

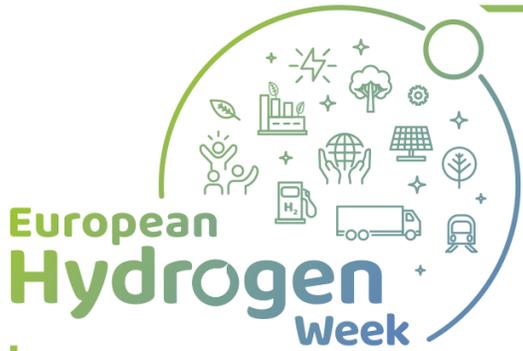
Mirela Atanasiu
Head of Unit Operations
and Communication

Programme Review Days 2021

FCH JU Programme Status

#PRD2021
#CleanHydrogen





A hydrogen strategy for a climate-neutral Europe

“Clean hydrogen demonstrates that we can reconcile our economy with the health of our planet. And this is precisely the spirit of the European Green Deal”

“Clean hydrogen is the energy of the next generation”



Ursula von der Leyen, President of the European Commission

2020 - 2024

Renewable H₂ technologies

≥ 6 GW of H₂ electrolysers

1 million tonnes H₂ in EU



2025 - 2030

Renewable H₂ technologies

≥ 40 GW of H₂ electrolysers

10 million tonnes H₂ in EU



2030 - 2050

Renewable H₂ technologies

✓ Being deployed at large scale

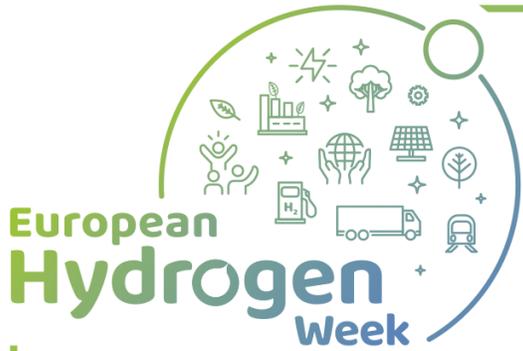
✓ Reaching maturity



+ “Hydrogen Valleys”



“Fit for 55” package of proposals



FCH JU: Strong public-private partnership with a focused objective

EU Institutional Public-Private Partnership (IPPP)



Industry grouping
More than 226 members

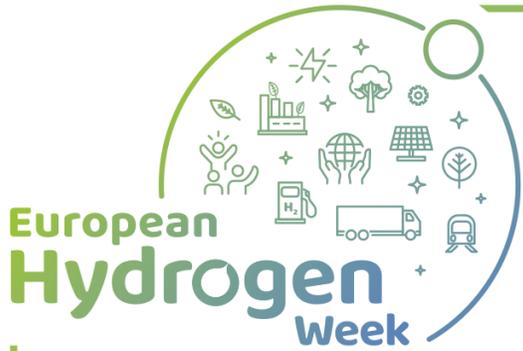


Research grouping
over 90 members

To implement an *optimal research and innovation programme* to bring FCH technologies to the point of market readiness by 2021

#PRD2021
#CleanHydrogen





FCH 2 JU Objectives

Market readiness of a portfolio of clean, efficient and affordable solutions for our energy and transport systems



Heat & electricity production

Increase fuel cell efficiency and lifetime



Minimal use of critical raw materials

Reduce platinum loading



Green hydrogen production

Increase efficiency and reduce costs of hydrogen production, mainly from water electrolysis and renewables



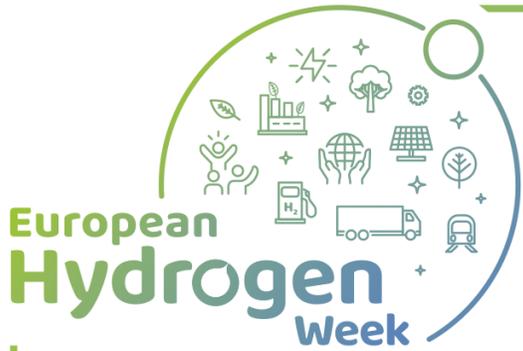
H₂ storage for grid balancing

Demonstrate on a large-scale hydrogen's capacity to harness power from renewables and support its integration into the energy system



Clean transport

Reduce fuel cell system costs for transport applications



FCH JU programme implementation



Energy

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



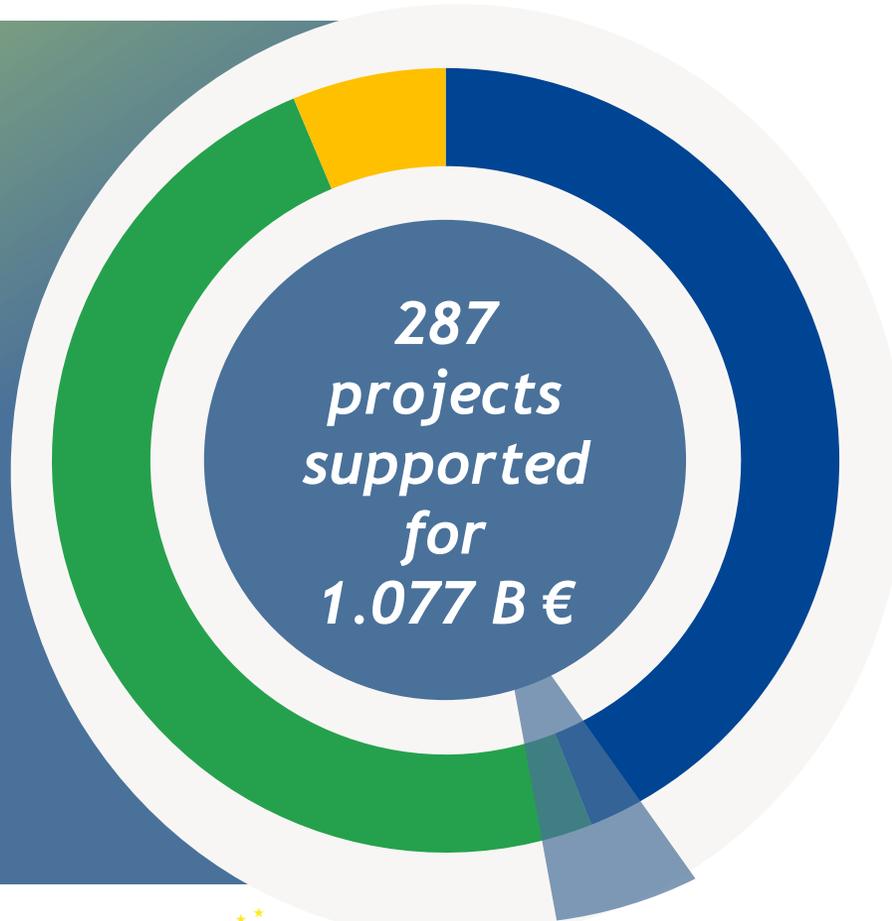
Transport

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



Cross-cutting

- E.g. standards, safety, education, consumer awareness ...



45 %



484 million euros
154 projects

41.4 %



447 million euros
78 projects

6.3 %

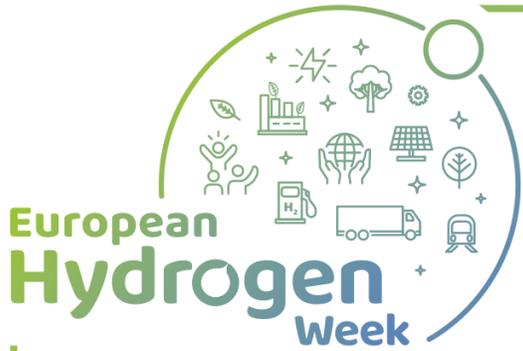


67 million euros
48 projects

7.3 %



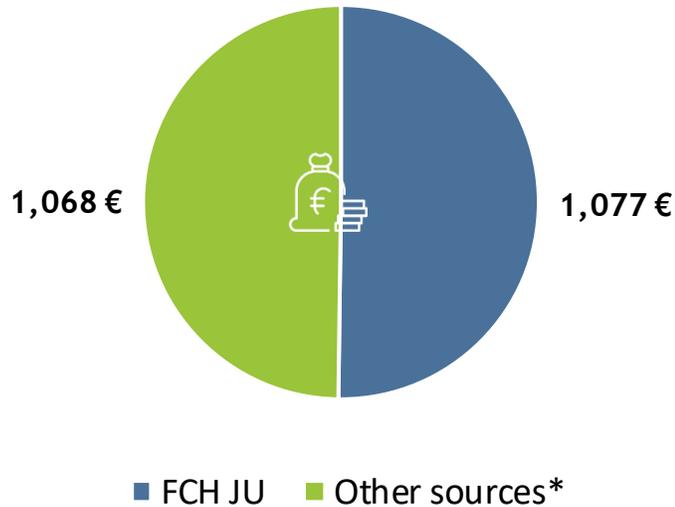
79 million euros
7 projects



Attracting investment from industry and research

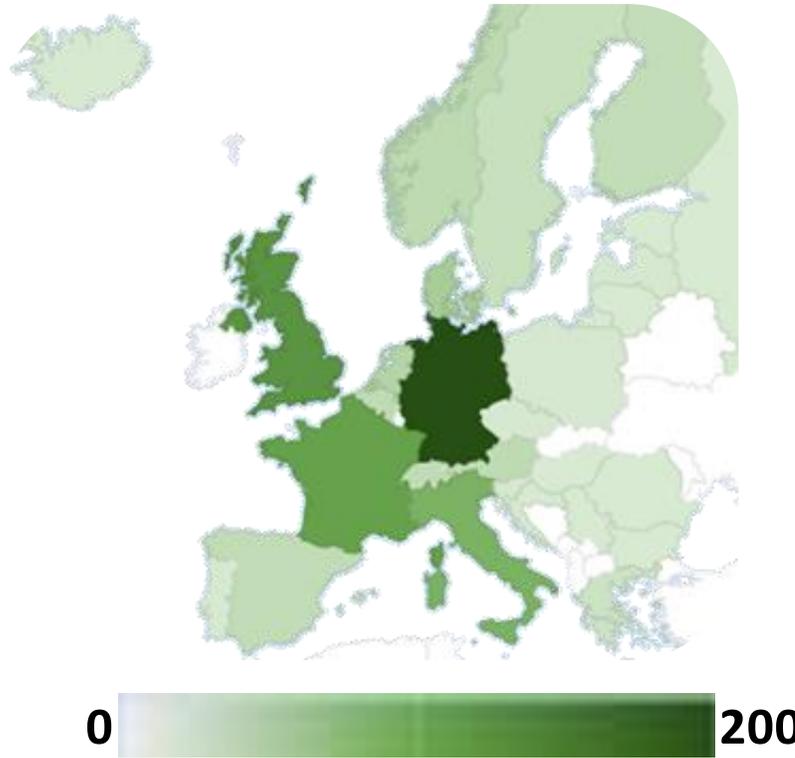
287 projects, 1.077 B€ public support, both research and innovation activities

FCH JU projects funding in M€

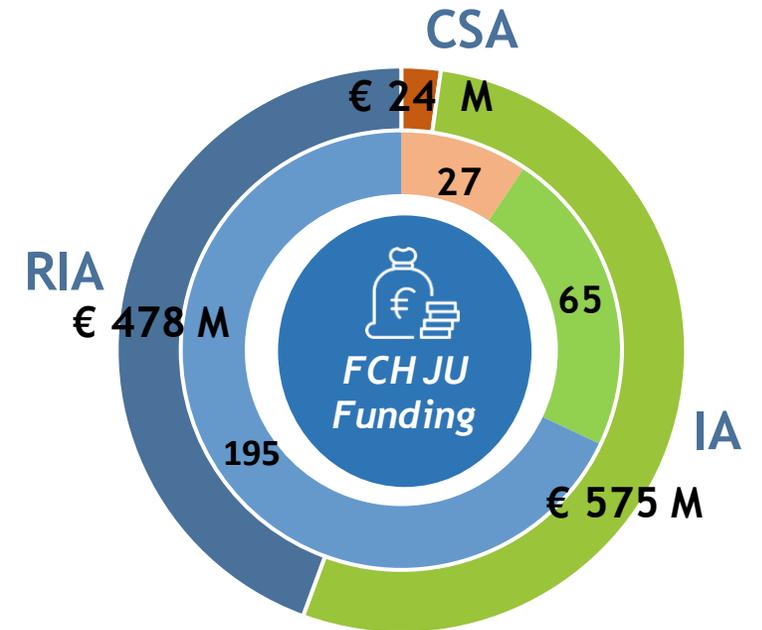


* Other resources including private and national/regional funding in projects (and additional 1 bill € in private investments/additional activities)

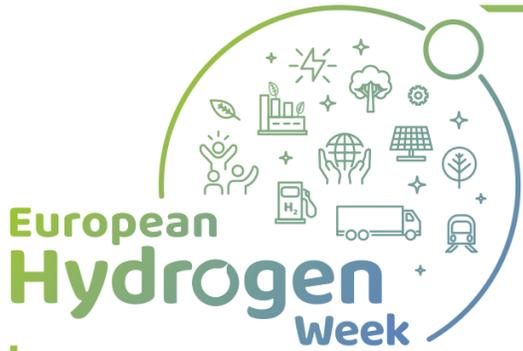
Funding allocation in M€



No. projects, M€



RIA=Research and Innovation action
IA=Innovation actions
CSA=Coordination and Support action



European Hydrogen Safety Panel

Expert group supporting the FCH 2 JU in safety-related issues



Assuring that hydrogen safety is adequately managed
Promoting and disseminating a high-level hydrogen safety culture

EHSP Working Groups



2021 Outcomes

- ✓ EHSP reports
 - Safety Planning guidance
 - Lessons learnt from past events
- ✓ Projects' safety plans reviews
- ✓ Workshop on Safe Storage of CGH2
- ✓ Research Thematic in TIM



Online Workshop on Safe Storage of Compressed Gas Hydrogen in road transport applications and related infrastructure

Overview

OBJECTIVES

- Summarize the state-of-the-art and standardization with regards to safety of CGH2 storage
- Review the available experience with regard to safe design and operations, and the lessons learnt from past accidents
- Exchange experiences and best practices related to hydrogen safety beyond project boundaries

Agenda

European Hydrogen Safety Panel (EHSP)
Tool for Innovation Monitoring (TIM) - Research Thematic on Hydrogen Safety

Analyzing large sets of semi-structured data related to hydrogen safety
Data sources: publications/patents/news/articles about technologies, projects

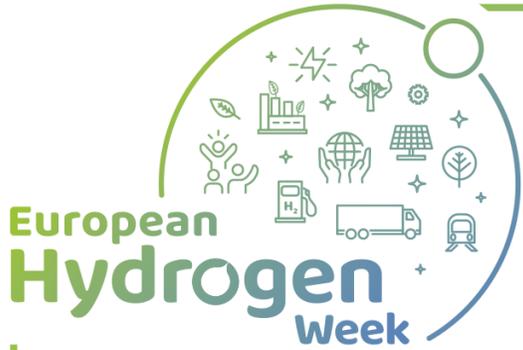
Safety-related data sets

- Safety general: training, engineering, personnel...
- Production: release, ignition, combustion, fire...
- Production: PEM, alkaline, reforming, biological...
- Storage and distribution: CNG, LH2, LNH2...
- Consumption: Fuel cells PEM, SO, alkaline, turbines...
- Applications: Road vehicles, Rail, Waterborne...

https://www.timanalytics.eu/TimTech/Public/main.jsp?datasetrs_1622

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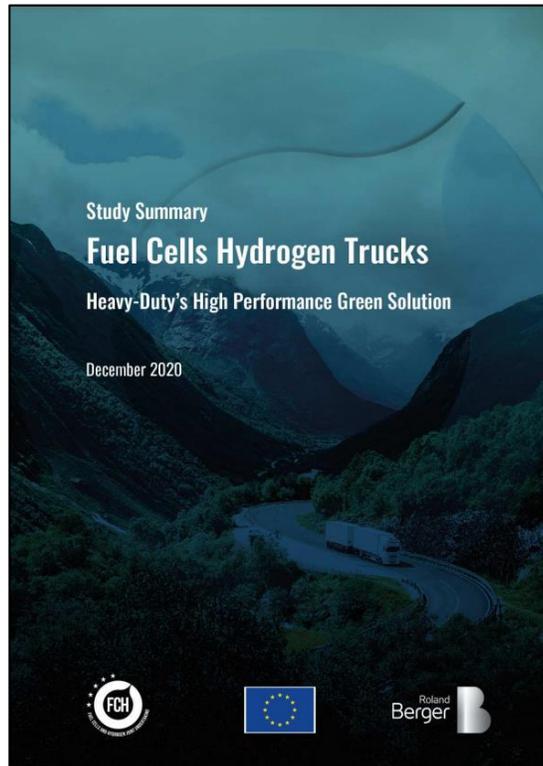




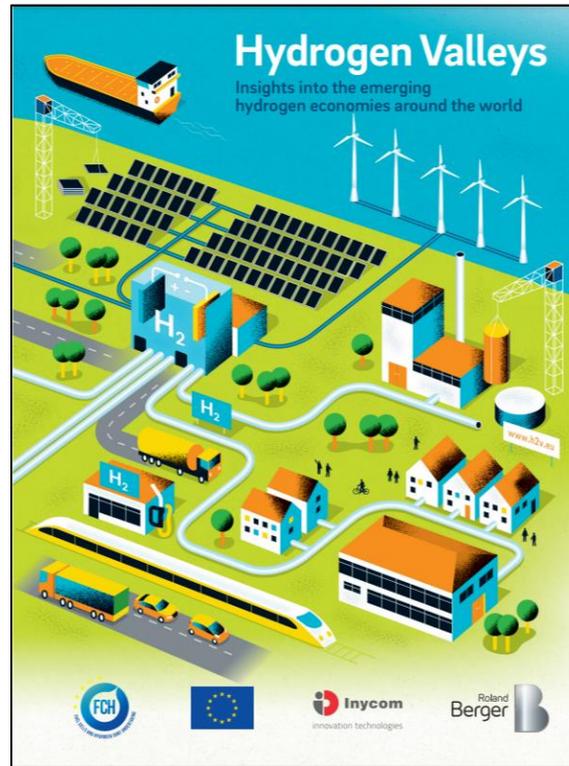
FCH JU Fact-based Studies/Publications

Providing guidance on key matters

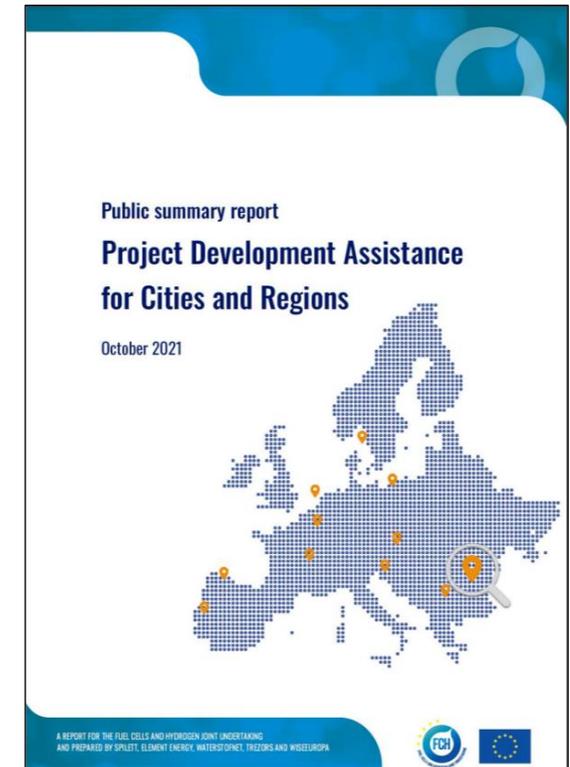
FUEL CELLS HYDROGEN TRUCKS



HYDROGEN VALLEYS

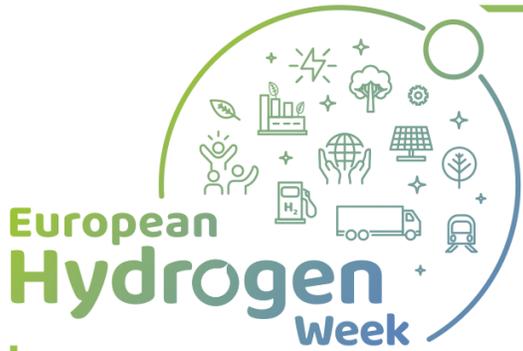


PROJECT DEVELOPMENT ASSISTANCE



#PRD2021
#CleanHydrogen





European Hydrogen Refuelling Station Availability System

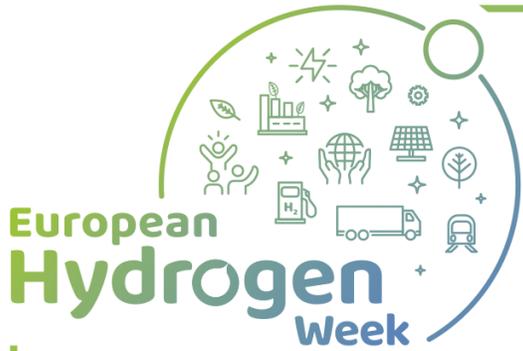
Free access to Real-time information system on the availability of publicly accessible HRS in Europe



<https://h2-map.eu/>

#PRD2021
#CleanHydrogen





Developing an EU wide Guarantees of Origin (GO) Scheme for Hydrogen

Green and Low-Carbon Hydrogen - more than 80,000 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)



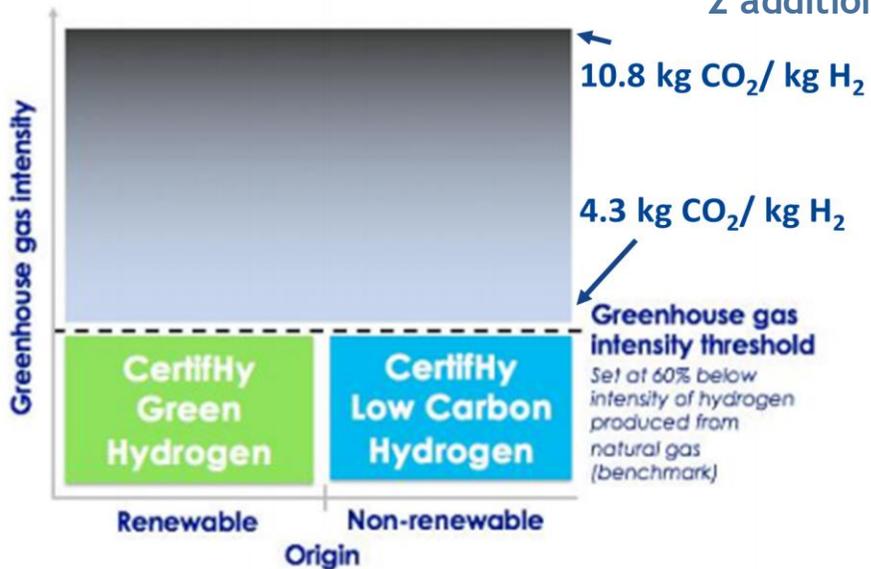
Air Products, Rotterdam (by product
H2 from Chlor-alkali process)



Uniper, Flakenhagen (Electrolysis
+ RE and methanation)

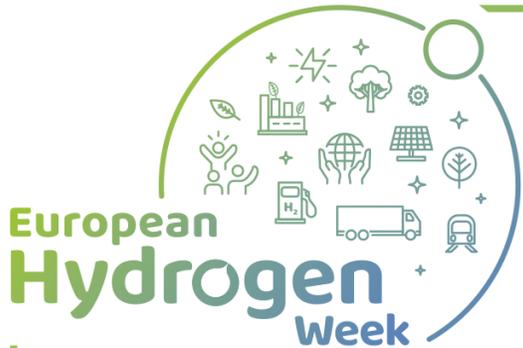


2 additional hydrogen production pathways are under investigation



On-going actions:

- (1) Harmonizing GO schemes across Member States
- (2) Extending the work beyond GOs to enable Renewable Fuels of Non-Biological Origin Certification



FCH JU Regions initiative was key to boost the hydrogen awareness

Supporting regions and cities in assessing various FCH applications



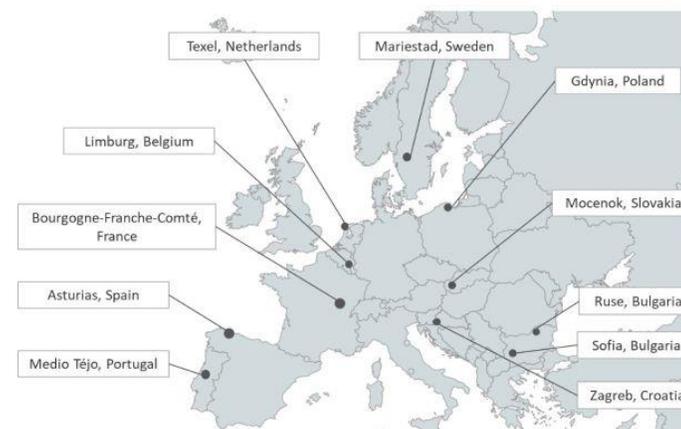
European Hydrogen Valleys Partnership
launched May '19 at EVS 32 in Lyon



<http://s3platform.jrc.ec.europa.eu/hydrogen-valleys>

Project Development Assistance (PDA)

launched Jan '20, concluded in June '21
(35 applications / 18 countries / 11 projects selected for direct support / 24 in Observer Network)



Great opportunity to bring on-board and share learnings with 'less FCH ready' but highly interested EU13 regions

<https://www.fch-regions.eu/>



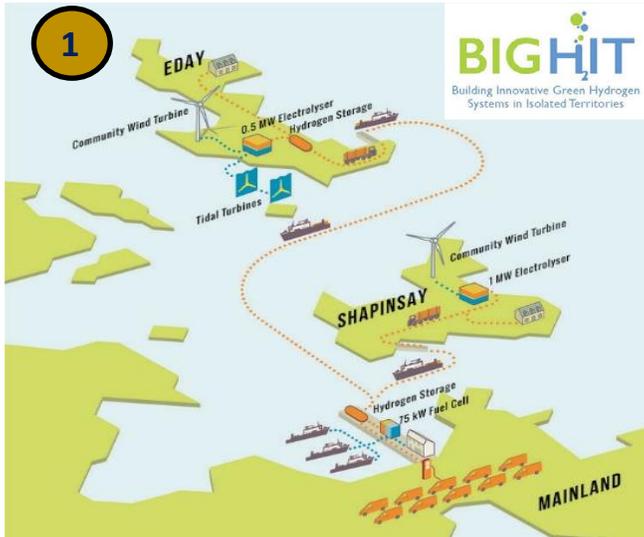
"I want NextGenerationEU to create new European Hydrogen Valleys to modernise our industries, power our vehicles and bring new life to rural areas."

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Hydrogen valleys: An accelerator for a European hydrogen economy

System integration: Production of renewable H₂, storage, distribution and end use (transport, stationary & industry) - Total project value 124 MEUR, funding 35 MEUR



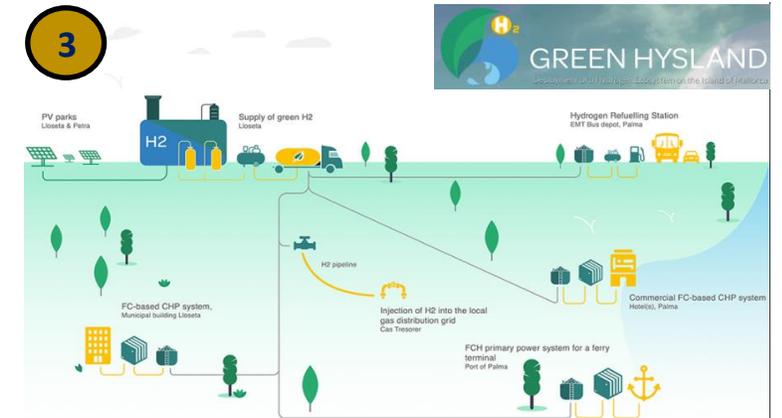
2015: Orkney's Island (Scotland):

- H₂ production by wind on Islands
- Storage & transportation by truck
- Use: heat (school), power (ferries) & mobility (municipality cars)
- www.bighit.eu



2019: North Netherlands (Groningen):

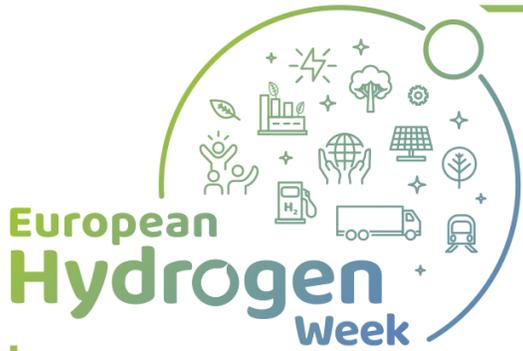
- 31 partners (public + private)
- Electrolysis for green H₂ production,
- H₂ Mobility: buses, passenger cars and trucks
- H₂ Refueling stations
- E-Kerosene for aviation
- H₂ for an inland water transport barge
- Domestic Heat applications
- Underground H₂ storage (Hystock)
- 3,000 tons H₂/year
- <https://heavenn.org/>



2020: Hydrogen Island (Spain)

- H₂ production from solar PV
- H₂ injection in gas-grid
- Use: heat (hotel, municipality buildings), power (port of Palma), mobility (buses)
- 300 tons H₂/year
- greenhysland.eu

Future Possible (cross-border) H₂ valleys: Ports, Airports, Industrial hubs, Logistical hubs, A H₂ city (or area)



Mission Innovation Hydrogen Valley Platform



- ➔ Mission Innovation 2.0/Clean Hydrogen Mission launched in June 2021
- ➔ 15 countries + EU
- ➔ The “Co-leads”: EU, Australia, Chile, UK, & USA
- ➔ Objective: *“To make clean hydrogen cost competitive to the end user by reducing end-to-end costs to USD \$2 per kilogram by 2030”*
- ➔ 3 Pillars of activities



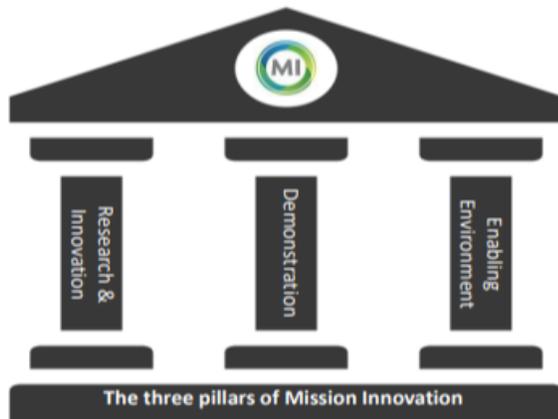
HYDROGEN VALLEYS ANALYSIS TOOLBOX MATCHMAKING JOIN ABOUT US



Mission Innovation Hydrogen Valley Platform

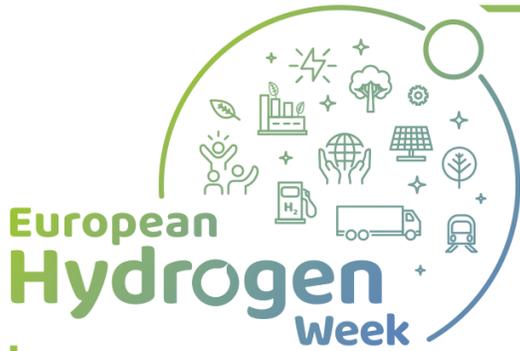
Showcasing hydrogen flagship projects around the world: A platform for project developers

[LEARN MORE](#)



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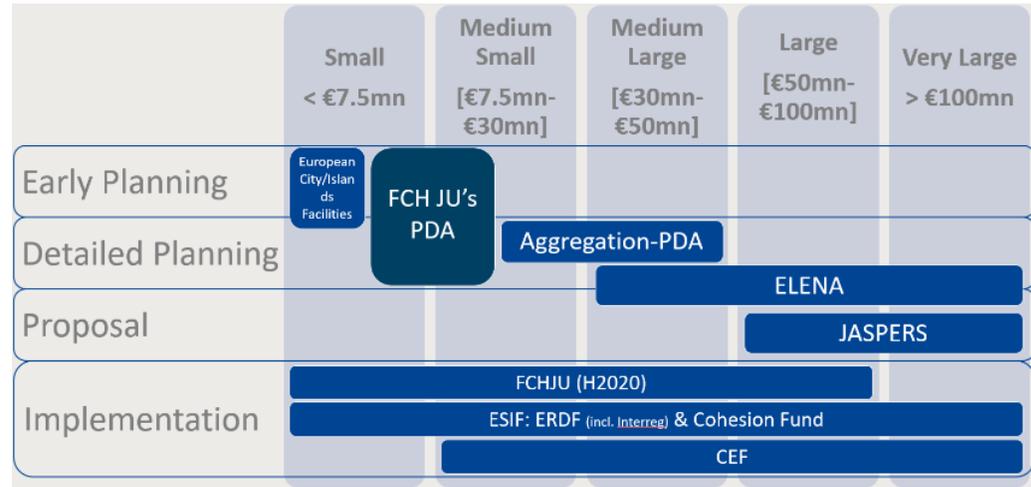




FCH Regions' Hub

Supports regional and local authorities to develop and turn their concepts for regional hydrogen and fuel cell projects into detailed work plans

The screenshot shows the website header with the FCH logo and 'FUEL CELLS AND HYDROGEN JOINT UNDERTAKING'. Navigation tabs include ABOUT US, INITIATIVES, PROJECTS, PROCUREMENTS, STAKEHOLDER FORUM, PROGRAMME REVIEW, CALLS FOR PROPOSALS & PROCUREMENTS, and NEWS, EVENTS & MEDIA. A search bar is present. The main content area is titled 'FCH REGIONS' HUB' and includes sections for 'Supporting European Regions and Cities to Launch Investments', 'How the FCH-Regions' Hub Works', and 'Latest News and Publications'. A sidebar on the left lists various resources like 'Background info FCH Regions' initiative', 'Latest News and Publications', and 'Tools to support the development of business models'.



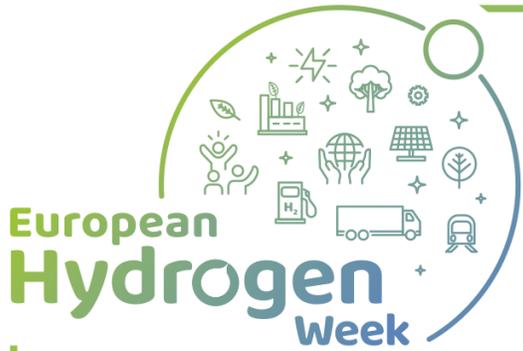
Type	Title
Initiative (S3P)	European Hydrogen Valley Partnership
Initiative	Clean Energy for EU Islands
Platform	Mission Innovation Hydrogen Valley Platform
Initiative	Covenant of Mayors. The world's largest movement for climate and energy actions
Association	CPMR - Conference of Peripheral and Maritime Regions

Type	Title	Source	Link	Last update
Technology introduction & preliminary business cases' dossiers	FCH Technology introduction & preliminary business cases' dossiers	FCH Regions Initiative (FCH JU: 2+26 PDF files)	All: - Technology Introduction Dossiers - Preliminary Business Cases Per applications:	
Business cases/models	Business models	Funding and Finance (FCH JU website)	https://www.fch.europa.eu/page/advice-complex-business-models	
Business cases/models	Teaser for Coupling wind farms (or any RES) and Electrolysers	Funding and Finance (FCH JU website)	https://www.h2v.eu/https://www.fch.europa.eu/page/advice-complex-business-models#PH2	
Modelling tools	Mobility business case tool	FCH Regions Initiative (FCH JU Excel sheet)	Excel file	27/03/2018
Funding tools	FCH Funding and Financing navigation tool	FCH Regions Initiative (FCH JU, Roland Berger, Excel sheet)	Excel file	08/02/2018

<https://www.fch.europa.eu/page/fch-regions-hub>

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#CleanHydrogen





Funding and Financing support services

Dedicated web page and support

Various types of support services and links to information and tools



Supporting Activities

Combination of funding

Exploitation of results

Advice on complex business models

News concerning funding and financing

Funding and Financing Navigation Tool
Cockpit



Your Filter | Your Results

Country* Portugal

Region* Other

Project be
 Comm
 SM
 Public
 NGO
 Acader
 Other

Budget of
EUR 50 m
EUR 1 000
> EUR

Co-fundit
 Yes

Get

Open ses
Get

Funding programme
Fact Sheet

<< Return to result list

Name of funding programme Cohesion fund	Funding instrument offered Grants	Target applications Thereof low carbon economy applications: 891 m
Responsible entity/institutions National/Regional Managing Authority	Co-financing required Yes	Total financing volume of programme [in EUR m] Policy of
First level of contact Please see managing authorities http://ec.europa.eu/regional_development/	Financing prerequisites Depends on the	Beneficiaries Commercial business, Academic institution, SME, Public entity, NGO, Other
Funding programme description The Cohesion Fund was established for the purpose of strengthening the economic, social and territorial development of the European Union in the interests of... For the 2014-2020 period, the Cohesion Fund provides support for... Região Autónoma dos Açores, Alga	Regions & Cities with experience	

1) Specialized SME grants are available
2) incl. state-owned entities
*) Mandatory (exp. for CH, IT, LU, MT, PL)

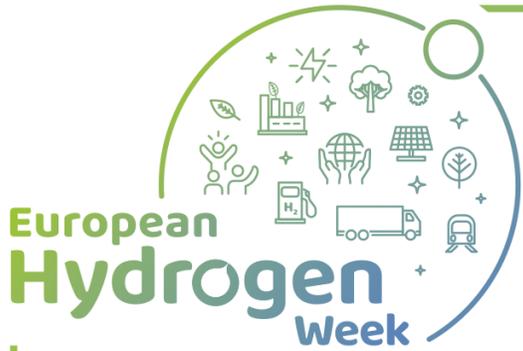


Funding and Financing Navigation Tool
Online!

www.fch.europa.eu/page/funding-financing

#PRD2021
#CleanHydrogen



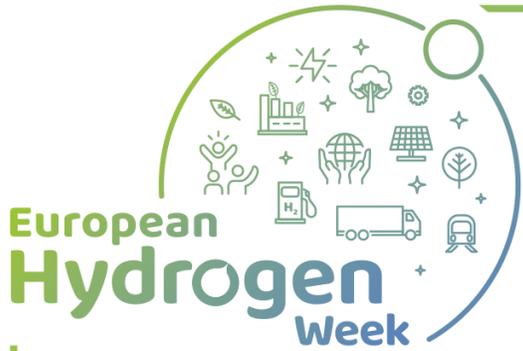


Knowledge Management

How to become a Hydrogen Knowledge Hub

- Gradually becoming a hydrogen knowledge hub, serving the entire hydrogen community
- **Based on following pillars:**
 - Annual Programme Review / Data Collection exercise (with the aim to cover all H2 EU funded projects)
 - Fuel Cell and Hydrogen Observatory (FCHO)
 - Feedback to Policy
 - KPI monitoring and reporting
 - Other Knowledge Management Tools
- Complemented by support from JRC and targeted studies





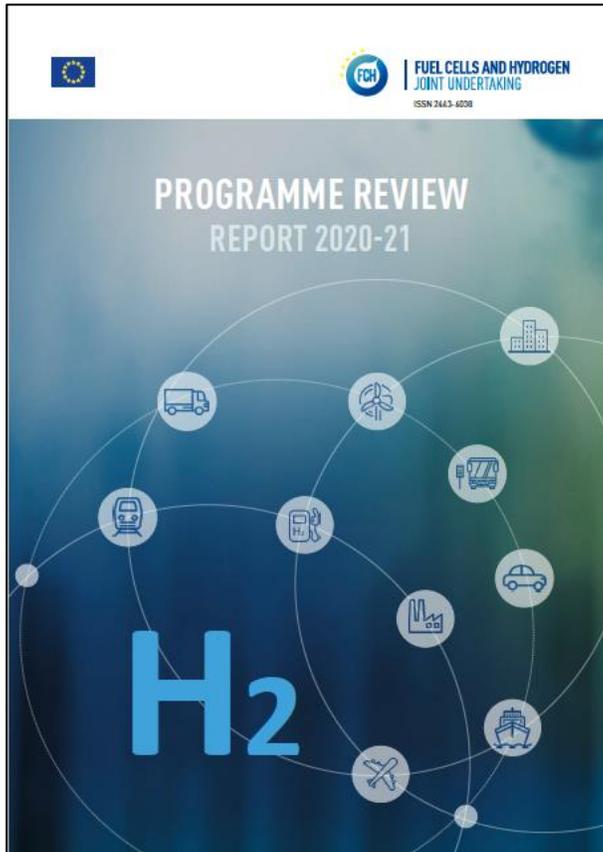
Annual Programme Review 2020-21

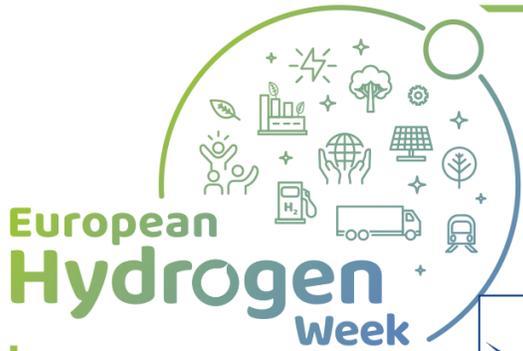
Annual exercise (as of 2011) with the support of Joint Research Centre of the European Commission (independent experts)

Review of 98 projects active in 2020-21 against SoA, targets and Key Performance Indicators set by the Multi-Annual Work-Plan (MAWP) and Annual Work-Plans (AWPs)

Collection of annual input from projects:

- EU-Survey Questionnaire
- Data collection exercise through TRUST (tech. monitoring) templates
- Contractual documents and project reports;
- 97 project posters published on event's webpage





Data Collection

Collecting annually technological data of projects



FCH JU Projects
Latest Data

EU-SURVEY

Online Questionnaire

- General Information, complementary to TRUST
- Progress, Impact, SoA
- Interactions with other projects & initiatives
- Dissemination and communication activities



Programme Review Analysis
Performed by JRC



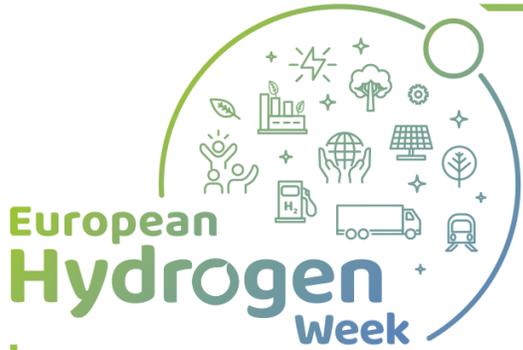
TRUST*

- Focus on technology KPIs and deployment data
- User-friendly, secure online tool
- Descriptive & Operational data
- Public & Confidential data

Previous calendar Year
FCH JU Projects



Annual Programme Review Report



A collection of continuous Success Stories & Innovations

13 *NEW* Success Stories

6 *NEW* Best Innovations

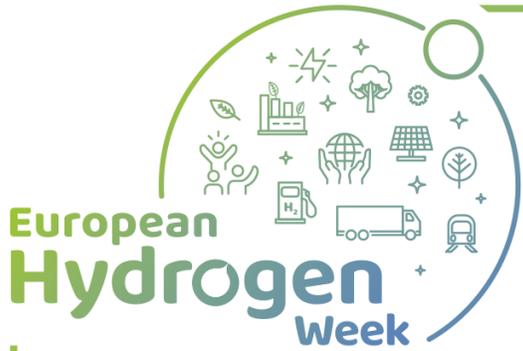
**FCH JU
AWARDS
2021**

Public Voting for:

- ✓ Best Success Story
- ✓ Best Project Innovation
- ✓ Best Outreach

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D&E, Publications & Patents

Exploitation
43 Projects
105 Activities

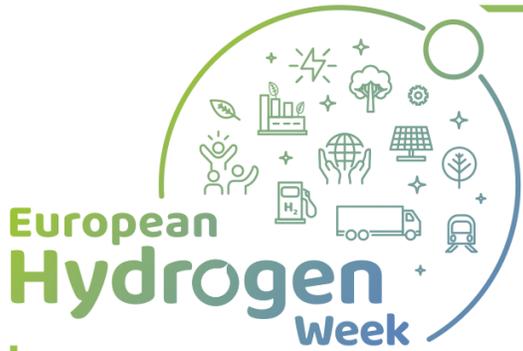
EU SURVEY
85 Projects

Dissemination
64 Projects
245 Activities

KERs
33 Projects
73 Results

53
Scientific
Publications

2
Patents



Fuel Cells and Hydrogen Observatory

One stop shop to understand where the FCH sector is at and how it is evolving

- **Resourcing all aspects on fuel cells and hydrogen area**
- **User friendly and reliable output** (charts, graphs and data downloads, annual reports...)
- **Global resource**
www.fchobservatory.eu
info@fchobservatory.eu
- **New tender in 2022**

Discover the FCH Observatory



Technology & Market

Access technology, infrastructure and supply statistics relevant to the Fuel cell & Hydrogen sector, including shipment data, hydrogen refuelling and vehicle deployment data as well as supply and demand information related to industrial hydrogen

See more



Patents

Understand the pattern of first patent registrations and monitor the trends in the sector over time

See more



Publications

Review the trends in publications across the sector, including articles, technical and conference papers, reviews and project report

See more



Financial Support

Search for National and European funding and finance opportunities of direct and indirect interest to stakeholders in the Fuel cell & Hydrogen space.

See more



Policy & Incentives, Regulation, Codes and Standards

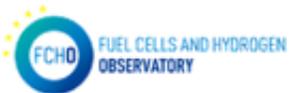
Review regional, national and European information on policies and incentives as well as sector-specific Codes and Standards

See more



Education & Training - Coming soon

Identify Education & Training courses with relevant Fuel cell & Hydrogen content, including location and types of course available. Relevant material available from courses or from projects is referenced.



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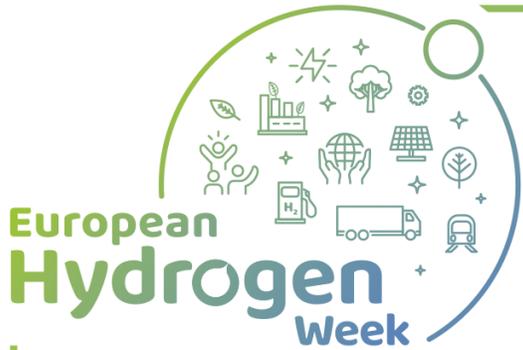
Public Opinion Survey

Analysis of European citizens' attitudes towards hydrogen technologies across the whole value chain

Objectives of the survey:

- Gaining insights into overall awareness, acceptance and uptake of
 - hydrogen technology
 - safety
 - hydrogen as an **efficient and sustainable** energy vector
 - possible applications of hydrogen technologies
- Identifying differences related to specific criteria (e.g. age, gender, nationality, regions)
- Benchmarking to monitor changing perceptions across Europe
- Guidance on how to raise awareness and build confidence to the public





CLEAN HYDROGEN JOINT UNDERTAKING

Established by the Council in 19 November 2021

Single Basic Act/Regulation published 30th of Nov. 2021

EU financial contribution: EUR 1 000 000 000

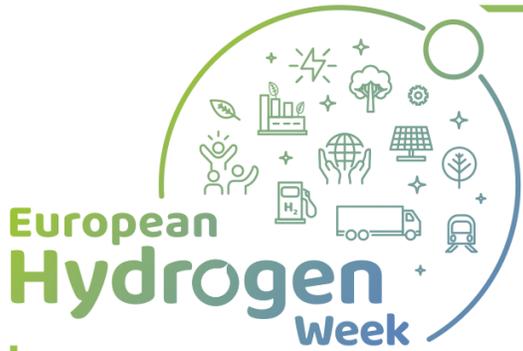
“The Clean Hydrogen Joint Undertaking should strengthen and integrate Union scientific capacity to accelerate the development and improvement of advanced clean hydrogen applications ready for market, across energy, transport, building and industrial end-uses”

Objectives:

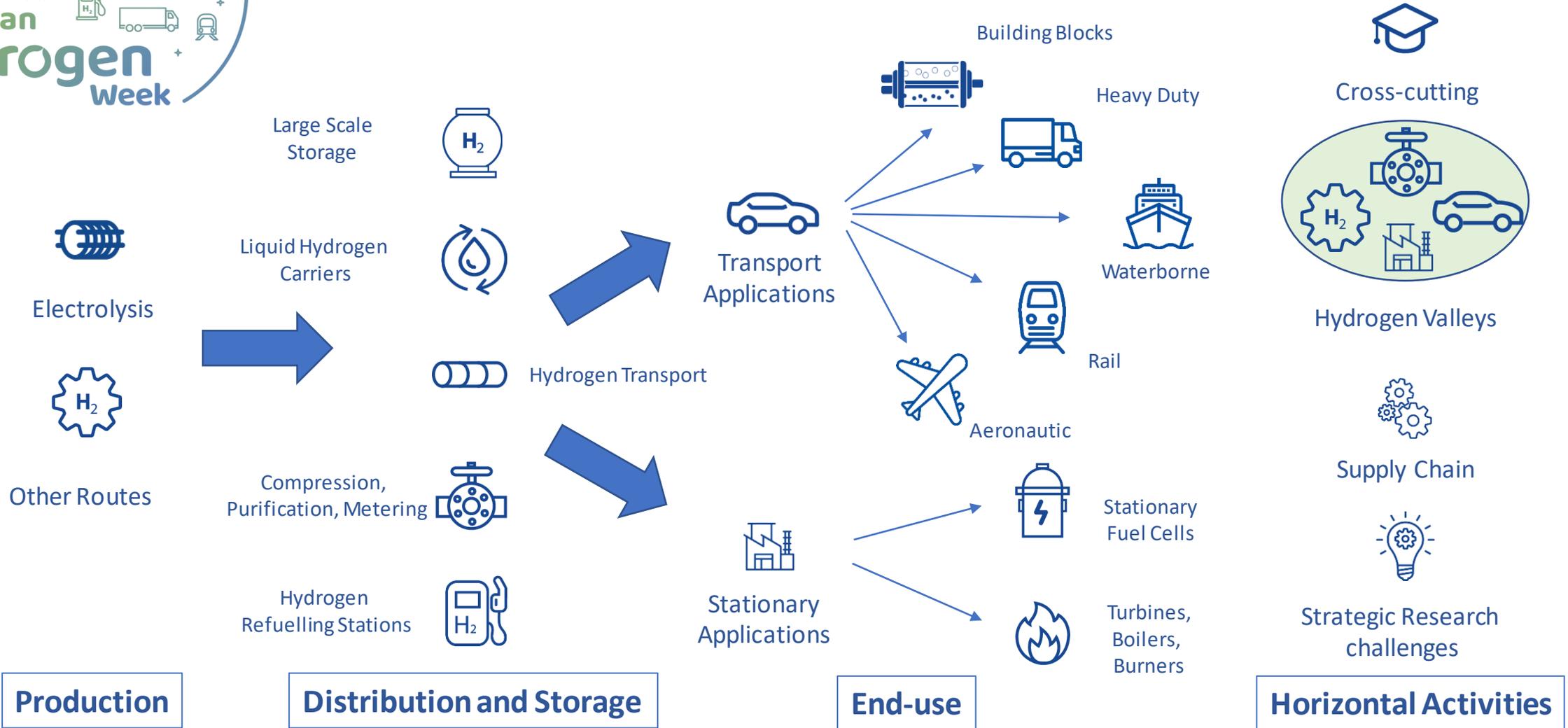
- To contribute to the **reduction of GHGs** by at least 55 % below 1990 levels by 2030
- To contribute to the implementation of the 2020 Commission’s **Hydrogen Strategy** for a climate neutral Europe
- To strengthen the **competitiveness** of the Union clean hydrogen value chain
- To stimulate **research and innovation** on clean hydrogen production, distribution, storage and end use applications.

Clean Hydrogen JU is the only partnership to deal with **hydrogen production and distribution/storage technologies.**



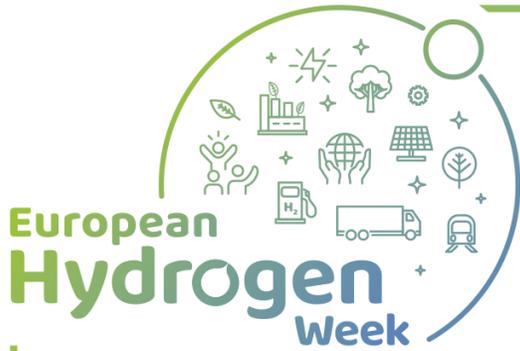


Research & Innovation Activities



#PRD2021
#CleanHydrogen





Programme Review Days - Sessions

Thursday, 2 December

Electrolysers for Industrial Application (part I)

Electrolysers for Industrial Application (part II)

Next Generation Electrolysers

H2 Distribution and Storage/Carriers

Transport Applications and Refuelling Infrastructure

Heavy Duty Transport Applications

Building Blocks for Heavy Duty Transportation

(European) H2 Valleys

Friday, 3 December

PNR for Standards and safety

Education and Training

Tools for market development

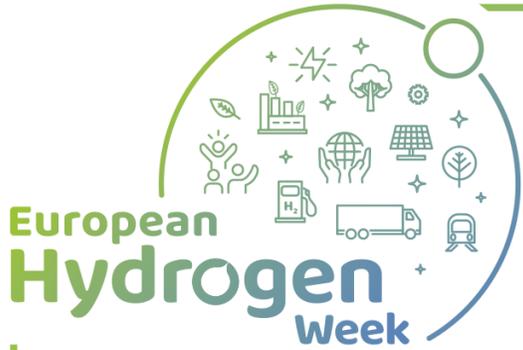
Stationary Applications: Gas to Power and Heat

Fuel Cell Technology for Stationary Applications

Early Research on alternative routes for hydrogen production

#PRD2021
#CleanHydrogen



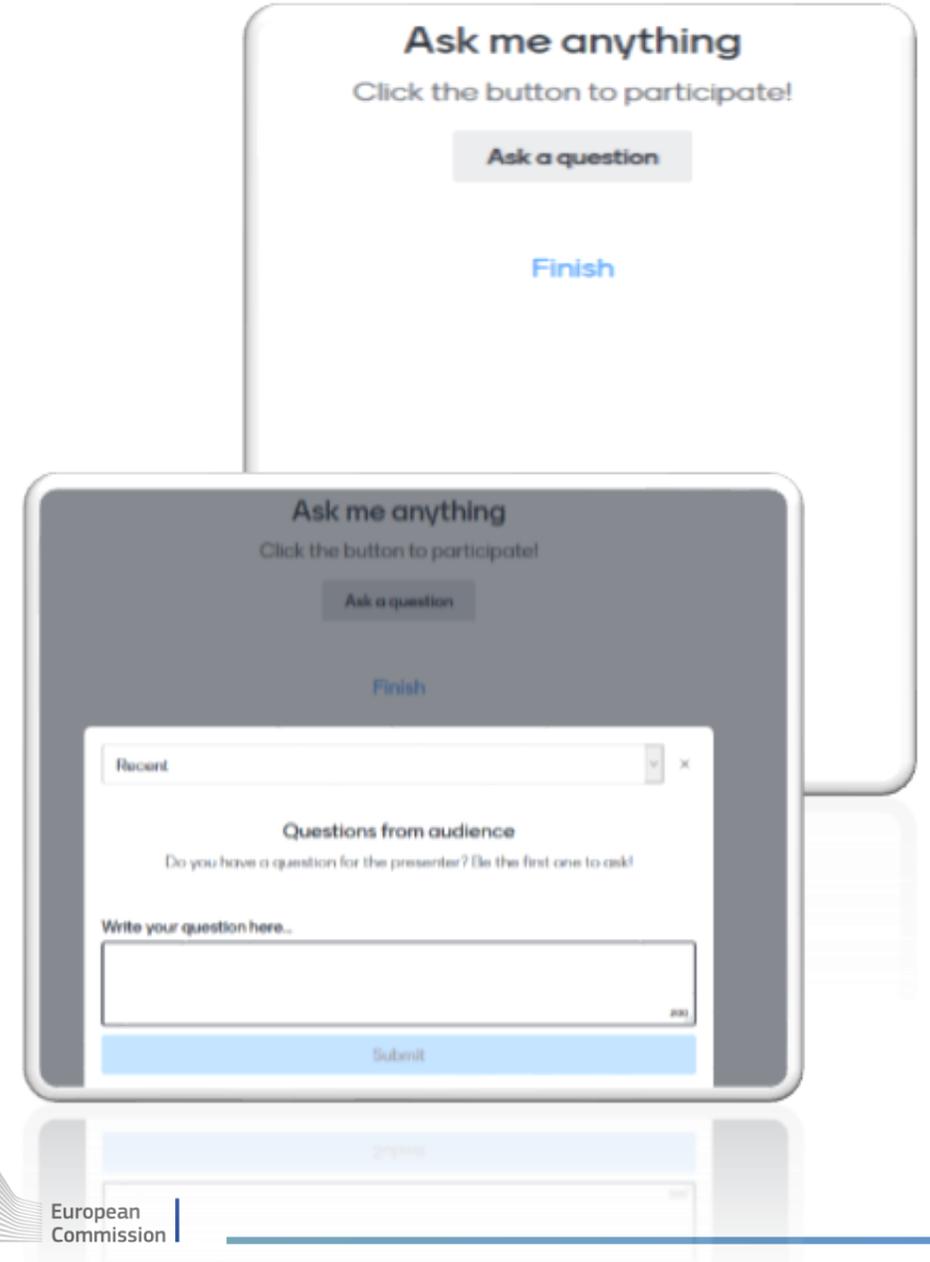


Live Q & A

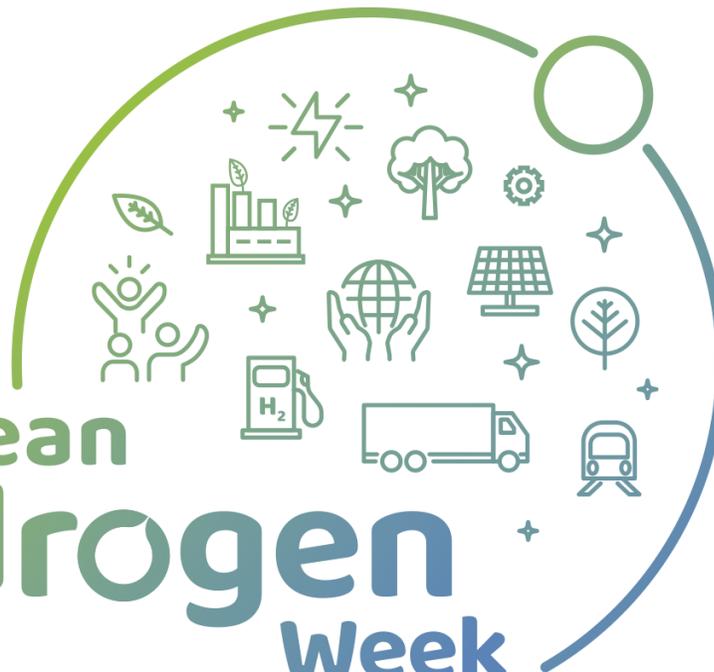
On the top right of your screen, you have the possibility to pose LIVE your questions

- ✓ Select the button and then submit your question to the presenter pressing the enter
- ✓ Voters can up vote each other's questions 
- ✓ **Questions** are asked **anonymously**, creating an open and safe environment.

Please do not forget to name the project in your question



European Hydrogen Week



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