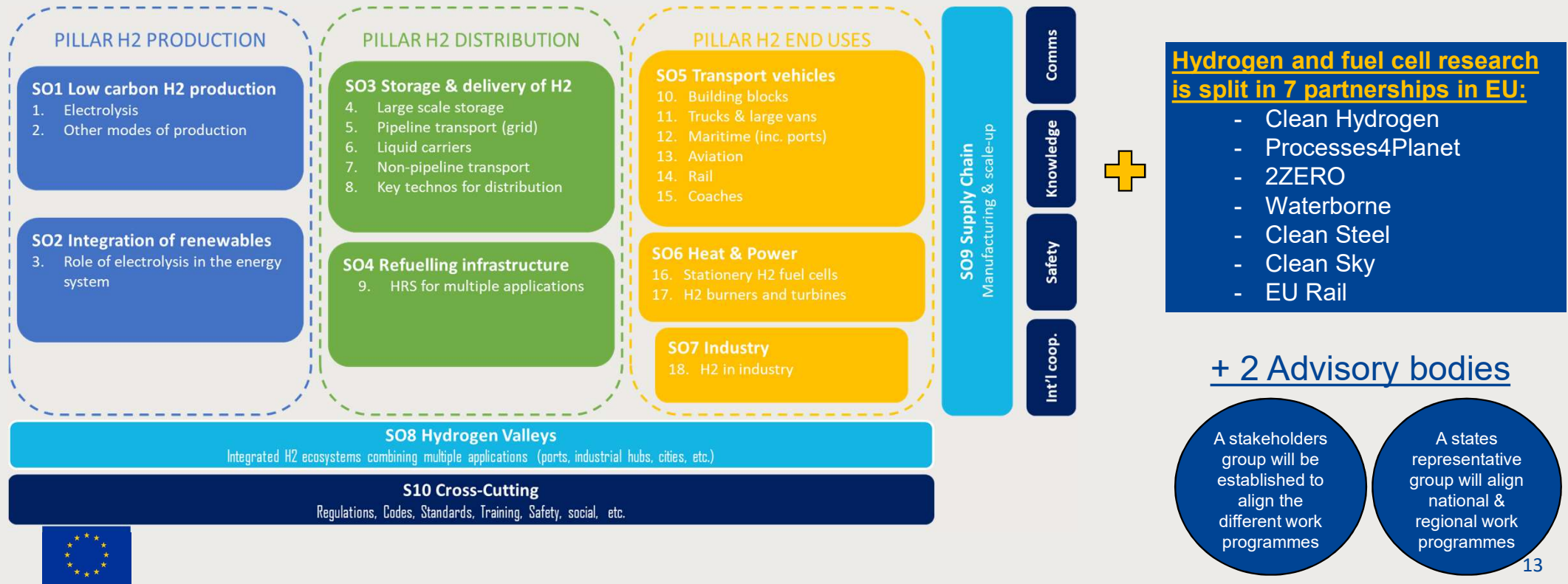


# Horizon Europe – R&I on Hydrogen

Partnership under Horizon Europe Programme  
with a stronger focus on Hydrogen production and hard to decarbonizing sectors.



Maintain and strengthen **EU's global leadership role**  
Clean Hydrogen Partnership start in Q4 2021 with a 7 year budget of **1 billion EUR**  
(Indicative: Jan '22:150m € + Jul '22:150m € + Jan '23:150m € + Jan '24:130m € + Jan '25:130m € + Jan '26:130m € + Jan '27: 130m €)



# The 2<sup>nd</sup> European Hydrogen Week

The biggest European hydrogen conference hosting key policy makers at European, National and regional level.



In 2020, >10.000 people from 63 countries



2<sup>nd</sup> European Hydrogen Week  
with the  
Launch of Clean H<sub>2</sub> JU

29<sup>th</sup> Nov. – 3<sup>rd</sup> Dec. 2021

Brussels, Belgium






# FUEL CELLS AND HYDROGEN JOINT UNDERTAKING

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## For further information

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