



Hydrogen Europe

Research

# HYDROGEN EUROPE RESEARCH

Policy Working Group 10/06/2021

# Agenda

1. Welcome & Approval of the agenda
2. Subgroups updates
  - Communication paper*
  - Technical paper*
3. Latest updates on EU news
4. Funding opportunities
  - Breakthrough Energy Catalyst*
  - Mission Innovation*
  - Research Fund for Coal and Steel (RCFS)*
5. Additional points of discussion

# Updates on the Subgroups

# Communication Paper

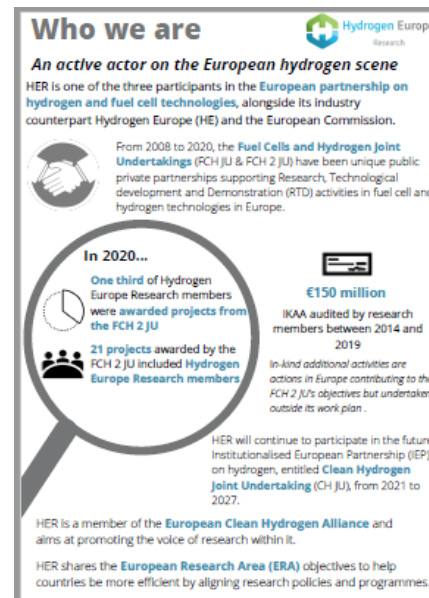
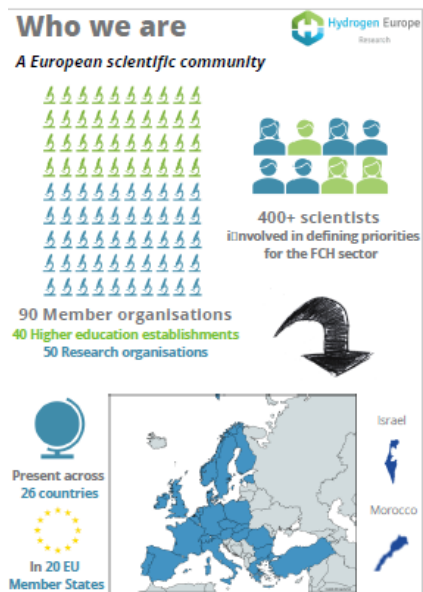
## Content:

- The paper will be finalised based on the last comments received and shared with the Board.

## Design

- Should we call on the services of a designer?

### Introduction - Who we are



### Recommendations (5 pages)

In light of this, HER wishes to stress that **this connection between research and technology should further be promoted in order to drive innovation**. University graduates and PhDs working in research areas may become a workforce. Furthermore, technology transfer is deeply rooted in spin-offs from research institutions and the efforts of many companies in the field. This helps to contribute to boost the application of clean H2-related technologies.

**Development of common technology infrastructures**  
Research and technology infrastructures are an essential enabler for new technologies to reach the market. **Open access to physical facilities, shared and financed through an open access to physical facilities, is a key enabler for the development, testing and validation of new technologies.**

**1 Secure funding for basic and applied research**  
Although some hydrogen technologies are mature and already present on the market, **low TRL research is still needed to develop the next generation of products**. Technological innovation is indeed of paramount importance in order to improve current hydrogen technologies and solve the challenges they face for their uptake. For example, undertaking fundamental and applied research aiming at the reduction of critical raw and toxic materials in FCH technologies is a vital step for the sustainable development of hydrogen. Research is also required to drive innovation in new technologies which have the potential to decarbonise hard to abate sectors but are currently at low TRL.

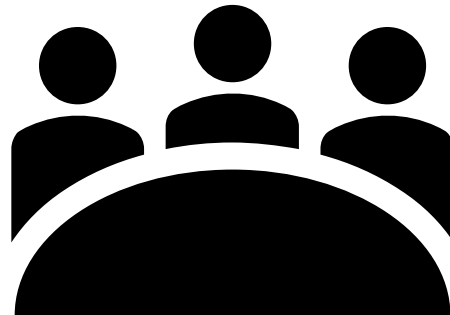
**Research institutions and universities are active actors in the development of the next generation of products.** They are working in close intelligence with industry stakeholders, who provide them expertise on the market developments and needs, but also with policy-makers and institutions, who set objectives and directions for the future of these developments. Research institutions and universities are a cornerstone of this ecosystem, and **the funding of their activities on the whole TRL spectrum is an important consideration for the ecosystem as a whole.**

Key benefits:  
**components and sub-components in research and development** (at low temperature and/or pressure) using research facilities;  
**open applied research and industrial research** to speed up the development of hydrogen technologies. The objective is to move from a laboratory (TRL 4) to prototypes (TRL 7), whilst simultaneously improving the efficiency of the technologies.  
Types of initiatives that would benefit the ecosystem:

# Communication Paper

## Next steps

- Send to the Board for validation (discussion on 15 June)
- Publication:
  - Through our main communication channel, feel free to reshare it.
  - After the summer holidays, the paper could be used to reach out to policy stakeholders to organise a 'Breakfast'.



# Technical Paper

## Content – reminder

- Research areas that should be further funded in the EU and in Member States, **beyond the scope of the CHE partnership**
  - Absent from the SRIA and not covered in the CHE
  - Present in the SRIA but not specifically or not enough

## Structure & methodology

- Strategic priority & challenges
  - To be declined within a new general structure (next slide)
- Methodology
  - Top-down from TC leaders and bottom-up with inputs from members

## Next steps

- Mail to members for inputs asking them where they believe the gaps in research funding for the FCH sector lie and the impact that further research would have

# Technical Paper – General structure

Foreword	3 pages
Challenges	1-2 pages
Topics/themes	6 pages
Production	2 pages
Logistics	2pages
End-uses	2 pages
Education/training/safety	1 page
Infrastructure/instruments	1 page
RCS	1 page
Conclusion	1 page

➤ Total: 12-13 pages

Latest update on EU news



# EP: adoption of 2 reports in plenary sessions

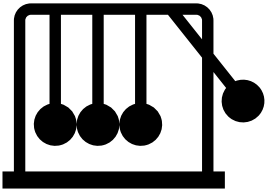
- 2 Initiative Reports tackling hydrogen have been voted on by the European Parliament on 19 May during the plenary session.
  - **Report on a European strategy for energy system integration** ([Final report](#), +542, -111, 42 abst.)
  - **Report on a European Strategy for Hydrogen** ([Final report](#), +411, -135, 149 ab.)



- These reports are non-binding but **indicate the position of the Parliament and will be considered by the EC when preparing the 'Fit for 55' package.**
- The place of **low carbon hydrogen remain at the core of disagreement between political groups.**

# European strategy for energy system integration

- Sets out measures to optimise, decarbonise and balance energy systems.
- It emphasises on:
  - the primacy of energy efficiency
  - the decarbonisation of transport and heating systems
  - the development of renewables and interconnections between Member States' electricity grids
- States that renewable hydrogen should be the priority, while recognising that "**renewable and low-carbon hydrogen can help reduce persistent emissions**" from sectors such as industry and heavy transport, where direct electrification may be limited.



# European Strategy for Hydrogen

## Low carbon hydrogen:

- **Recognizes the role of low carbon hydrogen as a transition technology in the short term.** The amendments requiring to concentrate European funds only on investment in renewable H2 were rejected.
- **Wishes to frame the use of low carbon H2 to a transition phase:** MEPs asked the EC to calculate how much low carbon H2 will be needed, in which cases and for how long. The Commission should come up with a plan to phase out the non renewable H2 in the future.
- Other points:
  - MEPs confirmed their **support to the additionality principle.**
  - Called for a **classification of the different forms of hydrogen based on a lifecycle assessment** both for hydrogen produced in the EU produced and imported
  - The report calls on the Commission to come **with an EU strategy for clean steel** produced from low carbon sources.
  - Only institution having mentioned the **role of skills and education for the ramping up of FCH technologies**

# FIT for 55 Package

To achieve a climate-neutral Europe by 2050, the Commission will table a **Fit for 55 package to reduce emissions by at least 55% by 2030**

➤ 12 legislative proposals to be presented on 14 July

- Revision of the **Renewable Energy** and **Energy Efficiency Directives**
- Strengthening and extension of the **Emissions Trading Scheme**
- Revision of the **Energy Taxation Directive**
- **Carbon Border Adjustment Mechanism** – aiming at reducing the risk of carbon leakage and ensure a level-playing field by encouraging EU partners to raise their climate ambition
- In addition, the Commission will propose measures to implement Europe's circular economy action plan, the EU biodiversity strategy and the farm to fork strategy.

➤ In November, a second set of initiatives will follow in the energy field

- **Hydrogen and the decarbonisation of the gas markets**
- A proposal for a regulation on reducing Methane emissions
- A proposal on strengthening the energy performance of buildings.

# Fit for 55 Package – RED III

- The Regulatory Scrutiny Board (RSB), an independent organisme in charge of advising the college of commissioners, gave a negative opinion on the impact assessment for the revision of RED II. The EC will submit a new version to the RSB for a final opinion before its official publication on 14 July.
- The European Council adopted [conclusions](#) on 24-25 May:

"The European Council invites the Commission to swiftly put forward its legislative package together with an in-depth examination of the environmental, economic and social impact at Member State level."
- The Commission (DG ENER) announced that energy with low carbon CO2 emissions such as low carbon hydrogen will not be included in the revision of the Directive. Rules for hydrogen classification will be proposed and a certification methodology for its usages, beyond transport as well.

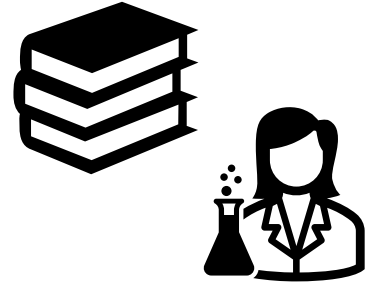
# FIT for 55 Package – Energy Taxation

## Revision of the Energy Taxation Directive

- Unchanged since 2003
- Meeting of the Council on 22 May
  - Consensus among Member States on the fact that green taxation can encourage a sustainable use of resources, bring socioeconomic benefits and lighten the taxation on work.
  - Large support to include air transport and maritime sector in the scope of the Directive. End 2019, 9 Member States called for the inclusion of the air sector (NL, DE, BE, BG, DK, FR, IT, LU, SE)
  - Unanimity will be needed to reach a decision on this revision.
- In relation to this, the **carbon border adjustment mechanism** will be presented as part of the Fit for 55 package in specific sectors (cement, electricity, fertilisers)

# Concil conclusions on Researchers careers

On 28 May 2021, the Council adopted [conclusions](#) on "Deepening the European Research Area: **Providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality**".



Below are some interesting points developed in the document:

- Notes that **suboptimal balance between institutional and project-based funding lead to short-term, project-based contracts that do not give a long-term perspective for researchers**. Recognises that **the number of academic positions is limited and that researchers are increasingly likely to find a job outside academia or to reach a permanent position in academia at a later stage in their professional careers; (point 14)**
- Highlights that the **skills mismatch observed in the labour markets of many countries result from the fact that doctoral training tend to focus on an academic research career path**, research skills and standard academic incentives, thus not providing the right transversal skills for talents to move to other sectors, whose absorption capacity for academic profiles is limited; *(point 16)*

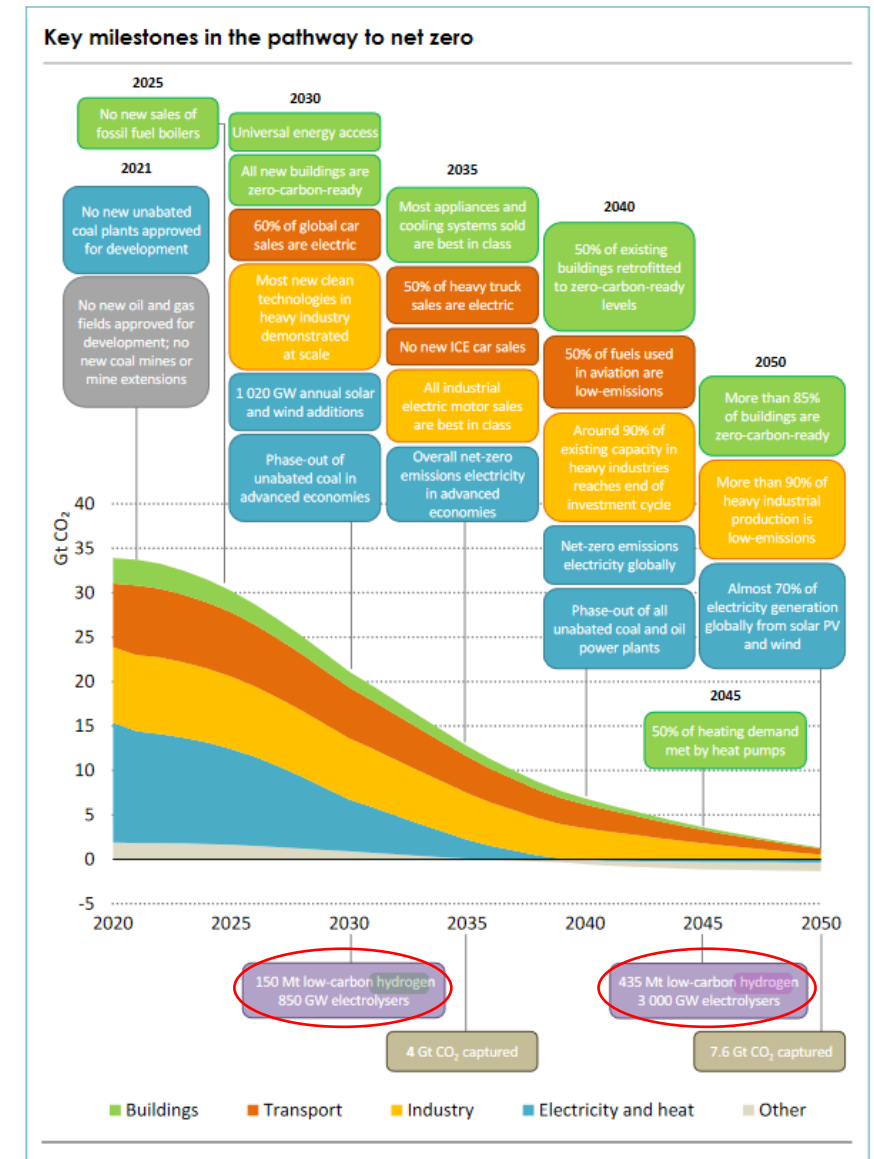
# Concil conclusions on Researchers careers

- **NOTES** the diverse and essential roles highly skilled talents play in successful research and innovation systems across the ERA like **data stewards, research (e-)infrastructure operators, research facilitators, knowledge brokers, innovation and technology transfer managers and coordinators, among others**; **NOTES** that these roles need to be acknowledged and supported via training and career development instruments to optimise job opportunities; and **INVITES Member States and the Commission to develop measures in support of career diversification and multiple career paths.** *(point 20)*
- **UNDERLINES** that **current reward and assessment practices are largely based on bibliometrics rather than on what researchers deliver and how (excellence and impact), and should evolve towards a more qualitative assessment**, which may impact on the diversification of research careers, taking into account open collaboration and knowledge and data sharing, valorisation of research, intersectoral aspects and, where relevant, societal engagement; *(point 23)*



# IEA Report – Net Zero by 2050

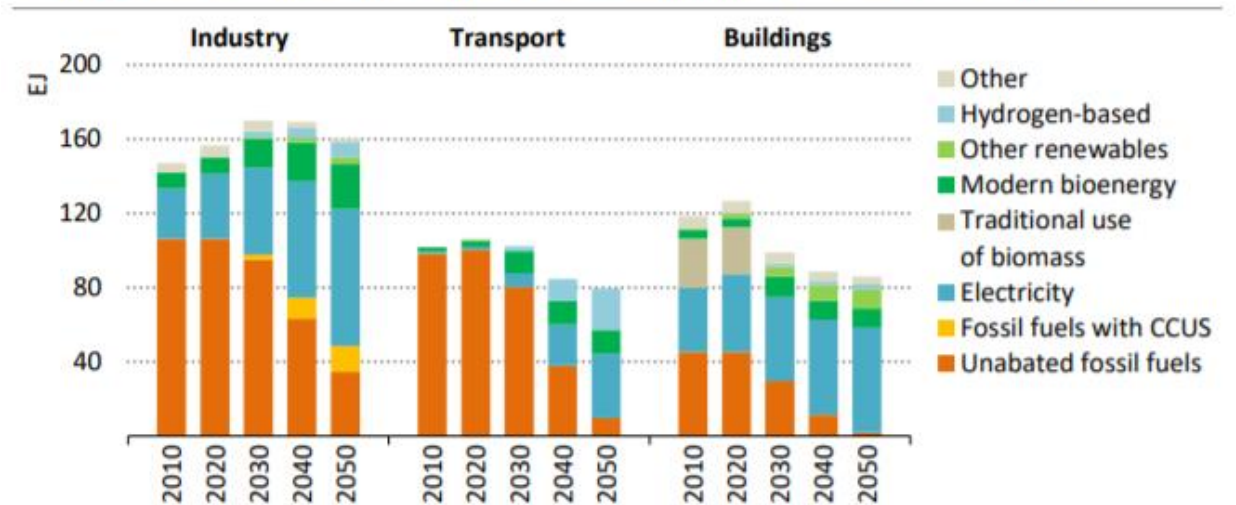
- New report setting out a Net Zero Emission scenario, spanning all sectors and technologies, for **what needs to happen and when**, to achieve net-zero energy-related and industrial process CO2 emissions by 2050
  - The report is designed to inform the high-level negotiations that will take place at COP26
- In terms of priorities, the report highlights investments in advanced batteries, **hydrogen electrolysers**, and direct air capture and storage
- By 2030, the report predicts that the 150Mt/year of low-C hydrogen will be produced; from 850GW of electrolyser capacity – increasing to 435Mt/year from 3000GW in 2045
- In order to underpin the necessary reduction of CO2 emissions the IEA pathway foresees that after 2030, **2 GW of electrolyser capacity are added at industrial sites each month** & policies that end sales of new internal combustion engine cars are in place by 2035 and 50% of heavy-duty truck sales are electric
- No new oil and gas fields, as well as new coal mines or mine extensions, should be approved for development



# IEA Report – Net Zero by 2050

- Specifically for hydrogen, the IEA foresees **that demand for H2 will grow from 90Mt in 2020 to more than 200Mt in 2030 and 530Mt in 2050**
  - The proportion of low-carbon hydrogen rises from 10% in 2020 to 70% in 2030 (50% Coal/Gas + CCS vs 50% Electrolytic)
  - The IEA foresees 15 million FCEVs on the road by 2030 but cautions that rolling out electrolyzers at the pace required is a key challenge given the lack of manufacturing capacity today
- In terms of energy consumption, total energy supply would fall to 550 exajoules (EJ) in 2030 (7% lower than in 2020) despite significant increases in the global population and economy because of a fall in energy intensity. Energy intensity would fall by 4% on average each year between 2020 and 2030.
  - This would be achieved through a combination of electrification and a push to pursue all energy and materials efficiency opportunities

**Figure 2.10** ▶ Global final energy consumption by sector and fuel in the NZE



IEA. All rights reserved.

*There is a wholesale shift away from unabated fossil fuel use to electricity, renewables, hydrogen and hydrogen-based fuels, modern bioenergy and CCUS in end-use sectors*

Note: Hydrogen-based includes hydrogen, ammonia and synthetic fuels.

# Hydrogen World

During the month of May, a [report](#) on EU Industry Alliances was published by *Friends of the Earth Europe*, **accusing Hydrogen Europe of being an oil and gas ‘lobby’ and promoter of fossil fuels**

- Hydrogen Europe reacted by issuing a press release
  - Debunk of the claim that HE pushed for a large role for blue hydrogen
  - Mention of their Charter that each of their members have to agree to
  - Answer to the accusations of the Clean Hydrogen Alliance
- Comment from Jorgo: *“We take these false and baseless statements accusations very seriously and we will be considering legal avenues against this defamation to protect our members and our vision.”*

An [article](#) negatively portraying the potential of hydrogen in some sectors was published in the Guardian on 6 May, the article is based on a study from Climate Impact Research (PIK), Germany, which states:

- Using hydrogen-based fuels for cars and home heating **risks locking in a dependency on fossil fuels and fail to tackle the climate crisis** – electricity being more efficient
- Using renewable electricity to create hydrogen from water and using carbon dioxide to manufacture other fuels **cannot work on a large enough scale to tackle the climate emergency in time**
- Contribution of e-fuels and hydrogen **will be marginal on the timescale of 2030**
- They mention that some critics say hydrogen provides a “cover story for fossil fuels”, with contradicting

Funding opportunities

# New partnership to fund clean tech deployment

- On 1 June, the **European Commission** and **Breakthrough Energy** (Bill Gates' Foundation) announced a partnership to support investments in clean technologies for low-carbon industries: **Breakthrough Energy Catalyst**.
- **How much?** Up to €820 million between 2022 and 2026.
- **What for?** To build large-scale, commercial demonstration projects for clean technologies to lower their costs
- **What portfolio?**
  - Green hydrogen
  - Sustainable aviation fuels
  - Direct air capture
  - Long-duration energy storage
- **What source of funding?**
  - Horizon Europe and the Innovation Fund
  - Private capital and philanthropic funds
  - The partnership will also be open to national investments by EU Member States through InvestEU or at project level.

More information on the set-up of the programme is expected in the coming months.



# Mission innovation

Mission Innovation is a global initiative of 24 countries (not necessarily EU) and the European Commission aiming to accelerate global clean energy innovation with the objective to make clean energy widely available and affordable

- Announced at COP21 in November of 2015
- The European Commission became a member of Mission Innovation in 2016, adding 400M€ to the aggregate annual spending on Mission Innovation R&D focus areas on clean energy innovation
- Main partners: IRENA, Breakthrough Energy, World Bank Group, Global Covenant of Mayors for Climate and Energy, IEA, and the World Economic Forum



MI has **4 objectives**:



Substantial boost in public sector investment



Increased private sector engagement and investment



Increasing international collaboration



Raising awareness of the transformational potential of energy innovation

To date MI members collaboration focused on **8 innovation challenges**:



IC1 Smart Grids



IC2 Off-grid Access to Electricity



IC3 Carbon Capture



IC4 Sustainable Biofuels



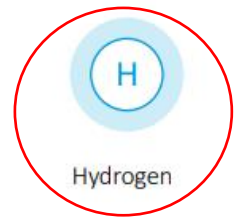
IC5 Converting Sunlight



IC6 Clean Energy Materials



IC8 Renewable and Clean



Hydrogen

# Mission innovation

Since Mission Innovation's launch at COP21 in 2015:



USD\$  
**18 Bn**  
cumulative increase in clean energy innovation investments

Clean energy

USD\$  
**5.8 Bn**



additional annual investment in clean energy innovation (2020)

USD\$  
**1.6 Bn**  
funding leveraged to support

**157**   
new international collaborations

supporting clean energy innovation



emissions reduction per year by 2030, if the nearly

**1,500**  
innovations

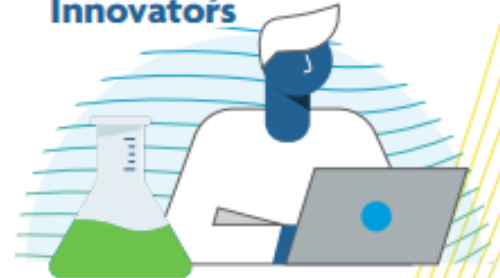
supported by Mission Innovation members are fully deployed



**70**  
international publications

highlighting the work of Mission Innovation

**185,400**  
Innovators



involved in

**62** on **4**  
Events Continents



# Mission innovation – Next steps



## The second phase of Mission Innovation started in June 2021

- In this next phase, Mission Innovation members will focus on outcomes and concrete actions to maximise innovation investments and bring solutions to the market
- There will be a greater emphasis on gender, youth and private sector involvement
- Mission Innovation will operate through **public-private innovation “Missions”** with **ambitious and inspirational goals**, three missions have already been launched:
  1. **Hydrogen** (the EC is co-leading this mission)
  2. Shipping
  3. Power
  - Additional missions may be launched in the future
- A new Innovation Platform will strengthen collaboration on the continued innovation challenges, accelerate learning, boost knowledge exchange and support every country to maximise the impact of their investments.



# Clean Hydrogen Mission



## The Mission

- Launched on 2 June
  - Aims to catalyse cost reductions by increasing research and development in hydrogen technologies and industrial processes and delivering at least 100 hydrogen valleys covering production, storage and end-use worldwide by 2030, to unleash a global clean hydrogen economy
  - Aims to accelerate the building of a global clean hydrogen economy by reducing end-to-end clean hydrogen costs to USD \$2 per kg by 2030. This would represent a tipping point in making clean hydrogen cost competitive with other energy vectors in different industries across production, transportation, storage and end-use
  - To achieve this goal, the Mission members commit to deliver at least 100 large-scale integrated clean Hydrogen Valleys worldwide by 2030
  - Co-leads: Australia, Chile, EU, UK and US
- More info can be found [here](#)

# Research Fund for Coal and Steel (RFCS)

The fund supports research and innovation projects in the areas of coal and steel:

- steel production processes
  - optimised utilisation and conservation of resources, energy savings and industrial efficiency improvements
  - health and safety at work
  - environmental protection
  - technologies supporting coal regions in transition (in complementarity with the Just Transition Fund)
  - emission reductions from steel production
- 
- **Who can benefit from it?** Universities, research centres, private companies.
  - **How much?** About €40 million / year since the end of the ECSA in 2002
  - List of [previous projects awarded](#) between 2017 and 2020 (hydrogen 33 occurrences)
  - The calls will be published on the [participants portal](#).

# Other points of discussion



# Thank you for your participation!

## **Contacts**

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