



**ANNEX to GB decision no CleanHydrogen-GB-2026-06**



## **CONSOLIDATED ANNUAL ACTIVITY REPORT YEAR 2025**

In accordance with Article 26 of Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Clean Hydrogen Joint Undertaking and with Article 23 of the Financial Rules of the Fuel Cells and Hydrogen 2 Joint Undertaking as re-adopted by the Clean Hydrogen Governing Board on 17 December 2021 (CleanHydrogen-GB-2021-02).

The consolidated annual activity report will be made publicly available after its approval by the Governing Board.

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## FACTSHEET

Name of the JU	CLEAN HYDROGEN JOINT UNDERTAKING (CLEAN HYDROGEN JU)
Objectives	<p>The Clean Hydrogen JU, through the involvement and commitment of its partners, will enhance cooperation between all stakeholders along the entire hydrogen value chain and mobilise them to increase the leverage effect of investments in R&amp;I, with the main objectives to:</p> <ul style="list-style-type: none"> <li>• Contribute to the EU 2030 and 2050 climate ambitions</li> <li>• Support the implementation of the Commission’s Hydrogen Strategy</li> <li>• Strengthen the competitiveness of the Union clean hydrogen value chain</li> <li>• Stimulate research and innovation on clean hydrogen production, distribution, storage and end-use applications.</li> </ul> <p>The Clean Hydrogen JU has the following specific objectives:</p> <p>a) improve through research and innovation, including activities related to lower TRLs, the cost-effectiveness, efficiency, reliability, quantity and quality of clean hydrogen solutions, including production, distribution, storage and end uses developed in the Union;</p> <p>b) strengthen the knowledge and capacity of scientific and industrial actors along the Union’s hydrogen value chain while supporting the uptake of industry-related skills;</p> <p>c) carry out demonstrations of clean hydrogen solutions with a view to local, regional and Union-wide deployment, aiming to involve stakeholders in all Member States and addressing renewable production, distribution, storage and use for transport and energy-intensive industries as well as other applications;</p> <p>d) increase public and private awareness, acceptance and uptake of clean hydrogen solutions, in particular through cooperation with other European partnerships under Horizon Europe.</p> <p>Moreover, the Clean Hydrogen Joint Undertaking shall carry out the following specific JU tasks:</p> <p>a) assess and monitor technological progress and technological, economic and societal barriers to market entry, including in emerging hydrogen markets;</p> <p>b) notwithstanding the Commission’s policy prerogatives, under the Commission’s policy guidance and supervision, contribute to the development of regulations and standards with a view to eliminating</p>

	<p>barriers to market entry and to supporting interchangeability, interoperability and trade across the internal market and globally;</p> <p>c) support the Commission, including through technical expertise, in its international initiatives on hydrogen, such as the International Partnership on the Hydrogen Economy (IPHE), Mission Innovation and the Clean Energy Ministerial</p>
<b>Legal Basis</b>	<p>Established under Article 187 of the <a href="#">Treaty on the Functioning of the European Union</a> and <a href="#">Council Regulation (EU) 2021/2085 of 19 November 2021 establishing the Joint Undertakings under Horizon Europe and repealing Regulations (EC) No 219/2007, (EU) No 557/2014, (EU) No 558/2014, (EU) No 559/2014, (EU) No 560/2014, (EU) No 561/2014 and (EU) No 642/2014</a></p>
<b>Executive Director</b>	Valérie Bouillon-Delporte
<b>Governing Board</b>	<p>Governing Board (3 representatives of the European Commission, 6 representatives of the Industry Grouping and 1 representative of the Research Grouping)</p> <p>Chair: Danica Maljković</p> <p>Vice-chair: Krzysztof Kuik (European Commission) since February 2026</p> <p>Current composition:</p> <p><a href="https://www.clean-hydrogen.europa.eu/about-us/organisation/governing-board_en">https://www.clean-hydrogen.europa.eu/about-us/organisation/governing-board_en</a></p>
<b>Other bodies</b>	<p>States Representatives Group</p> <p>Stakeholders Group</p>
<b>Staff number</b>	Staff Establishment Plan (2025): 27 temporary agents, 4 contract agents and 3 seconded national experts
<b>Total Budget 2025<sup>1</sup></b>	<p>Commitment appropriations<sup>2</sup>: amount EUR 202.8 million, of which EUR 193.2 million for operational activities and EUR 9.6 million for administrative expenditure</p> <p>Payment appropriations<sup>3</sup>: amount EUR 194.5 million, of which EUR 185.5 million for operational activities and EUR 9 million for administrative expenditure</p>

<sup>1</sup> Total budget includes operational budget (used for funding selected projects) & administrative (used for funding Programme Office activities)

<sup>2</sup> Voted commitment appropriations were EUR 196.4 million, subsequently amended to include unused appropriations from prior years.

<sup>3</sup> Voted payment appropriations were EUR 179.3 million, subsequently amended to include unused appropriations from prior years.

<p><b>Budget implementation/ execution</b></p>	<p>Commitments: EUR 200,561,465 (99% of appropriations):</p> <ul style="list-style-type: none"> <li>• Title 1: EUR 4,229,826 (99%)</li> <li>• Title 2: EUR 4,469,555 (96%)</li> <li>• Title 3: EUR 191,862,083 (99%)</li> </ul> <p>Payments: EUR 181,783,793 (93 % of appropriations):</p> <ul style="list-style-type: none"> <li>• Title 1: EUR 4,155,344 (83%)</li> <li>• Title 2: EUR 3,533,686 (88%)</li> <li>• Title 3: EUR 174,094,763 (94%)</li> </ul>
<p><b>Grants/Tenders/Prizes</b></p>	<p>32 grants signed in 2025 (incl. those remaining from call 2024) for a total value of EUR 184,443,730.38.</p> <p>2 specific contracts under operational tenders for a total value of EUR 787,900 and administrative tenders for a total value of EUR 2,282,960</p>
<p><b>Strategic Research &amp; Innovation Agenda</b></p>	<p>Strategic Research and Innovation Agenda 2022–2027 (<a href="https://www.clean-hydrogen.europa.eu/about-us/key-documents/strategic-research-and-innovation-agenda_en">https://www.clean-hydrogen.europa.eu/about-us/key-documents/strategic-research-and-innovation-agenda_en</a>)</p>
<p><b>Call implementation</b></p>	<p>Number of calls launched in 2025: 1  Number of proposals submitted: 212  Number of admissible and eligible proposals: 207  Number of proposals granted: 30  Deadline model: Single stage  Number of global project portfolio as of end of 2025 (since the setting up; signed grant only; for evolution overview): 134</p>
<p><b>Participation, including SMEs</b></p>	<p>Total of 1 102 beneficiaries in funded projects of the Clean Hydrogen JU (Calls 2022, 2023, 2024 and 2025), securing EUR 826.92 million of funding. Of these beneficiaries:</p> <ul style="list-style-type: none"> <li>• 25 % were SMEs, receiving 23 % of total EU funding;</li> <li>• 47 % were private for profit/large companies, receiving 43 % of total EU funding;</li> <li>• 2 % were non-EU, non-associated members’ entities ;</li> <li>• 79 % were newcomer entities;</li> </ul> <p>22% were members of the Clean Hydrogen JU’s private members, receiving 45% of the total funding.</p>



## FOREWORD

2025 was a year of strong delivery, growing impact and renewed momentum for the Clean Hydrogen Partnership.

Against a rapidly evolving European policy and industrial landscape, clean hydrogen continued to stand at the heart of Europe's efforts to decarbonise, strengthen competitiveness and build a more resilient energy system. In this context, the Clean Hydrogen Partnership has once again demonstrated its role as a key instrument for turning strategic ambition into concrete progress — by supporting innovation, connecting stakeholders across the value chain, and accelerating the development of hydrogen solutions across Europe.

One of the clearest signs of this momentum was the unprecedented interest generated by our 2025 Call for Proposals. Launched with a budget of EUR 184.5 million, including EUR 80 million from the RePowerEU Plan dedicated to Hydrogen Valleys, the call attracted 212 proposals. This exceptional response confirms both the dynamism of Europe's hydrogen ecosystem and the continued relevance of the Partnership's strategic priorities. By the end of the year, 19 grant agreements had already been signed, representing EUR 102.1 million in EU funding, with additional grants to follow in 2026.

Our growing portfolio — 138 projects by the end of 2025 — reflects the breadth and maturity of the clean hydrogen sector. These projects cover the full hydrogen value chain, from production, storage and distribution to end-use applications in transport, industry, energy and buildings. They also underline the importance of sustained research and innovation support in bridging the gap between technological development and market deployment.

2025 was also a landmark year for Hydrogen Valleys. With the launch of the Hydrogen Valleys Facility, we strengthened our support for integrated regional hydrogen ecosystems, providing project development assistance and ensuring that knowledge, experience and lessons learned are collected, analysed and shared in a structured way. The start of PDA services for 15 selected Hydrogen Valleys in November marked an important step in helping projects move closer to investment readiness and implementation on the ground.

Beyond grant management, the Partnership continued to reinforce its role as a knowledge hub and trusted convener for the hydrogen community. The restart of the European Safety Panel, the continuation of work on sustainability and circularity, the launch of the Annual Data Collection exercise on the Hydrogen Knowledge Hub, and the maintenance of the European Hydrogen Observatory all contributed to strengthening the evidence base needed for informed decision-making and responsible deployment.

Our visibility and outreach activities were equally important in 2025. Through flagship events such as the Hydrogen Valley Days, European Hydrogen Week, the EU Hydrogen Research & Innovation Days and the Clean Hydrogen Awards, we brought together policymakers, industry, researchers, regions and innovators to exchange knowledge, showcase achievements and identify the next steps needed to scale clean hydrogen in Europe. These moments of dialogue and collaboration are essential: they help build trust, align priorities and ensure that innovation responds to real market and societal needs.



The Partnership also delivered strongly from an administrative and financial perspective. Budget implementation reached an unprecedented level, with 99% of commitments and 93% of payments implemented. This reflects sound financial planning, robust monitoring and the dedication of our teams to ensuring effective and compliant management of public funds. At the same time, important progress was made in recruitment, internal processes, preparation for the SUMMA financial system, and staff engagement — all of which are vital to maintaining a resilient and high-performing organisation.

These achievements would not have been possible without the commitment of our staff, members, project beneficiaries, advisory bodies and partners across Europe. I would like to thank them all for their professionalism, collaboration and continued trust.

Looking ahead, the challenge is clear. Europe must accelerate the deployment of clean hydrogen technologies while ensuring that innovation translates into industrial leadership, competitiveness and tangible benefits for citizens and regions. The Clean Hydrogen Partnership is well placed to contribute to this objective. Our work in 2025 has shown that Europe has the ideas, the expertise and the partnerships needed to move forward. Our task now is to continue building on this foundation — with ambition, focus and determination.

As Executive Director, I am proud of what we achieved in 2025 and confident in the Partnership's ability to continue delivering impact for Europe's clean energy transition.

**Valerie Bouillon-Delporte**

**Executive Director**

Clean Hydrogen Partnership

## EXECUTIVE SUMMARY

Continuing the successes of previous years, the year 2025 also had innovations and new approaches.

Regarding its main activity, the Clean Hydrogen JU successfully managed its annual **call for proposals** under Horizon Europe. Launched on 15 January 2025, it had a total budget of EUR 184,5 million, of which EUR 80 million from the RePowerEU Plan (exclusively devoted to Hydrogen Valleys actions) and EUR 20 million from United Kingdom (UK) appropriations allocated to the call for proposals but not allocated yet to the topics within the call. The call included 19 topics again covering the full value chain of Hydrogen, in continuation of previous years. The 2025 call for proposals 2025 is implemented using lump sum grants for all topics, like in 2024. In response to this call, a total of 212 proposals were received, showing an unprecedented interest. 143 proposals were above the funding threshold requesting a budget of EUR 778,4 million. A total of 30 proposals were invited for grant agreement preparation in the second half of 2025 in 2 different batches, from which 19 grants were signed before the end of the year (for a value of EUR 102,1 million) and the remaining grants resulting from the call 2025 are expected to be signed in 2026.

With the **new grants** signed in 2025, the number of projects the JU is managing has continued to increase. By the end of 2025, the JU portfolio included 138 projects supporting R&I across the whole hydrogen value chain. 8 of these projects are funded under H2020 and 130 from Horizon Europe. Furthermore, in 2025, a total of 83 reports were assessed and paid. In addition, 58 amendments were signed.

But the activities of the Clean Hydrogen JU are not limited to call for proposals management and grants signature only.

Supporting the development of Hydrogen Valleys and complementing the related topics in the calls for proposals across the years, the **'Hydrogen Valleys Facility'**<sup>4</sup> was kicked off in 2025. Resulting from a public procurement, the Facility includes project development assistance (PDA) services to support Hydrogen Valleys at different levels of maturity, as well as activities aiming to ensure that the knowledge gathered and the lessons learnt from Hydrogen Valley projects are retained, collected, analysed and widely disseminated and used in a structured and efficient way. The Facility is also used to maintain and update the Hydrogen Valley Platform, supporting also the Clean Hydrogen Mission under Mission Innovation. PDA services

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<sup>4</sup> <https://h2v.eu/>



for 15 Hydrogen Valleys selected under the H2Valley Facility's first Call for Applications started in November 2025.

Also in 2025, the activities of the **European Safety Panel** restarted and the one year pilot for a **European Hydrogen Sustainability and Circularity Panel** came to an end. Building on this, a framework contract to continue the activities of the **Sustainability and Circularity Panel** was signed at the end of 2025 and the activities of the panel should resume early in 2026.

Building on the activities performed in the past, following a new public procurement, in 2025 the JU launched the Annual Data Collection exercise on the **Hydrogen Knowledge Hub**. In addition, the **European Hydrogen Observatory**, was maintained and updated throughout 2025.

Regarding other operational activities aiming to support its strategic objectives, the JU continued its technology and programme monitoring activities, both covering its projects and the wider developments in the hydrogen sector, resulting also in the latest **Programme Review Report 2025**.

**Public outreach and communication activities** remained strong in 2025, anchored by a series of high-visibility flagship events in Brussels that convened stakeholders from across Europe's hydrogen ecosystem and reinforced the Clean Hydrogen Partnership's role in driving EU competitiveness, innovation and collaboration.

- **Hydrogen Valley Days 2025 (24–25 June, Brussels)** — The second edition, under the theme "*Hydrogen Valleys: Driving Europe's Competitiveness*", brought together participants across the hydrogen value chain to engage with industry leaders, explore pioneering Hydrogen Valley projects, and identify new opportunities for growth, innovation and partnership.
- **European Hydrogen Week 2025 (29 September–3 October, Brussels)** — The sixth edition provided a major platform combining high-level policy dialogue with the **EU Hydrogen Innovation Forum (2–3 October)**, featuring research and innovation sessions across the full value chain with a strong focus on **EU competitiveness, skills and Hydrogen Valleys**.
- **EU Hydrogen Research & Innovation Days 2025 (24–25 November, Brussels)** — Building on the legacy of the Programme Review Days, the event served as a key forum to showcase programme achievements, address sector challenges, exchange insights and shape future priorities. The 2025 edition highlighted progress across the Clean Hydrogen programme and underscored the role of **regional collaboration through Hydrogen Valleys** in accelerating Europe's clean hydrogen transition, with



contributions from senior representatives of the European Commission, industry and research organisations.

- **Clean Hydrogen Awards Ceremony (24 November, Brussels)** — The Partnership recognised outstanding projects and individuals, celebrating excellence in hydrogen R&I and reinforcing visibility of breakthrough innovations

Supporting the operations of the JU and ensuring full compliance with its legal and regulatory framework, the administration and financial functions also had their lots of novelties and success.

Firstly, the budget implementation reached an unprecedented level in 2025, with 99% for commitments (slightly higher than 98% in 2024), and 93% in payments. Operational commitments were implemented at 99% (unchanged compared to 2024), with operational payments reaching 94% (compared to 85% in 2024). Administrative commitments were implemented at 91% (85% in 2024), with administrative payments reaching 86% (66% in 2024). Taken as a whole, the Clean Hydrogen JU budget implementation for 2025 demonstrated effective commitment and payment management across key areas, reflecting sound financial planning, robust monitoring mechanisms and the timely implementation of corrective measures.

Regarding resources, the private members of the JU made in-kind contributions to additional activities (IKAA) for a total exceeding EUR 1.4 bn since 2022, a figure which significantly higher than the initial target of EUR 970 million.

On HR side, the JU worked hard towards filling its Staff Establishment Plan, with 5 recruitment procedures completed or close to being completed at the end of 2025 (this included procedures related to new positions granted to JU's Staff Establishment Plan at the beginning of the year). The JU also worked on filling two trainees positions (one for the Operations Unit and the other one for the Administration Unit), which was completed in the beginning of 2026.

Finance and Administration also involved a significant effort in the preparation for the onboarding to SUMMA, the new financial and accounting system rolled out from the European Commission. The teams were heavily involved in testing the application and followed a lot of trainings, not forgetting the adaptation of procedures. Although the tool is officially in use on the 1<sup>st</sup> January 2026, the first transactions could be successfully managed at the end of 2025 thanks to this massive onboarding effort.

Finally, the JU ran a Staff Engagement Survey in 2025, the first since 2019. The numerous information and data collected have resulted in an action plan defined collectively at the end of the year and that will be implemented in 2026.

# 1 IMPLEMENTATION OF THE ANNUAL WORK PROGRAMME 2025

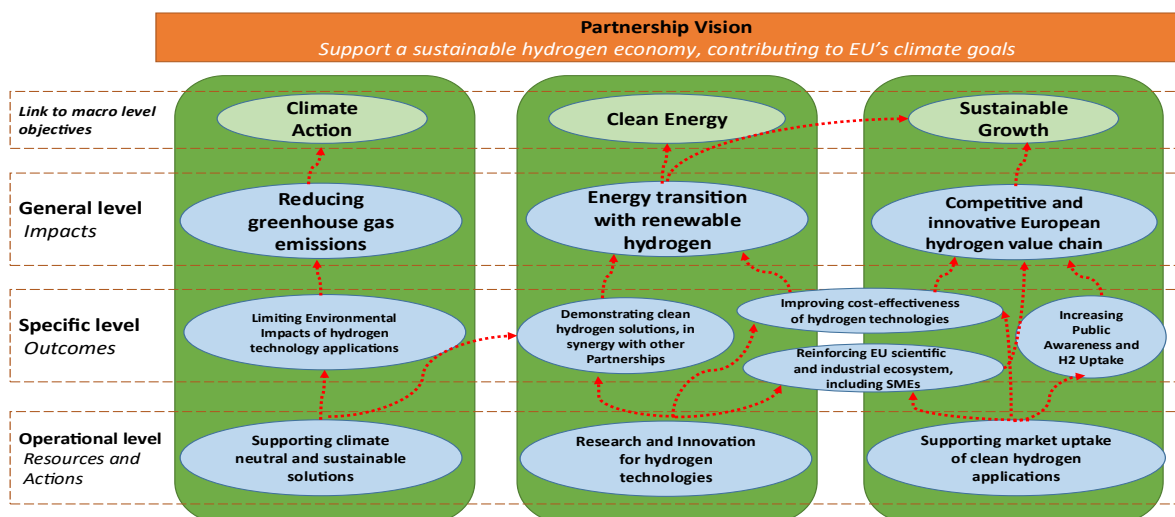
## 1.1. Key objectives 2025, associated risks and corrective measures

### 1.1.1 Progress towards achieving the Clean Hydrogen JU objectives

The European Green Deal aims to transform the Union into a fair and prosperous society with a modern, resource-efficient and competitive economy, where there are no net emissions of greenhouse gases by 2050 at the latest. Priority areas include clean hydrogen and fuel cells, together with other alternative fuels and energy storage. The Clean Hydrogen JU aims to accelerate the development and deployment of advanced clean hydrogen applications ready for market, across energy, transport, building and industrial end-uses for a European value chain, strengthening its competitiveness, with a view to supporting notably SMEs, accelerating the market entry of innovative competitive clean solutions. The final goal is to contribute to a sustainable, decarbonised and fully integrated EU energy system, and to the EU’s Hydrogen Strategy, thereby playing an important role in the implementation of its roadmap towards climate neutrality.

The Clean Hydrogen JU outlined a Strategy Map to facilitate the implementation of the Programme, underscoring its large number of objectives, some of them high-level, to more specific ones<sup>5</sup>. This allowed the identification of the necessary actions across the lifetime of the Clean Hydrogen JU to meet its objectives. The Strategy Map, presented in Figure 1, links the resources of the Clean Hydrogen JU and the actions taken (operational objectives / indicators) to concrete outcomes (specific objectives / indicators) and directly to one (or more) of the general objectives and intended impacts of the Clean Hydrogen JU, which in turn contribute to one or more high-level objectives of the European Union.

**FIGURE 1 - STRATEGY MAP OF THE CLEAN HYDROGEN JU**



Source: Clean Hydrogen JU

<sup>5</sup> See Section 7 of the Clean Hydrogen JU SRIA



Therefore, the programme's progress towards its objectives can be assessed based on the progress of its KPIs towards achieving the targets associated with the Clean Hydrogen JU Strategy Map, as described above.

All projects support climate neutral and sustainable solutions, as well as supporting the market uptake of clean hydrogen applications. Significant support is given both to SMEs (25% of the total beneficiaries) and to low TRL projects (almost 41% of the total projects) and to demonstration projects (58% of its budget). Therefore, the Clean Hydrogen JU activities are fully in line with its objectives, strengthening the knowledge and capacity of scientific and industrial actors, improving the technology characteristics of hydrogen technologies and thus contributing to the implementation of the European Commission's Hydrogen Strategy and the achievement of the objectives set out in the European Green Deal and the 2030 Climate Target Plan.

In particular, looking at the Calls 2022, 2023, 2024 and 2025, EUR 827.3 million<sup>6</sup> has been used to support projects across the whole hydrogen value chain, covering different technology readiness levels including research actions up to the demonstration of specific technologies as well as projects aiming to demonstrate hydrogen ecosystems or Hydrogen Valleys. In addition, a number of projects have been supported looking at cross-cutting issues such as skills, pre-normative research and sustainability of hydrogen technologies.

Out of the EUR 827.3 million, a share of 14% (EUR 115.0 million) corresponds to Hydrogen Valleys funded by the "REPowerEU Plan".

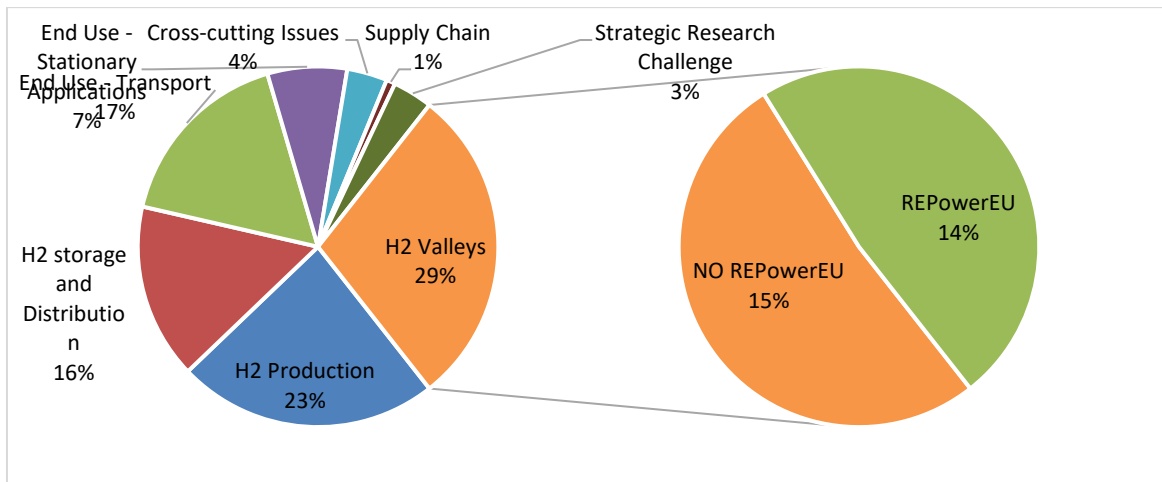
The figures below show the share of funding per Pillar and sub-pillar, as well as by type of action. Figure 2 provides a breakdown of the support provided under these calls per pillar in the SRIA, with the largest share used to support clean hydrogen production.

In addition, the breakdown by type of action is shown in the figure 3. A good balance between Research and Innovation actions and Innovation Actions (demonstrations) is observed.

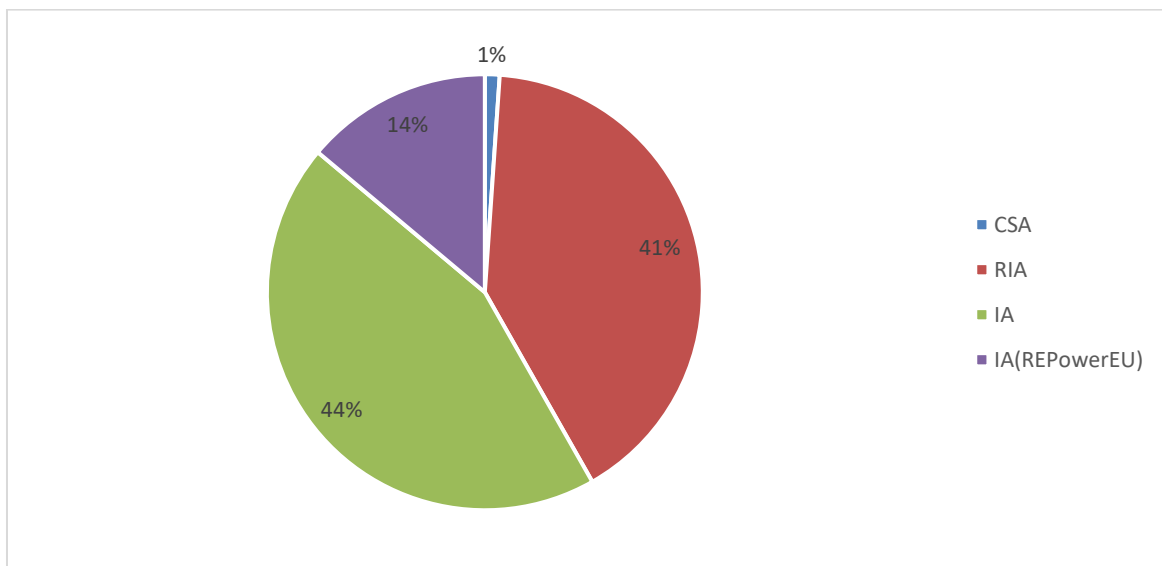
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<sup>6</sup> Considering grants in the Call 2025 signed before end of 2025

**FIGURE 2. SHARE OF TOTAL FUNDING FOR 2022, 2023, 2024 AND 2025 CALLS**



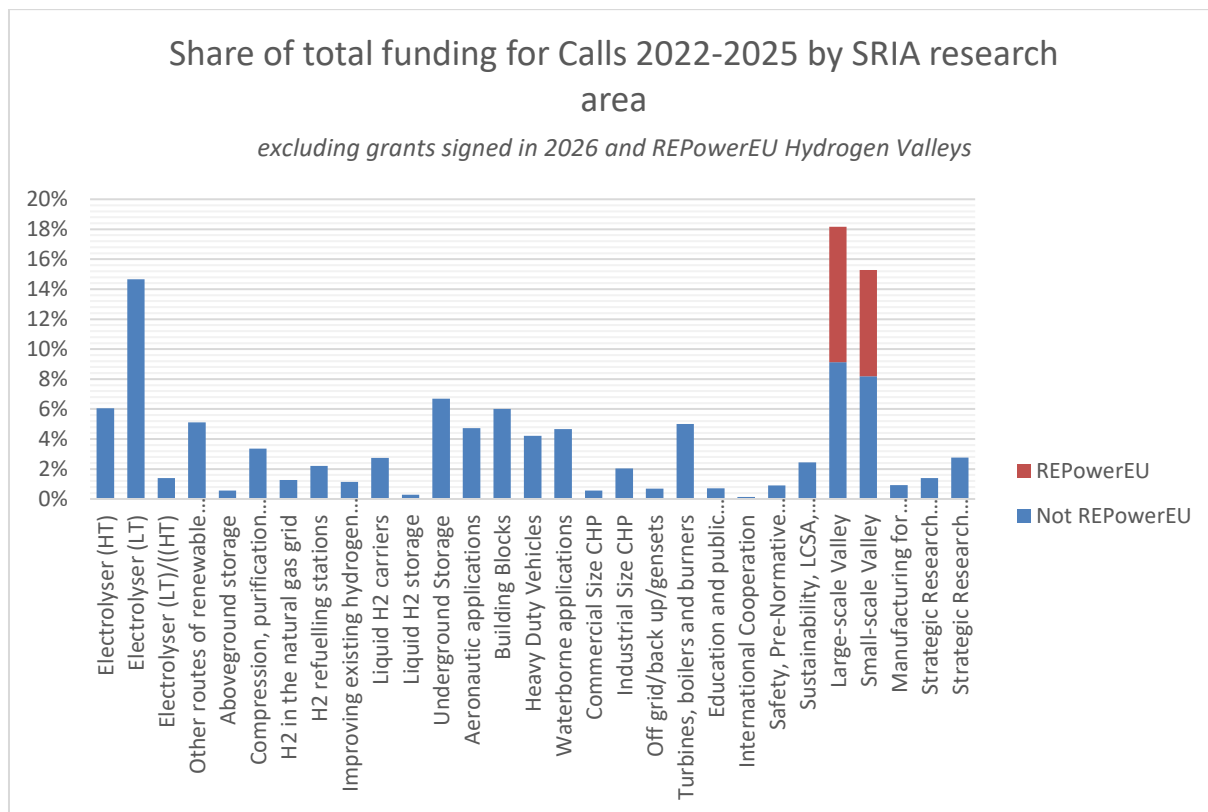
**FIGURE 3. SHARE OF TOTAL FUNDING FOR 2022, 2023, 2024 AND 2025 CALLS PER TYPE OF ACTION**



NB: CSA, coordination and support action; IA, innovation action; RIA, research and innovation action. Source: Clean Hydrogen JU.

At a deeper level of granularity, Figure 4 shows the funding -by type of sub-pillar, helping to identify where most efforts have been directed.

FIGURE 4. SHARE OF TOTAL FUNDING FOR 2022, 2023, 2024 AND 2025 CALLS PER SRIA RESEARCH AREA



### Hydrogen Valleys

The Clean Hydrogen JU has supported a total of 19 Hydrogen Valleys under Horizon Europe by the end of 2025. This was achieved using funding awarded from the budget included in the main JU calls (EUR 123.3 million) and the dedicated budget under RePowerEU (EUR 115.0 million). Additionally, three Hydrogen Valleys supported are being supported under H2020 (EUR 35 million budget). In total, these 22 Hydrogen Valleys represent project costs of close to EUR 1,340 million.

More information on all the Clean Hydrogen JU projects supported by the Clean Hydrogen Partnership can be found on the Clean Hydrogen JU website<sup>7</sup>.

## 1.1.2 Operational risks, mitigation and corrective measures

### Risk assessment in 2025

Risk management is a crucial part of strategic decision-making and is essential for ensuring the effective and efficient use of the EU budget. A robust risk management framework enables the timely identification of risks and the implementation of appropriate mitigating actions. Every member of staff

<sup>7</sup> [https://www.clean-hydrogen.europa.eu/projects-dashboard\\_en](https://www.clean-hydrogen.europa.eu/projects-dashboard_en)

at the Clean Hydrogen JU plays a role in identifying and managing risks. The Executive Director, directly accountable to the Governing Board, is ultimately responsible for managing the Clean Hydrogen JU’s activities, achieving its objectives, and ensuring that critical risks are known and appropriately managed.

In line with established practices, an annual risk assessment exercise was conducted in October 2025 to identify, analyse, and respond to key risks (including fraud risks) across all areas of responsibility of the Clean Hydrogen JU Programme Office (PO). As part of this exercise, a risk management workshop was organised to:

1. Assess the relevance of risks identified in previous exercises;
2. Evaluate the implementation of actions in place to mitigate these risks;
3. Identify and assess any new risks that could hinder the achievement of the Clean Hydrogen JU objectives;
4. Agree on actions to be taken in 2026 to mitigate both ongoing and newly identified risks.

Table 1 summarises the outcomes of the risk assessment exercise, including the main risks and the status of action plans, up to 31 December 2025.

**TABLE 1. FULFILMENT OF THE ACTION PLANS UP TO DECEMBER 2025**

RISK LEVEL	OBJECTIVE	RISK IDENTIFIED in AWP 2024	ACTION PLAN - identified for 2025 and implemented
HIGH	All	<p><b>Risk: Insufficient Manpower</b></p> <p>There is a significant risk of not meeting the objectives of H2020 and Horizon Europe due to insufficient staffing levels. The Programme Office is currently managing two framework programmes simultaneously—H2020 and Horizon Europe—while handling a 50% increase in budget, including additional funding from RePowerEU. This expanded has not been matched by a proportional increase in manpower.</p> <p>Furthermore, this risk is compounded by potentially high staff turnover, which may lead to loss of expertise, and additional pressure on existing staff. These interconnected factors could further impact the Programme Office’s capacity to effectively deliver programme objectives.</p>	<p>Several actions were taken in 2025 to mitigate the risk.</p> <p>The Clean Hydrogen JU continued to:</p> <ul style="list-style-type: none"> <li>- implement simplification measures (e.g. the introduction of fully lump-sum grants in 2025);</li> <li>- use service contracts to support operational and communication activities;</li> <li>- explore synergies with other Joint Undertakings for administrative activities via the Back Office Arrangements (BOA);</li> <li>- outsource tasks, where possible;</li> <li>- monitor the allocation of tasks among staff members to assess workload (with support from the BOA HR);</li> <li>- explore ways to maintain staff engagement and motivation;</li> <li>- explore and identify ways to shorten recruitment timelines;</li> <li>- present and discuss with the Governing Board (GB) on the adequacy of the current staff establishment plan (SEP) supported by a detailed workload analysis.</li> </ul>

<b>MEDIUM</b>	Synergies	<p><b>Synergies</b></p> <p>Risk of missing opportunities for synergies with other partnerships and other EC programmes or Member States/regional funds for hydrogen technologies due to lack of strategic guidance and consequently the JU proper involvement in programming activities.</p>	<p>Several actions had been undertaken, in line with the recommendations of the Commission’s Internal Audit Service (IAS), with the objective of strengthening synergies and improving organisational efficiency.</p> <p>In May 2025, a tender was launched to support the analysis of existing synergies activities and the development of a comprehensive synergies strategy. Following the procurement process, a contract was signed in July 2025 with White Research / Trinomics for a duration of six months.</p> <p>By December 2025, a final draft version of the synergies strategy had been delivered. This draft served as the basis for a consultation process involving key stakeholders, including the SG, SRG, EC, HE and HER, which had been initiated by the end of the year.</p> <p>The consultation process is expected to continue into early 2026, with discussions planned in the framework of SG and SRG meetings. The final version of the strategy is to be submitted to the Governing Board (GB), with a view to endorsement in March 2026. Next steps include the finalisation of both an internal (comprehensive) version and a public (shorter) version of the strategy, as well as the development of an action plan for 2026 to support its implementation.</p>
<b>MEDIUM</b>	Operational & Financial reporting	<p><b>Membership Data</b></p> <p>Risk that in-kind contributions in projects are not timely and fully recognised, due to lack of clear identification and timely update of private members membership (of Hydrogen Europe and Hydrogen Europe Research) status within JU projects.</p> <p>In addition, there is a risk that beneficiaries (non-members) could be indirectly contributing to JU administrative expenses, which could result in non-compliance of the JU financing rules. This can result in a potentially high negative impact on the JU reputation.</p>	<p>To mitigate the risk, the JU has implemented processes to ensure that eligibility criteria are duly met and that in-kind contributions are continuously monitored throughout the lifetime of the projects.</p> <p>In parallel, the JU has continued to strengthen its approach both internally and externally. Internally, it has maintained active participation in inter-service working groups aimed at developing an IT tool to enable comprehensive data collection, improved tracking, and enhanced accuracy of reporting.</p> <p>Externally, the JU has continued to remind stakeholders of the applicable provisions of its Financial Rules and their obligations on declaration, certification and reporting of in-kind contributions.</p>
<b>MEDIUM</b>	Operational	<p><b>Projects Execution</b></p> <p>There is a risk that programme objectives may not be fully or timely achieved due to delays in project execution. These delays are driven by multiple external factors, including the lingering effects of COVID-19, geopolitical</p>	<p>Several actions were taken in 2025 to mitigate the risk.</p> <p>The Clean Hydrogen JU continued to:</p> <ul style="list-style-type: none"> <li>- Assess the impact of the evolving geopolitical situation on project implementation and energy supply chains.</li> </ul>

	<p>instability, inflationary pressures, and evolving conditions in the hydrogen market.</p> <p>Ongoing conflicts have further intensified disruptions across global value chains. These developments have led to increased prices and reduced availability of critical raw materials and energy resources.</p> <p>As a result, project timelines are being negatively affected. This includes delays in reaching Final Investment Decisions (FID) for demonstration projects, particularly where co-funding is required. Consequently, these challenges are impacting budget execution and may hinder the programme’s ability to achieve its intended objectives within the planned timeframe.</p>	<ul style="list-style-type: none"> <li>- Follow developments in hydrogen markets.</li> <li>- Monitor project delays and, where necessary, grant extensions through amendments.</li> <li>- Closely monitor the budget and maximise the use of carry-overs by reallocating project funding sources.</li> <li>- Report quarterly to the Governing Board on budget execution.</li> </ul>
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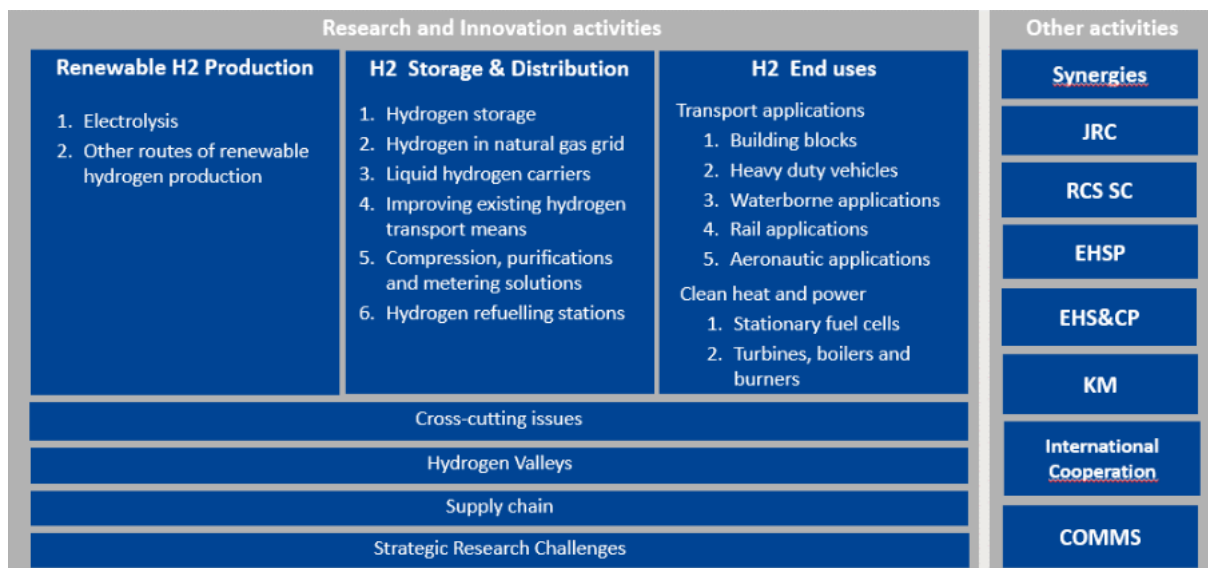
The actions listed above are being closely followed up on a regular basis.

## 1.2. Research & Innovation activities/achievements

### 1.2.1 Overview of R&I Activities

The Programme of the Clean Hydrogen JU has been structured to cover all innovation aspects of the hydrogen value chain, as shown in Figure 5. Its main focus will remain on the research and innovation actions on renewable hydrogen production, transmission, distribution and storage, alongside stationary and transport end-use technologies, with a strong emphasis on “circularity and safety by design”.

**FIGURE 5. OVERVIEW OF THE CLEAN HYDROGEN JU ACTIVITIES**





NB: EHS&CP, European Hydrogen Sustainability and Circularity Panel; EHSP, European Hydrogen Safety Panel; RCS SC, regulations, codes and standards strategy coordination

In line with the new programme structure of the Clean Hydrogen JU explained in the SRIA<sup>8</sup>, projects ongoing in 2025, including those from H2020 managed by the Clean Hydrogen JU predecessor, have been assigned to eight Pillars:

- Pillar 1: Renewable Hydrogen Production
- Pillar 2: Hydrogen Storage and Distribution
- Pillar 3: Hydrogen End Uses: Transport Applications
- Pillar 4: Hydrogen End Uses – Clean Heat and Power
- Pillar 5: Cross-Cutting Issues
- Pillar 6: Hydrogen Valleys
- Pillar 7: Supply Chain
- Pillar 8: Strategic Research Challenges

Each SRIA Pillar includes a wide range of activities and applications. Moreover, as part of the legacy projects under H2020, the Clean Hydrogen JU continues certain activities and applications of its predecessor. To better map the different current and possible future activities of the Clean Hydrogen JU, its Programme (including ongoing legacy projects) can be further mapped into a set of Research Areas<sup>9</sup>, which group projects covering related topics. This split in research areas is presented in Table 2, providing also a short summary of the topics of ongoing projects in 2025.

**TABLE 2. PILLARS OF R&I ACTIVITIES**

PILLARS	RESEARCH AREAS	RESEARCH TOPICS
<b>1) Renewable Hydrogen Production</b>	1 – Low temperature electrolysis	Projects targeting AEL, PEMEL and AEMEL
	2 – High-temperature electrolysis (incl. co-electrolysis)	Projects targeting SOEL and PCCEL
	3 – Other hydrogen production methods	Projects covering other production routes, including solar driven thermochemical hydrogen

<sup>8</sup> [https://www.clean-hydrogen.europa.eu/about-us/key-documents/strategic-research-and-innovation-agenda\\_en](https://www.clean-hydrogen.europa.eu/about-us/key-documents/strategic-research-and-innovation-agenda_en)

<sup>9</sup> These Research Areas are the basis of the annual programme technical assessment performed by JRC. For more information see Section 1.5.1.1.

		production and waste-to-hydrogen production
<b>2) Hydrogen Storage and Distribution</b>	4 – Hydrogen storage	Projects targeting the feasibility, risks and impact of H <sub>2</sub> underground storage
	5 – Hydrogen in the natural gas grid	Projects assessing the effect of H <sub>2</sub> on transmission and distribution of Natural Gas (NG) pipelines
	6 – Hydrogen carriers and liquid hydrogen	Projects focusing on the improvement of the roundtrip efficiency of conversion and system cost
	7 – Improving existing hydrogen transport means	Projects aiming to develop long-term storage and long-distance transportation of Liquid Hydrogen (LH <sub>2</sub> ) for commercial vessels
	8 – Compression, purification and metering solutions	Projects demonstrating scale-up of existing compression concepts, material research on proton conducting ceramic electrochemical cells (PCC and purification concepts), quality assurance of hydrogen fuel
	9 – H <sub>2</sub> refuelling stations	Projects scaling up and demonstrating innovative hydrogen compression technology and liquid hydrogen refuelling stations for heavy-duty applications
<b>3) Hydrogen End Uses: Transport Applications</b>	10 – Building Blocks	Projects focusing on PEMFC MEA components, durability, development and optimisation of versatile PEMFC stacks, hydrogen tanks and demonstration of Non-Road Mobile Machinery
	11 – Heavy Duty Vehicles	Projects demonstrating Heavy-Duty Vehicles (HDV) in large scale
	12 – Waterborne Applications	Projects focusing on FC applications for ports/harbors ecosystems, scaling-up and demonstrating multi-MW FC systems for shipping and

		demonstration of ships, including inland waterway vessels
	13 – Rail Applications	Projects with the objective of enabling hydrogen to be recognised as the leading option for trains on non-electrified or partially electrified routes
	14 – Aeronautic Applications	Projects addressing development and optimisation of a dedicated FC for aviation
	15 – Bus/Coaches	Large-scale demonstration projects, including refuelling infrastructure
<b>4) Hydrogen End Uses: Clean Heat and Power</b>	16 – Commercial Size CHP	Demonstration projects for commercial size SOFC CHP, including ammonia-powered
	17 – Industrial Size CHP	Projects focusing on SOFC, including reversible SOC systems, and PEMFC
	18 – Next generation degradation and performance & Diagnostic	Projects exploring diagnostic and control tools to enhance durability and reliability of stationary PEM and SOFC systems
	19 – Turbines, boilers and burners	Research projects to allow low NOx combustion of hydrogen-enriched fuels (up to 100%) at high-pressure conditions for new or existing gas turbine combustion systems
<b>5) Cross-Cutting</b>	20 – Sustainability, Life Cycle Sustainability Assessment, recycling and eco-design	Projects addressing the needs to define guidelines for sustainability assessment
	21 – Education and Public Awareness	Projects aiming to increase public understanding of hydrogen and FC technologies
	22 – Safety, Pre-Normative Research and Regulations, Codes and Standards	Projects focusing on improving knowledge of risks of hydrogen utilisation and the definition of a protocol for permitting and measuring

	23 – International Cooperation	Research & Innovation co-operation with Africa on hydrogen
<b>6) Hydrogen Valleys</b>	24 – Small-scale Valley	Projects aiming to develop island and micro-hydrogen integrated systems, to showcase the potential of hydrogen technologies
	25 – Large-scale Valley	Projects aiming to demonstrate a cross-border or interregional hydrogen integrated system when favourable conditions exist from an industrial or geographical point of view
<b>7) Supply Chain</b>	26 – Manufacturing for stationary applications	Projects aiming to advance high-volume production techniques and quality control measures for manufacturing SOFC components and stacks
<b>8) Strategic Research Challenges</b>	27 – Strategic Research Challenges	Projects aiming at the development a sustainable European supply chain of materials, components and cells, less reliant on CRM, with lower environmental footprint and costs, and higher performance and durability.

NB: CHP, combined heat and power; m-CHP, micro-scale combined heat and power; PEMFC, proton exchange membrane fuel cell; SOFC, solid oxide fuel cell.

## 1.2.2 Financial support

### 1.2.2.1 Overview of the financial support from 2008 to 2025

Before the establishment of the Clean Hydrogen JU, its predecessors, the FCH JU (2008-2013, funded under the FP7 programme) and the FCH 2 JU (2014-2020, funded under the H2020 programme), have supported 287 projects in total, with a combined budget of EUR 1.08 billion, complemented by equivalent funding from non-EU sources (e.g.: regional, national or private).

In line with the ambition to drive research and innovation -around hydrogen technologies and to ensure the achievement of the objectives set for the Clean Hydrogen JU, the EU almost doubled its budget in comparison with that of its predecessor the FCH2 JU, supporting the JU with another EUR 1 billion for 2021-2027. As a result, under the Horizon Europe programme, the total funding for the Clean Hydrogen JU programme-, including investment from the private members of the Clean Hydrogen JU, it is expected to reach over EUR 2 billion. Moreover, the European Commission has topped up the Clean Hydrogen JU budget with an additional EUR 200 million, to be matched by the same amount from industry, with the goal of doubling the number of Hydrogen Valleys and accelerating hydrogen projects under the REPower EU Plan.

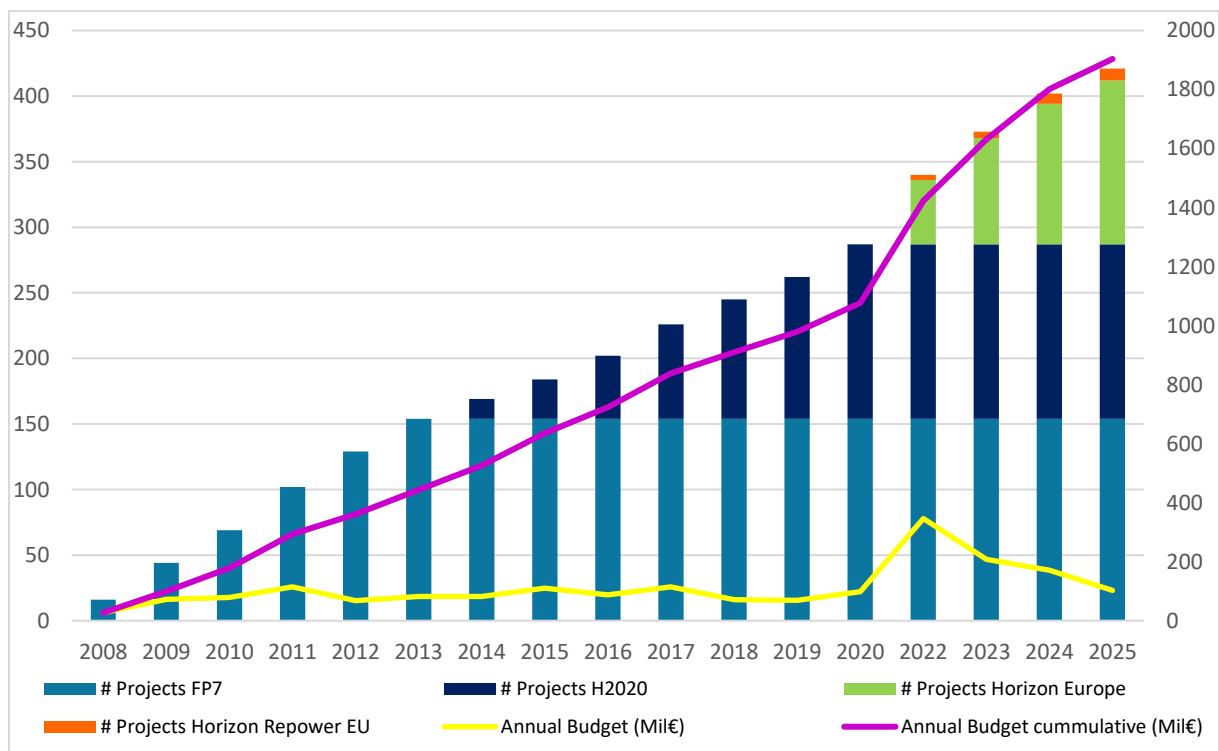
**FIGURE 6. SEQUENCE OF DEPLOYED EU BUDGET (\*INCLUDING EXPECTED FUNDING FOR HYDROGEN VALLEYS FROM THE REPOWEREU PLAN)**



Source: Clean Hydrogen JU.

Under the Horizon Europe Framework Programme, the Clean Hydrogen JU inherited the technological achievements and funding of the previous programmes and started to implement a new one. Based on the updated data from E-Grants, Figure 7 shows the cumulative number of projects supported by the FCH, FCH 2 and Clean Hydrogen JUs programmes (respectively, 154 projects under FP7, 133 projects under H2020 and 134 projects so far under Horizon Europe) and the annual and cumulative JU financial support given to the projects per year and by origin of funds.

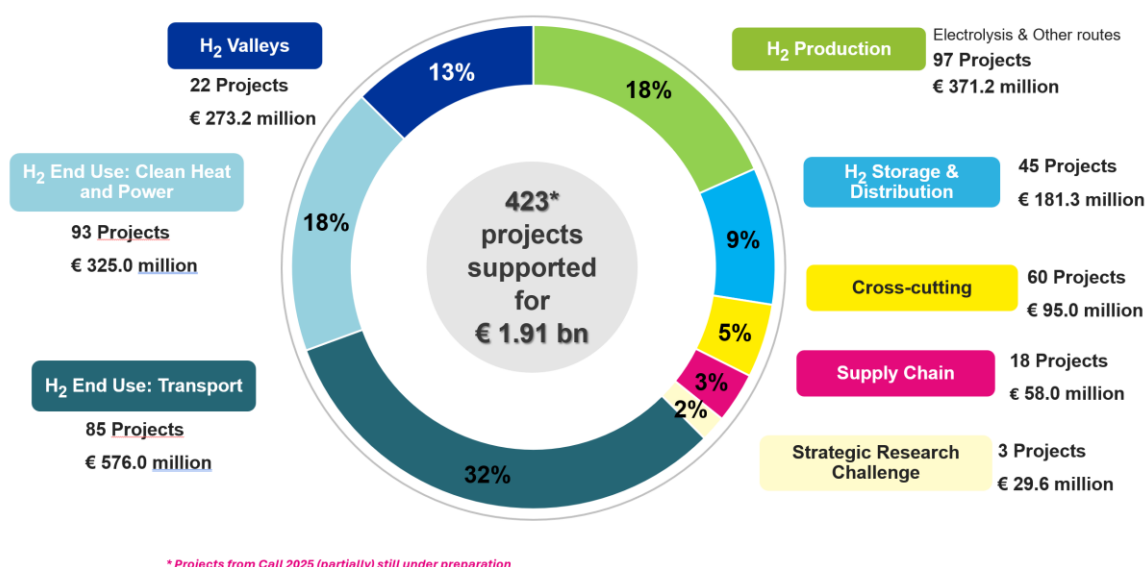
**FIGURE 7. CUMULATIVE NUMBER OF PROJECTS SUPPORTED BY THE CLEAN HYDROGEN JU AND ANNUAL COMMITMENTS OF CALLS 2008-2025**



The bars show the cumulative number of projects supported by the Clean Hydrogen JU since 2008. The yellow line shows the annual commitments made by the Clean Hydrogen JU against the new projects signed under the call of each year. The purple line shows the cumulative amount of Clean Hydrogen JU funding, including the commitments undertaken for ongoing projects, taking into account any amendments, and the final amount of funding per finished project. Projects suspended or terminated for which ongoing recovery processes are being implemented are not included.

The overall split of the Clean Hydrogen JU’s funding is summarised in Figure 8.

**FIGURE 8. TOTAL FUNDING OF THE CLEAN HYDROGEN JU PROGRAMME (2008 – 2025 PROJECT CALL YEARS)**



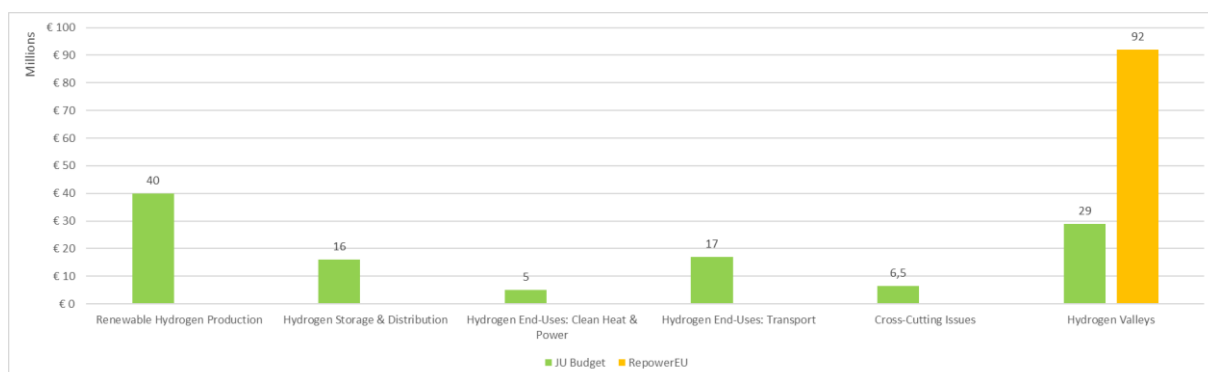
Source: Clean Hydrogen JU.

### 1.2.2.2 Financial support in 2022 - 2025 (Horizon Europe programme)

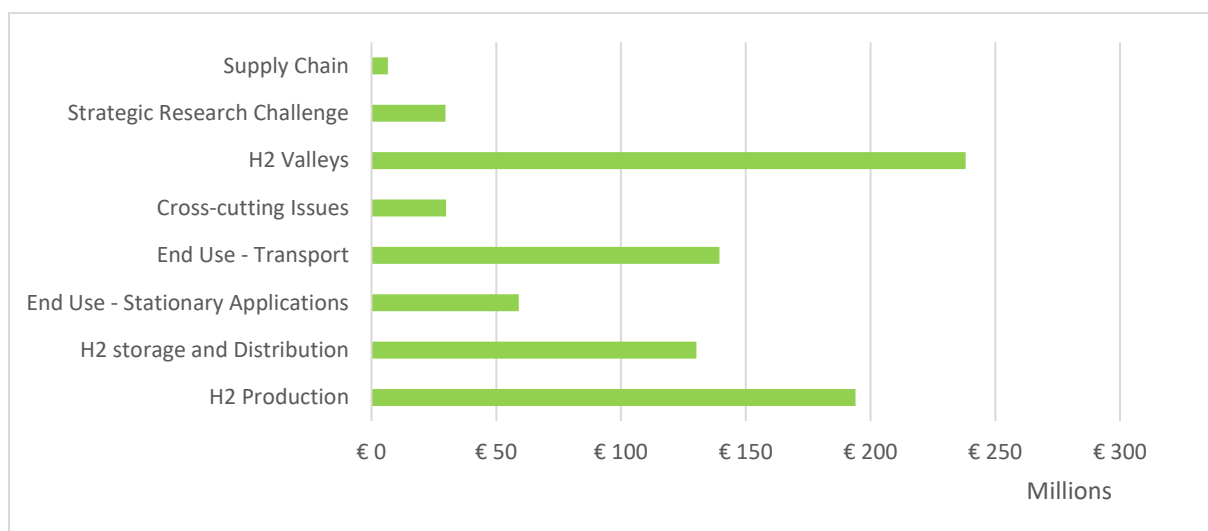
The fourth call for proposals under the Horizon Europe programme was launched in 2025. Following the evaluation results of Call 2025, 19 grant agreements (out of 24 proposals invited to prepare the grant, GAP phase) were signed for funding under Horizon Europe by December 2025, for a total funding of EUR 102.2 million. Figure 9 shows the distribution of Call 2025 total amount across the SRIA Pillars.

The projects from the Call 2025 have been added to the 115 projects that signed GA following the Calls 2022, 2023 and 2024 under Horizon Europe, leading to a total of 134 projects which have signed grant agreements with the Clean Hydrogen JU by the end of 2025, receiving a total EU funding of EUR 826.9 million. Figure 9 shows the distribution of the budgets for projects funded through the 2022, 2023, 2024 and 2025 calls per pillar.

**FIGURE 9. CLEAN HYDROGEN JU CALL 2025 MAXIMUM BUDGET ALLOCATION PER SRIA PILLAR**



**FIGURE 10. SOURCE OF FUNDING OF CLEAN HYDROGEN JU CALLS 2022, 2023, 2024 AND 2025**



For the purpose of annual programme review and analysis below, and due to the evolving structure of the Clean Hydrogen JU Programme compared with those of its predecessors, all previous projects under FP7 and H2020 were redistributed to the seven Pillars of the new Programme. The eighth Pillar on Strategic Research Challenges will include only projects funded under the current Programme.

### 1.2.3 Achievements and impact of funded projects

The projects funded under the previous programmes are continuously contributing to the development of hydrogen technology, as also highlighted in the Programme Review Report 2025. Under the Clean Hydrogen JU programme, the 2025 technical assessment covered 114 ongoing projects, which has been further expanded with 28 new projects from the 2024 call. While the first projects from Call 2022 began delivering gradual results in 2024, the current assessment shows they are now increasingly contributing to the overall programme impact alongside the legacy projects, paving the way for further advancements. The overview of the main achievements of the ongoing projects (including both legacy H2020 and the first Horizon Europe projects) per pillar is as follows:



## *Pillar 1 – Hydrogen Production*

The main technology funded under this Pillar is electrolysis, with 38 ongoing projects identified in the latest assessment. Higher-TRL technologies such as Alkaline Electrolysers (AEL), Proton Exchange Membrane Electrolysers (PEMEL), and Solid Oxide Electrolysers (SOEL) continue to receive robust support, while the portfolio has expanded its focus on newer, lower-TRL technologies such as Anion Exchange Membrane Electrolysers (AEMEL) and Proton Conducting Ceramic Electrolysers (PCCEL).

In Low Temperature (LT) electrolysis, the programme has moved toward validating larger-scale solutions in diverse industrial environments. These high-TRL demonstration projects have faced significant external challenges, particularly regarding complex permitting processes and the integration of systems into harsh or remote operational settings. For **Alkaline electrolysis (AEL)**, the current portfolio shows that projects are successfully pushing the boundaries of efficiency. Notably, the project HYPRAEL has demonstrated substantial progress by achieving a system electricity consumption of 48 kWh/kg and a CAPEX of 450 EUR/kW, meeting the SRIA 2024 targets while further efforts are required to improve stack degradation rates and cold-start ramp times to meet 2030 ambitions.

**Proton Exchange Membrane electrolyser (PEMEL)** technology is currently being investigated by a significant portion of the JU projects. A major technical achievement highlighted this year is the drastic reduction in the use of critical raw materials (CRMs); the PGM loading in PEMEL systems has decreased from 0.74 mg/W to 0.15 mg/W. This research is increasingly integrated across other pillars, specifically within Hydrogen Valleys and Refuelling Stations (HRS), where modular PEMEL systems are being deployed to provide on-site renewable hydrogen.

For **Anion Exchange Membrane Electrolysis (AEMEL)**, the foundation laid by projects like CHANNEL, ANIONE, and NEWELY has triggered a new wave of research. While early KPIs were based on single-cell tests, recent projects started in 2023-2024 are now focusing on scaling up to stacks. These newer initiatives are specifically targeting the development of PFAS-free membranes and further CAPEX reductions. In addition to the promising results in component development, these projects will also prioritize mass-manufacturing techniques and stack assembly quality at an earlier stage to ensure commercial viability.

The JU continues to lead in improving the Levelised Cost of Hydrogen (LCOH) by focusing on two primary drivers: CAPEX reduction and efficiency gains. Over the last 15 years, electricity consumption for AELs has dropped from 65 to 48 kWh/kg, while for PEMEL it has decreased from 60 to 53.8 kWh/kg. This translates to an approximate **10% reduction in LCOH** for grid-connected AELs (falling to approximately 7.21 EUR/kg) and a 9% reduction for those connected directly to renewables (falling to 6.02 EUR/kg). For a grid-connected AEL, electricity costs and CAPEX are the two main contributors to the LCOH, each accounting for roughly one-third of the total cost (30–40% and 25–45%, respectively). In contrast, for RES-connected systems, the absence of grid fees shifts the balance, with CAPEX accounting for 57-59% of the total cost. These figures remain still highly sensitive to geographic location and the operational hours of the renewable source, independent of the electrolysis technology improvements.

Regarding High Temperature (HT) electrolysis, **Solid Oxide Electrolyser (SOEL)** technology is advancing through 14 ongoing projects. While still at a lower overall TRL than AEL or PEMEL, the transition to megawatt-scale systems is establishing SOE as a powerful competitor for industrial applications that can utilize waste heat. Significant progress is reported in the SWITCH project, which demonstrated the



versatility of reversible SOE/SOFC operation at high efficiency. This has led to more ambitious durability targets within the SRIA to reflect the improved longevity of modern stack materials.

**Proton-conducting ceramic electrolyzers (PCCEL)** remain a low-TRL but high-potential technology. Projects like NOCELL are exploring their superior efficiency and ability to operate at intermediate temperatures. PCCEL is increasingly recognized for its multi-functional role, not only for hydrogen generation but also for purification and electrochemical compression, which can significantly enhance overall system efficiency when integrated into complex industrial processes.

Finally, **other routes of renewable hydrogen production** are being explored via 4 ongoing projects, covering solar thermochemical water splitting, biomass gasification, and photocatalysis. These technologies generally sit at a lower TRL compared to electrolysis. These projects face still persistent fundamental bottlenecks in reactor design and material durability due to the extreme temperatures and chemical complexities involved. While achievements in these areas are often under-reported due to these technical hurdles, biogas-to-hydrogen systems have shown exceptional results, with system energy use reaching 41.7 kWh/kg, already exceeding the 2030 target of 57 kWh/kg.

### *Pillar 2 – Hydrogen Storage and Distribution*

The Strategic Research and Innovation Agenda (SRIA) continues to advocate for a pluralistic approach to hydrogen transport and storage, supporting a wide range of technologies to build a resilient, EU-wide logistical infrastructure. This pillar currently encompasses 24 projects addressing distribution challenges such as compression, purification, and various transportation methods, including liquid hydrogen and chemical carriers.

**Aboveground storage:** While this area was previously highlighted by the completion of the HYCARE project, there were no projects under the “aboveground storage” research area with data reported in time of the programme review. Nevertheless, the Clean Hydrogen JU remains committed to advancing innovative solutions for solid-state and high-pressure storage as key components of the hydrogen value chain, an example is the project REMEDHYS, which is developing a modular solid-state hydrogen storage system based on recycled metal hydrides.

**Underground Hydrogen Storage (UHS):** This area has seen significant technical advancements in both salt caverns and porous reservoirs. The HYUSPRE project has notably improved the understanding of porous rock storage by developing open-source modelling software and a GIS story map to visualize European storage potential. Complementary initiatives such as FRHYGE and EUH2STARS are demonstrating large-scale storage in salt caverns and depleted gas fields, respectively, with EUH2STARS aiming to reach TRL 8 by the end of the decade.

**H2 in the natural gas grid:** Research remains focused on the injection of hydrogen into existing grids and the repurposing of pipelines. Projects like CANDHY and PILGRHYM are providing critical data for standardization and safety regulations. Additionally, the OPTHYCS project is developing advanced sensor technologies for leak detection, supporting environmental goals by quantifying hydrogen releases.

**Liquid H2 and Chemical Carriers:** Significant progress is being made in maritime and large-scale transport solutions. The LH2CRAFT project is developing a novel membrane containment system for liquid hydrogen (LH2) shipping, targeting classification approval by 2027. For chemical carriers, the SINGLE project is advancing ammonia cracking using a PGM-free approach, which enhances cost-



efficiency and sustainability. Furthermore, HYLICAL is exploring innovative magneto-caloric liquefaction technology, having already reviewed hundreds of potential materials.

**Compression, purification, and metering:** The COSMHYC project series continues to evolve, with its metal hydride compressor technology now being utilized in the HYGHER project for extended test cycles. In the area of purification, WINNER has achieved remarkable progress in integrating proton-conducting ceramic (PCC) components for extracting hydrogen from gas streams. Standardization has also seen major success through the HQE project, which has already impacted three international standards.

**Hydrogen refuelling stations (HRS):** The deployment and reliability of refuelling infrastructure are expanding, with a focus on both gaseous and liquid hydrogen. A major milestone was reached in February 2024 with the inauguration of the first public liquid HRS for fuel cell trucks in Germany. Beyond road transport, liquid hydrogen bunkering is being pioneered by the MF Hydra ferry in Norway and projects like DelHyVEHR. In aviation, projects such as ALRIGH2T and GOLIAT are actively addressing the complex requirements of LH2 aircraft refuelling.

### *Pillar 3 – Hydrogen End-Uses: Transport*

Solutions for sectors such as heavy-duty road transport, off-road and industrial vehicles, rail, shipping, and aviation require further development and demonstration to meet the ambitious decarbonisation targets of the EU. These solutions leverage the extensive technical knowledge acquired through earlier generations of FCEVs and FCEBs. The Programme Review Report 2025 indicates that cost reductions and efficiency improvements are being pursued through the standardisation of components and the scaling up of manufacturing processes. Research in this pillar is balanced between the development of foundational building blocks and large-scale vertical applications, with 27 ongoing projects currently active.

**Heavy Duty Vehicles – Fuel cell stack and system technology:** More efforts are directed at understanding degradation mechanisms under real-world heavy-duty cycles. Defining mitigation strategies to improve PEMFC durability is critical, as these vehicles require much higher lifespans than passenger cars. A significant focus remains on reducing the loading of Platinum Group Metals (PGM), which currently stands at approximately 0.47 mg/cm<sup>2</sup> for heavy-duty applications.

The transition to non-PGM catalysts is being explored with encouraging results, providing a pathway to reduce reliance on critical raw materials. Several projects, including IMMORTAL, DOLPHIN, and FURTHER-FC, are actively delivering testing protocols and AI-based diagnostic tools to optimize fuel cell designs. Notably, the StasHH project has made a major contribution by developing standard sizes and interfaces for fuel cell modules, which have been proposed for international standardisation via the IEC.

**Heavy Duty Vehicles – On-board vehicle hydrogen storage:** A key requirement is decreasing tank costs by reducing the amount of carbon fibre used while maintaining safety at 350 or 700 bar. Projects like COPERNIC and THOR have advanced the state-of-the-art in compressed storage. However, the 2025 review highlights a growing interest in liquid hydrogen (LH2) storage for long-haul missions, where higher energy density is required. New configurations, such as conformable tanks or integrated cabin-rear storage, are being tested to maximize space efficiency on varied vehicle architectures.



**Heavy-duty vehicles:** Fuel Cell Electric Trucks (FCETs) are increasingly seen as the optimal solution for long-range missions and heavy goods where battery weight would be prohibitive. Projects in this area are helping to establish a resilient EU supply chain for high-power stacks. Furthermore, feedback from truck demonstrations is proving invaluable to tank manufacturers regarding refuelling speeds and the activation of pressure relief devices. The experience from the JIVE bus projects is being extrapolated to support the next generation of heavy-duty refuelling stations, which must handle throughputs of 800–1,000 kg per day with high reliability.

**Waterborne applications:** While building blocks were established in earlier projects like MARANDA, the portfolio has gained significant visibility through active demonstrations. The H2PORTS project is showcasing hydrogen-powered port machinery, while FLAGSHIPS is deploying vessels for inland waterways. The RH2IWER project, which started in 2023, is set to demonstrate six cargo and tanker vessels, further validating hydrogen's role in inland navigation. Additionally, the H2MARINE project is specifically adapting fuel cell components to the harsh, saline maritime environment, contributing to the development of international maritime safety standards.

**Aeronautical applications:** The aviation portfolio has expanded with projects such as BRAVA and NIMPHEA, which focus on next-generation High-Temperature MEAs. A strategic alignment with the Clean Aviation JU has been reinforced in 2024 to validate high-power fuel cells and liquid hydrogen storage for zero-emission aircraft. Projects like HEAVEN have already demonstrated the feasibility of LH2-powered flight, paving the way for larger commercial applications.

**Buses and cars:** Legacy projects such as JIVE and JIVE2 continue to provide data on the long-term performance of fuel cell buses, showing steady improvements in availability and hydrogen consumption. For cars, projects like ZEFER and H2ME2 have achieved large-scale deployment, proving the reliability of the technology in taxi fleets and police services. The 2025 report notes that while these technologies are reaching commercial maturity, the focus is now shifting toward the secondary market and the long-term durability of the systems after several years of intensive operation.

#### *Pillar 4 – Hydrogen End-Uses: Clean Heat and Power*

**Turbines, Boilers and Burners:** This research area, significantly expanded since 2022, currently includes 10 ongoing projects focusing on the combustion of hydrogen, ammonia, and hydrogen-natural gas blends in turbine combustors and industrial burners. These initiatives align with the SRIA goals of repurposing existing infrastructure to minimize new investment costs while ensuring a cost-effective transition to zero-carbon power and high-temperature heat. A key advantage of these technologies is their tolerance for fuel impurities, which facilitates more energy-efficient production compared to fuel cell-grade hydrogen. The strategic objective remains to ensure that 100% of European gas turbines and burners are hydrogen-ready by 2030. Within this pillar, a total of 35 projects have historically contributed to the development of PEMFC technology, while 34 projects have supported SOFC technology. The 2025 review specifically assesses 16 active projects that continue to push these technologies toward commercial maturity.

**m-CHP:** For small-scale stationary applications, the portfolio has transitioned from the recently finished PACE project to newer initiatives focusing on domestic micro-cogeneration. These projects explore the deployment of both PEMFC and SOFC systems, primarily fuelled by natural gas or hydrogen blends, to provide efficient heat and power for residential buildings.



**Commercial Size Systems:** This research area currently focuses on fuel cell-based systems in the mid-sized power range (up to 100 kW). Key projects reviewed in 2025 include SO-FREE and E2P2, which are advancing SOFC technology for commercial-scale applications. Additionally, the AMON project is investigating the use of ammonia-fed SOFCs, while EMPOWER continues to develop high-temperature PEMFC (HT-PEMFC) solutions. These projects aim to demonstrate high electrical efficiency and grid-balancing capabilities in commercial environments.

**Industrial Size Systems:** The industrial-scale research area typically addresses systems in the MW range. For the 2025 Programme Review, 3 projects are under active consideration, namely SWITCH, 24\_7 ZEN, and CLEANER. A notable technical milestone was achieved by the SWITCH project, which successfully tested a large stack module (25 kW FC / 77 kW EC) demonstrating reversible operation between electrolysis and fuel cell modes, a critical feature for industrial decarbonisation and energy storage.

**Off-grid/back-up/gensets:** This area focuses on demonstration projects for remote locations, construction sites, and temporary power for events. The current assessment includes projects such as REMOTE and EVERYWH2ERE, which utilize PEM, Solid Oxide, and Alkaline technologies. These "power-to-power" solutions are proving essential for replacing diesel generators in urban and remote areas, providing silent and emission-free electricity.

**Other research areas:** This category includes projects like WASTE2WATTS and RUBY, which focus on monitoring and fuel flexibility. These initiatives are exploring the use of "opportunity fuels" like biogas for SOFC systems and developing advanced diagnostic tools (e.g., the RUBY monitoring system) to extend the operational life and reliability of both PEMFC and SOFC stacks in various stationary applications.

### *Pillar 5 – Cross-Cutting Issues*

The cross-cutting activity area contains specific supporting activities, structured around three research areas: (i) Sustainability, life cycle sustainability assessment (LCSA), recycling and eco-design, (ii) Education and public awareness, and (iii) Safety, Pre-Normative Research (PNR) and Regulations, Codes and Standards (RCS).

**Sustainability, life cycle sustainability assessment (LCSA), recycling and eco-design:** The projects in this area aim to contribute significantly to mitigating the environmental impact of the design, production, use, and end-of-life phases of hydrogen technologies. The SH2E project has reached a major milestone by delivering tailored LCA guidelines, which are now being adopted across the JU portfolio to ensure harmonised environmental reporting. Building on this, the HYPEF project is currently defining the "Product Environmental Footprint" for hydrogen, establishing the essential benchmarks required for future EU sustainability policies. Meanwhile, the NHYRA project, in collaboration with HyDRA, has made significant progress in quantifying hydrogen atmospheric releases, providing the scientific data necessary to understand and mitigate the potential climate impact of hydrogen leakage. Furthermore, the European Hydrogen Sustainability and Circularity Panel (EHS&CP) has been established to provide strategic guidance on reducing the use of critical raw materials (CRMs) and PFAS across all technical pillars.

**Education and public awareness:** The Clean Hydrogen JU continues to expand its tools and methods to address the growing demand for specialised hydrogen skills among technicians, researchers, and public officials. A key achievement highlighted in the 2025 review is the full operationalisation of the



European Hydrogen Academy, which serves as a central hub for educational resources, directly supporting the goals of the Net-Zero Industry Act (NZIA). The HyAcademy project has successfully launched its digital platform, providing certified training modules to bridge the skilled workforce gap. Additionally, the HYPOP project is actively engaging with regional and national policy stakeholders through tailored communication strategies to facilitate the societal acceptance of hydrogen infrastructure. These efforts are complemented by the European Hydrogen Observatory (EHO), which has become the primary reference point for market data and public information regarding the European hydrogen landscape.

**Safety, Pre-Normative Research (PNR) and Regulations, Codes and Standards (RCS):** This area focuses on providing the technical basis for harmonised standards, with a particular emphasis on high-capacity applications. Following the success of the PRESLHY project in understanding liquid hydrogen (LH2) behaviour, the recently launched ELVHYS and ALRIGH2T projects are advancing technical knowledge on LH2 transfer and safety protocols for maritime and aviation. In the road transport sector, the high-flow refuelling protocols for heavy-duty vehicles developed by PRHYDE are undergoing final validation at the RHEADHY station. A comprehensive 2024 standardization study has identified over 400 remaining gaps, and the JU is now prioritising PNR activities in projects like HYDRAEL and H2DIRECT to address these hurdles. This integrated approach ensures that safety and regulatory progress keep pace with the rapid technological advancements in hydrogen production and distribution.

#### *Pillar 6 – Hydrogen Valleys*

The significant expansion of the Hydrogen Valleys portfolio over the last three years underscores the strong commitment of regional communities and industrial partners to this integrated ecosystem concept. As highlighted in the Programme Review Report 2025, the total number of ongoing Valleys has risen to 17 (at the time of the 2025 review), reflecting a strategic push to double the number of such ecosystems across Europe by 2025. Although securing diversified funding remains a primary challenge, participants are increasingly successful in blending JU support with regional, national, and private investment, demonstrating the maturing financial viability of these clusters.

The flagship large-scale Valleys are now moving into more advanced implementation phases, providing high visibility and serving as critical contributors to the REPowerEU and SRIA targets. There is a notable trend toward more complex and integrated end-use applications, particularly in industrial clusters and heavy-duty transport hubs. For small-scale Valleys, the diversity of archetypes continues to grow, ranging from island-based energy systems to inland logistics centers. This variety is essential for creating replicable "blueprints" that can be adapted to different geographical and economic contexts across the Union.

Infrastructure development remains a cornerstone of this pillar, with projects focusing on the localized creation of hydrogen production, storage, and distribution networks. These regional grids are increasingly interconnected with broader hydrogen initiatives, allowing for the shared use of assets and the optimization of supply chains. The 2025 review emphasizes that these valleys are not merely isolated projects but serve as the foundational building blocks for a future European hydrogen backbone.

#### *Pillar 7 – Supply Chain*

European companies and research organisations continue to hold a leading position in several segments of the hydrogen value chain, providing a significant competitive advantage over global



players such as China, the USA, Japan, and South Korea. However, the Programme Review Report 2025 emphasizes that this leadership is increasingly challenged by global competition and supply chain vulnerabilities. To remain competitive, constant efforts in R&I are required to address existing technological gaps, particularly in the mass manufacturing of stacks and the automation of assembly processes.

The latest assessment highlights that while only one project is currently dedicated solely to this pillar, more than 20 projects across the entire portfolio incorporate supply chain and industrialisation objectives. The updated 2024 study on supply chain sustainability has mapped the strengths and weaknesses of 14 key hydrogen technologies, offering strategic recommendations to mitigate risks related to the availability of critical raw materials and the high cost of components. Detailed data on European suppliers, manufacturers, and service providers continue to be updated and made available through the European Hydrogen Observatory (EHO), which serves as a vital resource for monitoring the industrial evolution of the sector.

### *Pillar 8 – Strategic Research Challenges*

The three projects within this pillar continue to focus on the core research areas established in the Strategic Research and Innovation Agenda (SRIA), targeting the fundamental scientific hurdles that underpin the entire hydrogen value chain. As highlighted in the Programme Review Report 2025, these projects remain distinct from those in other pillars due to their focus on low Technology Readiness Levels (TRL) and their long-term, exploratory nature. Rather than delivering immediate commercial prototypes, their primary objective is to resolve complex research challenges through advanced modelling, AI-driven material discovery, and high-fidelity simulations.

This approach makes the projects highly transversal, as the solutions they develop—such as PGM-free catalysts, PFAS-free membranes, and a deeper understanding of degradation mechanisms—are applicable across multiple technologies, including various types of electrolyzers and fuel cells. The multi-faceted nature of Pillar 8 projects allows them to address sustainability and durability simultaneously, distinguishing them from the more application-specific demonstrations found elsewhere in the portfolio. Consequently, the fundamental insights and lessons learned from these strategic research activities are essential for the long-term evolution of the programme and are designed to be shared across all other technical pillars to ensure the future competitiveness of European hydrogen technology.

## **1.2.4 Information on quantitative and qualitative leverage effects**

**TABLE 3. CONTRIBUTIONS FROM MEMBERS OTHER THAN THE EU UNDER H2020 (SITUATION AS OF 31 DECEMBER 2025) (MILLION EUR)**

Nature		Target	Situation as of 31 December 2025	
			Committed	Validated / Certified
Financial contributions (FC) to administrative expenditure	Industry Grouping	16.34		16.34

	Research Grouping	2.66		2.66
<b>Total FC from Members other than the EU</b>		<b>19.00</b>		<b>19.00</b>
In-Kind contributions to Operational Activities (IKOP)	Industry Grouping	76.00	56.31 <sup>10</sup>	139.20 <sup>11</sup>
	Research Grouping		0.52	5.03
In-Kind contributions to Additional Activities (IKAA)	Industry Grouping	285.00		1,039.05
	Research Grouping			
<b>Total in-kind contributions from Members other than the EU</b>		<b>361.00</b>	<b>56.83</b>	<b>1,183.28</b>
<b>Total contributions from Members other than the EU</b>		<b>380.00</b>	<b>56.83</b>	<b>1,202.28</b>

**TABLE 4. CONTRIBUTIONS FROM MEMBERS OTHER THAN THE EU UNDER HORIZON EUROPE (SITUATION AS OF 31 DECEMBER 2025) (MILLION EUR)**

Nature		Target	Situation as of 31 December 2025	
			Committed	Validated / Certified
Financial contributions (FC) to administrative expenditure	Industry Grouping	25.97 <sup>(12)</sup>		5.79

<sup>10</sup> Cumulated IKOP foreseen for open H2020 projects at 31.12.2025 based on budget and membership at 31.12.2025

<sup>11</sup> Cumulated IKOP validated (certified) for H2020 projects up to 31.12.2025, as it appears in our 2025 accounts

<sup>12</sup> Rounded figures coming from the breakdown, 25.97 and 4.23. Original figures are 25 965 980 + 4 227 020 = 30 193 000. Total contribution from members: 30 193 000.

	Research Grouping	4.23 <sup>(13)</sup>		0.94
<b>Total FC from Members other than the EU</b>		<b>30.19</b>		<b>6.73</b>
In-Kind contributions to Operational Activities (IKOP)	Industry Grouping		112.27 <sup>14</sup>	0
	Research Grouping		0.57 <sup>14</sup>	0
In-Kind contributions to Additional Activities (IKAA)	Industry Grouping		2,419.34	1,437.97
	Research Grouping			
<b>Total in-kind contributions from Members other than the EU</b>		<b>969.81</b>	<b>2,531.18</b>	<b>1,437.97</b>
<b>Total contributions from Members other than the EU</b>		<b>1,000.00</b>	<b>2,531.18</b>	<b>1,444.70</b>

### 1.3. Calls for proposals, grant information and other funded actions

#### 1.3.1 Information on Call for proposals 2025

As part of AWP 2025, the 2025 Call for proposals (HORIZON-JU-CLEANH2-2025) was published on 15 January 2025, with an indicative budget of EUR 184.5 million. The deadline for the submission of proposals was 23 April 2025. The Call included 19 topics, distributed among the areas of activity of the Clean Hydrogen JU and its SRIA as follows:

Renewable Hydrogen Production: 7 Topics

Hydrogen Storage and Distribution: 3 Topics

End-Uses Transport: 3 Topics

End-Uses Heat and Power: 1 Topic

<sup>13</sup> Rounded figures coming from the breakdown: 25.97 and 4.23. Original figures are 25 965 980 + 4 227 020 = 30 193 000.

<sup>14</sup> Cumulated IKOP foreseen for open HE projects at 31.12.2025 based on budget and membership at 31.12.2025



Cross-cutting: 3 Topics

Hydrogen Valleys: 2 Topics

On 22 January 2025, a public European Info Day took place on-site in Brussels. Upon invitation by the local hydrogen stakeholders, several National Info Days dedicated to the call for proposals 2025, took place either physically or remotely in some EU27 Member States and associated countries to Horizon Europe, namely: In Hungary on 23<sup>rd</sup> January, in Italy on 24<sup>th</sup> January, in France and in Poland on 29<sup>th</sup>, in Spain on 10<sup>th</sup> February and in Portugal on 12<sup>th</sup> February.

By the deadline, the 2025 Call for proposals received 212 proposals, with 207 proposals satisfying the relevant eligibility and admissibility criteria. The distribution of the 207 proposals by areas and call topic is provided in Table 5.

**TABLE 5. PROPOSAL STATISTICS: ELIGIBILITY AND ADMISSIBILITY OF PROPOSALS RECEIVED IN THE 2025 CALL FOR PROPOSALS**

Area	Topic	Submitted	Inadmissible	Ineligible	Eligible
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-01	21	1	-	20
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-02	10	-	-	10
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-03	11	-	-	11
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-04	9	-	-	9
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-05	8	-	-	8
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-06	14	-	-	14
Renewable Hydrogen Production	HORIZON-JU-CLEANH2-2025-01-07	15	-	-	15
Hydrogen Storage and Distribution	HORIZON-JU-CLEANH2-2025-02-01	9	-	-	9
Hydrogen Storage and Distribution	HORIZON-JU-CLEANH2-2025-02-02	10	-	-	10
Hydrogen Storage and Distribution	HORIZON-JU-CLEANH2-2025-02-03	7	-	-	7
Hydrogen End Uses: Transport	HORIZON-JU-CLEANH2-2025-03-01	9	-	-	9
Hydrogen End Uses: Transport	HORIZON-JU-CLEANH2-2025-03-02	7	-	-	7
Hydrogen End Uses: Transport	HORIZON-JU-CLEANH2-2025-03-03	7	-	-	7
Hydrogen End Uses: Heat and Power	HORIZON-JU-CLEANH2-2025-04-01	19	-	-	19
Cross-cutting	HORIZON-JU-CLEANH2-2025-05-01	7	-	-	7
Cross-cutting	HORIZON-JU-CLEANH2-2025-05-02	8	-	1	7



Cross-cutting	HORIZON-JU-CLEANH2-2025-05-03	6	-	-	6
Hydrogen Valleys	HORIZON-JU-CLEANH2-2025-06-01	17	2	-	15
Hydrogen Valleys	HORIZON-JU-CLEANH2-2025-06-02	18	1	-	17
	<b>Grand Total</b>	<b>212</b>	<b>4</b>	<b>1</b>	<b>207</b>

Therefore, all 19 topics have received eligible and admissible proposals.

The 207 eligible and admissible proposals submitted involved 2 417 participations from legal entities established in 52 different countries. A breakdown by the country where the legal entity is established is provided in Table 6.

**TABLE 6. DISTRIBUTION OF PARTICIPATION AND REQUESTED EU CONTRIBUTION BY COUNTRY**

Country	Number of participants	Requested EU contribution
AE	1	0.00
AL	2	370,000.00
AT	102	48,762,951.01
AU	2	40,000.00
BE	89	36,526,548.94
BG	12	7,180,214.38
BR	1	0.00
CA	6	1,395,725.58
CH	57	29,777,558.99
CO	1	256,437.50
CY	10	9,935,302.80
CZ	20	8,916,822.96
DE	380	188,879,292.60
DK	65	47,249,372.74
EE	21	9,809,193.60
EL	88	33,525,579.80
ES	259	107,281,439.84
FI	38	20,682,812.23
FR	226	112,737,438.69
HR	3	1,494,687.50
HU	25	12,672,245.96
IE	35	15,414,158.96
IL	1	594,750.00
IN	2	40,000.00
IS	2	565,772.50
IT	241	108,821,912.96
JE	1	322,855.66

KR	10	3,567,970.22
KZ	1	405,000.00
LB	1	132,250.00
LI	2	85,015.00
LT	3	2,260,196.75
LU	7	6,187,726.05
LV	23	13,734,405.42
MA	2	437,632.50
MC	1	0.00
MT	1	171,492.31
NL	135	72,223,548.61
NO	100	76,493,393.95
NZ	4	773,223.70
PL	73	38,519,880.71
PT	31	14,627,682.14
RO	7	1,206,818.20
RS	4	1,239,076.38
SE	75	39,929,468.33
SI	30	10,627,809.65
SK	16	3,962,402.89
TR	15	6,652,364.96
UA	12	21,244,781.58
UK	168	101,676,199.35
US	1	0.00
ZA	5	3,180,697.80
<b>TOTAL</b>	<b>2,417</b>	<b>1,222,592,111.70</b>

The distribution of the 2,417 legal entity participations is broken-down by entity in Table 7.

**TABLE 7. DISTRIBUTION OF PARTICIPATION AND REQUESTED EU CONTRIBUTION BY TYPE OF ENTITY**

Entity type	Number of participants by entity type	Requested EU contribution
Higher or Secondary Education	390	162,320,848.54
Other	143	53,375,000.36
Private for Profit	1,299	735,213,321.12
Public Body	105	34,878,057.07
Research Organisation	480	236,804,884.61
<b>Grand Total</b>	<b>2,417</b>	<b>1,222,592,111.70</b>

Of the 2,417 participations of legal entities, 590 are SME (24.4%) accounting for 31.6% of the total requested EU contribution (EUR 386 851 445.48).

Moreover, of the 1,594 unique legal entities, 1,168 of these participations correspond to “newcomers” (73.3%), entities that are not listed as a beneficiary of a grant awarded by an individual joint undertaking or its preceding initiative.

After the evaluations, out of the 207 eligible and admissible proposals, 143 proposals (69.1%) passed all the call’s evaluations thresholds and were placed in either the main lists or reserve lists. This represents an improvement of the quality of the submitted proposals, because in the call 2024, 62.8 % of the proposals passed all evaluations thresholds. The exact distribution of the retained proposals and the budget per topic is provided in the Table 8.

**TABLE 8. RETAINED PROPOSALS AND REQUESTED EU CONTRIBUTION PER TOPIC FOR THE 2025 CALL FOR PROPOSALS**

Topic	Eligible proposals	Main list	Reserve list	Cumulative Requested EU Contribution (main list)	Available Budget in topic*
HORIZON-JU-CLEANH2-2025-01-01	20	3	14	11,995,105.04*	4,000,000.00
HORIZON-JU-CLEANH2-2025-01-02	10	3	7	11,966,173.34*	8,000,000.00
HORIZON-JU-CLEANH2-2025-01-03	11	2	9	7,999,020.25	8,000,000.00
HORIZON-JU-CLEANH2-2025-01-04	9	1	5	6,000,000.00	6,000,000.00
HORIZON-JU-CLEANH2-2025-01-05	8	1	2	4,049,361.14	4,000,000.00
HORIZON-JU-CLEANH2-2025-01-06	14	1	6	7,969,487.51	8,000,000.00
HORIZON-JU-CLEANH2-2025-01-07	15	1	9	1,999,984.58	2,000,000.00
HORIZON-JU-CLEANH2-2025-02-01	9	1	7	4,999,995.58	5,000,000.00
HORIZON-JU-CLEANH2-2025-02-02	10	1	4	4,989,022.51	5,000,000.00
HORIZON-JU-CLEANH2-2025-02-03	7	1	5	5,997,390.10	6,000,000.00
HORIZON-JU-CLEANH2-2025-03-01	9	1	4	4,999,844.79	5,000,000.00
HORIZON-JU-CLEANH2-2025-03-02	7	1	6	4,969,339.06	5,000,000.00
HORIZON-JU-CLEANH2-2025-03-03	7	2	4	13,999,910.27*	7,000,000.00
HORIZON-JU-CLEANH2-2025-04-01	19	1	11	4,999,895.04	5,000,000.00
HORIZON-JU-CLEANH2-2025-05-01	7	1	5	3,392,038.00	3,500,000.00
HORIZON-JU-CLEANH2-2025-05-02	7	1	6	1,999,930.02	2,000,000.00
HORIZON-JU-CLEANH2-2025-05-03	6	1	1	996,753.00	1,000,000.00
HORIZON-JU-CLEANH2-2025-06-01	15	3	4	57,705,846.53**	80,000,000.00
HORIZON-JU-CLEANH2-2025-06-02	17	4	4	35,966,912.60**	
<b>Grand Total</b>	<b>207</b>	<b>30</b>	<b>113</b>	<b>196,996,009.36</b>	<b>164,500,000.00</b>

\* In these topics, the remaining operational budget of EUR 18,995,407.15 originating from third countries and UK contributions, and call leftovers, was used to promote proposals from the reserve to the main lists in November 2025.

\*\* in these topics, the 2025 RePowerEU budget of EUR 80,000,000.00 was used to promote proposals from the reserve list to the main list.

It is important to note that, as all the actions of the Clean Hydrogen JU contribute to the Horizon 2020 and Horizon Europe objectives to address climate action, the total of the cumulative requested EU



contribution mentioned above (EUR 197 million) should be considered to be contributing to the HE (and H2020) objective to contribute at least 35% of expenditure to climate-related objectives<sup>15</sup>.

### 1.3.2 Information on Grant Agreement Preparation (GAP)

In 2025, the Clean Hydrogen JU also completed the GAP for 13 proposals from the call HORIZON-JTI-CLEANH2-2024. Out of them, 9 were signed in January-April 2025 and reported in the AAR2024

publication, and the remaining four are reported below (Table 9). These GAs refer to complex actions and/or consortium that required more time for grant preparation, such as those from the flagship and hydrogen valley topics and after approval of the requests by the consortium, the TTG of 245 days was extended for the GA preparation.

**TABLE 9. INFORMATION ON GRANT AGREEMENT PREPARATION OF CALLS HORIZON-JTI-CLEANH2-2024**

Call	Proposal number	Acronym	Ranking status	TTI	TTS	TTG
HORIZON-JTI-CLEANH2-2024	101192497	VHyTTA	MAIN	113	451	564
HORIZON-JTI-CLEANH2-2024	101192359	HYCELAND	RESERVE	113	212	325
HORIZON-JTI-CLEANH2-2024	101192557	ACCEPT	RESERVE	113	167	280
HORIZON-JTI-CLEANH2-2024	101192235	Sea4Volt	RESERVE	113	167	280

In August 2025, the Clean Hydrogen JU informed the applicants of the outcome of the evaluations of the call HORIZON-JU-CLEANH2-2025 (deadline at 23/04/2025). All consortia were informed of the evaluation results at the same time, 107 days after the closure of the call, well in advance of the Time-To-Inform (TTI) target fixed in the General Annexes to the Horizon Europe - Work Programme 2023-2025 (153 days).

Five proposals made requests for review (redress) under this call, none of which led to re-evaluation or change in the ranked lists established in the evaluation process.

In August 2025, immediately after the information letters were sent, the Clean Hydrogen JU invited 24 proposals from the main lists to grant agreement (GAs) preparation, in November 2025 another 6 proposals from the reserve lists were invited, following decisions on the optimal budget implementation including leftovers, and UK appropriations.

In total, 19 out of 30 GAs were signed in 2025, after an average 238 days - that is within the 245 days of Time-To-Grant (TTG) target fixed in the General Annexes to the Horizon Europe - Work Programme 2023-2025. The remaining 11 GAs, were signed in 2026. These GAs refer to complex actions and/or consortium that required more time for grant preparation, such as those from the flagship and hydrogen valley topics (Table 10).

<sup>15</sup> In order to support EU's commitment to make it the world's first climate-neutral continent by 2050, Horizon Europe will direct a minimum of 35% of the funding available to climate objectives.

**TABLE 10. INFORMATION ON GRANT AGREEMENT PREPARATION OF CALL HORIZON-JU-CLEANH2-2025**

Topic	Proposal number	Acronym	Ranking status	TTI	TTS	TTG
HORIZON-JU-CLEANH2-2025-01-01	101251073	PEMPIRE	MAIN	107	131	238
HORIZON-JU-CLEANH2-2025-01-02	101251323	DESIREE	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-01-02	101250775	ThunderStack	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-01-03	101250891	HySPRINT	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-01-03	101251223	SCALE-AEM	MAIN	107	131	238
HORIZON-JU-CLEANH2-2025-01-04	101250344	SURFER	MAIN	107	132	239
HORIZON-JU-CLEANH2-2025-01-05	101251371	SAFphyre	MAIN	107	133	240
HORIZON-JU-CLEANH2-2025-01-06	101251342	PYRAH2	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-01-07	101251033	H2-QUEST	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-02-01	101251372	HyCavern	MAIN	107	133	240
HORIZON-JU-CLEANH2-2025-02-02	101251337	HyCO2	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-02-03	101251455	COUPLE	MAIN	107	130	237
HORIZON-JU-CLEANH2-2025-03-01	101251484	H2ROAM	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-03-02	101251185	CENTREPIECE	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-03-03	101250260	MiNaMi	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-04-01	101251551	H2SCORE	MAIN	107	129	236
HORIZON-JU-CLEANH2-2025-05-01	101251635	IRION	MAIN	107	133	240
HORIZON-JU-CLEANH2-2025-05-02	101250924	UPeM	MAIN	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-05-03	101251722	PermittHy	MAIN	107	133	240
HORIZON-JU-CLEANH2-2025-06-01	101251367	HiWhyV	MAIN	107	131	238
HORIZON-JU-CLEANH2-2025-06-01	101251448	LtA	MAIN	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-06-01	101251667	NORHyWAY	MAIN	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-06-02	101251573	H2B-IMPACT	MAIN	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-06-02	101251080	TH2ISTLE	MAIN	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-01-01	101250907	AELIOS	RESERVE	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-01-01	101251004	NEREUS	RESERVE	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-01-02	101251678	PROCEED	RESERVE	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-03-03	101251528	MARINER	RESERVE	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-06-02	101251586	APLEH2C	RESERVE	107	N/A	N/A
HORIZON-JU-CLEANH2-2025-06-02	101250974	FIHyPorts	RESERVE	107	N/A	N/A

*NB: TTS, Time-To-Sign.*

The 30 projects listed above include 420 participations from 350 entities for a total Clean Hydrogen JU requested contribution of EUR 196 996 009,36. This amount was distributed by participant category shown in Table 11.

**TABLE 11. BREAKDOWN OF PARTICIPATION AND CONTRIBUTION BY PARTICIPANT CATEGORY (IN EUR)**

Entity type	Number of participations	Requested EU Contribution
Higher or Secondary Education	56	19,911,994.42 €
Other	28	8,957,892.06 €
Private for Profit	231	122,029,497.06 €
Public Body	23	4,574,198.46 €
Research Organisation	82	41,522,427.36 €
<b>Grand Total</b>	<b>420</b>	<b>196,996,009.36 €</b>

The 30 projects include 107 SME participations (25.5%) and amount to EUR 57,798,430.13 of funding. 212 of the 420 participations correspond to “newcomers” (50.5%), i.e. entities that are for the first-time beneficiaries of a grant awarded by an individual joint undertaking or its preceding initiatives.

In terms of country participations, participants from 32 EU Member States or Associated Countries are participating in the 30 projects and have received funding. In addition, entities from 4 third countries are participating. Table 12 indicates the distribution of the participants and the Clean Hydrogen JU contribution by country.

**TABLE 12. NUMBER OF ENTITIES PARTICIPATING AND CLEAN HYDROGEN JU CONTRIBUTION BY COUNTRY**

Country	Number of entities participating	Requested EU Contribution (EUR)
AT	4	3,262,001.61
AU	1	40,000.00
BE	24	8,769,086.96
BG	1	95,812.00
CA	2	123,437.50
CH	6	3,860,039.60
CY	1	279,359.14
CZ	4	912,993.75
DE	46	20,400,087.65
DK	13	6,234,826.67
EE	1	727,875.00
EL	9	1,745,741.35
ES	54	23,947,745.63
FI	8	4,488,157.34
FR	30	14,594,177.69
HU	1	138,008.20
IE	3	747,250.50
IL	1	594,750.00
IN	2	40,000.00
IT	41	15,747,024.11

KR	1	20,087.50
LU	2	655,376.23
LV	1	0.00
MC	1	0.00
MT	1	171,492.31
NL	16	4,700,807.47
NO	35	26,015,320.26
NZ	1	306,834.95
PL	2	496,551.00
PT	4	1,828,005.66
RO	2	419,900.00
SE	46	20,876,267.14
SI	1	455,000.00
UA	1	32,125.00
UK	53	34,220,019.64
ZA	1	49,847.50
<b>Grand Total</b>	<b>420</b>	<b>196,996,009.36</b>

### 1.3.3 Other funded actions: calls for tenders

Operational calls for tenders in 2025.

In accordance with its AWP for the year 2025, the Clean Hydrogen JU planned to launch the following operational procurement procedures via open calls for tenders on the following topics:

- **Legal and administrative processes relevant to fuel cell and hydrogen technologies**

Scope: to assess the legal and administrative processes relevant to fuel cell and hydrogen technologies across the EU (and some associated countries).

The study could not be carried out in 2025 and has been moved forward for launch in 2026.

- **H2 in Port Environments**

Scope: Overall, the study seeks to deliver actionable guidance for accelerating hydrogen integration in ports : Support port financing and investment strategies, Port-to-port cooperation and engagement with stakeholders, Policy interface and institutional engagement, and Project Development Assistance with case studies.

The scope of the activities has been discussed with the Members during the year 2025, with a subsequent launch of the call to be carried out in 2026.

- **European Hydrogen Refuelling Stations (E-HRS) Availability**

Scope: to support the implementation of the requirements included in the Alternative Fuels Infrastructure Regulation including the obligation of operators of having publicly accessible (hydrogen) refuelling stations to ensure the availability of certain static and dynamic data for their stations.



The procedure was launched and successfully closed with the award of a framework contract. The framework contract was signed on 01 December 2025. The first specific contract implementing the framework contract has been signed on 17 December 2025.

- **Sustainable paths for the use and management of water in the hydrogen value chain**

Scope: to assess the techno-economic, environmental and social sustainability of water use in green hydrogen value chain. The study will also analyse the resilience of water availability with respect the concurrent demand from different sectors and in the proximity to upcoming large hydrogen production capacities in Europe and neighbouring countries at regional levels and across the seasonal changes. Proposed recommendations to develop a circular approach to reduce and manage water consumption in a sustainable way is also part of the study.

The call for tenders was foreseen in AWP 2024. As stated in the AAR 2024, the procedure was launched in 2024, and was subsequently closed with the successful award and signature of a direct services contract on 12 June 2025.

- **European Hydrogen Sustainability and Circularity Panel (EHS&CP)**

Scope: to set up the scope of the EHS&CP based on input of a multidisciplinary pool of experts to support addressing and integration of sustainability and circularity aspects. The framework contract will be concluded for a maximum duration of 48 months and will have a maximum ceiling of EUR 2 million. The framework contract will be implemented through specific contracts, with a first specific contract to be concluded in 2024 with the indicative budget of 500.000 EUR.

The call for tenders was added to the AWP 2024 via the second amendment to the work programme, adopted on 18 November 2024 through Governing Board Decision reference number CleanHydrogen-GB-2024-13. The call was launched in 2025 and was subsequently closed with the successful award and signature of a framework contract on 20 October 2025. A first specific contract, implementing the framework contract was signed on 17 December 2025.

- **Hydrogen Valleys Facility**

Scope: to set-up and run a 'Hydrogen Valley Facility' aiming at accelerating the number of hydrogen valleys in Europe. The facility will include project development assistance to support Hydrogen Valleys at different level of maturity. Whilst the focus will be on European countries, such project development assistance may be extended to third countries, in line with the European Commission's policy priorities. In addition, it will include activities aiming to ensure that the knowledge gathered and the lessons learnt from Hydrogen Valley projects (including skills) are retained, collected, analysed and widely disseminated and used in a structured and efficient way. The Facility will also be used to maintain and update the Mission Innovation Hydrogen Valley Platform.

The call for tenders was foreseen in AWP 2024.

As stated in the AAR2024, the procedure was launched in 2024, and was subsequently closed with the successful award and signature of a direct services contract on 21 May 2025.

## 1.4. Evaluation procedures and outcomes

In March-April 2025, a pool of 185 experts was built. The selection prioritizes expertise, absence of conflict of interest, and availability over geography and gender, and demonstrates efforts to improve diversity through inclusion of associated countries, rotation, and outreach campaigns.

The evaluation of proposals of the call HORIZON-JU-CLEANH2-2025 was carried out between May and June 2025. The proposals were evaluated by a total of 98 external experts taken from the pool of 185 experts. In addition, six Vice-Chairs (Quality Controllers) were appointed to assist with the management of the entire evaluation process, including the quality control task.

The evaluation procedure had one observer (i.e. independent external expert to advise on the conduct and fairness of the evaluation sessions, the application of the evaluation criteria and ways to improve the processes). Of the 98 individual external experts, 30 were female (30.6%). Regarding the nationality of experts, 26 nationalities were represented as shown in Table 13 (based on experts' first nationality).

**TABLE 13. EXTERNAL EXPERTS BY GENDER AND COUNTRY OF NATIONALITY**

Country group	Country	Number of female experts	%	Number of male experts	%	Total
Associated Countries	Morocco	0	0.00 %	2	100.00 %	2
Associated Countries	Türkiye	1	16.67 %	5	83.33 %	6
Associated Countries	United Kingdom	0	0.00 %	3	100.00 %	3
<b>Associated Countries</b>		<b>1</b>	<b>9.09 %</b>	<b>10</b>	<b>90.91 %</b>	<b>11</b>
EU Member States	Austria	0	0.00 %	1	100.00 %	1
EU Member States	Belgium	0	0.00 %	2	100,00 %	2
EU Member States	Bulgaria	1	100.00 %	0	0.00 %	1
EU Member States	Croatia	1	100.00 %	0	0.00 %	1
EU Member States	Czechia	1	50.00 %	1	50.00 %	2
EU Member States	France	4	30.77 %	9	69.23 %	13
EU Member States	Germany	1	12.50 %	7	87.50 %	8
EU Member States	Greece	2	33.33 %	4	66.67 %	6
EU Member States	Hungary	1	100,00 %	0	0.00 %	1
EU Member States	Ireland	1	100.00 %	0	0.00 %	1
EU Member States	Italy	1	11.11 %	8	88.89 %	9
EU Member States	Latvia	1	100.00 %	0	0.00 %	1
EU Member States	Lithuania	1	100.00 %	0	0.00 %	1
EU Member States	Netherlands	0	0.00 %	3	100.00 %	3

EU Member States	Poland	3	75.00 %	1	25.00 %	4
EU Member States	Portugal	4	40.00 %	6	60.00 %	10
EU Member States	Romania	3	100.00 %	0	0.00 %	3
EU Member States	Spain	2	13.33 %	13	86.67 %	15
EU Member States	Sweden	1	100.00 %	0	0.00 %	1
<b>EU Member States</b>		<b>28</b>	<b>33.73 %</b>	<b>55</b>	<b>66.27 %</b>	<b>83</b>
Third countries	Argentina	1	100.00 %	0	0.00 %	1
Third countries	Egypt	0	0.00 %	1	100.00 %	1
Third countries	India	0	0.00 %	1	100.00 %	1
Third countries	Venezuela	0	0.00 %	1	100.00 %	1
<b>Third countries</b>		<b>1</b>	<b>25.00 %</b>	<b>3</b>	<b>75.00 %</b>	<b>4</b>
<b>GRAND TOTAL</b>		<b>30</b>	<b>30.61 %</b>	<b>68</b>	<b>69.39 %</b>	<b>98</b>

## 1.5. Follow-up activities linked to past calls

### 1.5.1 Knowledge Management

#### 1.5.1.1 Annual Programme Review

The annual Programme Review Exercise is one of the main knowledge management activities of the Clean Hydrogen JU. Its purpose is to monitor the implementation of the Clean Hydrogen JU Programme to ensure that it is aligned with the strategy and objectives set out in its founding regulation, as further elaborated in its SRIA for 2021-2027.

The Annual Programme Review can be separated into four main activities: (i) The annual data collection exercise, (ii) the JRC Annual Programme Technical Assessment (and Report), (iii) the Programme Review Report and (iv) the Innovation Forum including Programme Review Day(s). In 2025 activities (ii) and (iii) were merged into a single activity resulting in a Programme Review Report co-authored by the JRC and the Clean Hydrogen JU.

The annual data collection exercise<sup>16</sup> from projects was performed for the first time via the internally developed data collection platform Knowledge Hub which replaced the previous TRUST (Technology Reporting Using Structured Templates) platform.

Projects were invited to provide their data in February-March 2025 concerning results and achievements generated in 2024. The data collected allow for the benchmarking of the technology progress reported by the projects against the SoA and the Clean Hydrogen JU targets, as defined in the

<sup>16</sup> [https://www.clean-hydrogen.europa.eu/knowledge-management/annual-data-collection\\_en#data-collection-methodology](https://www.clean-hydrogen.europa.eu/knowledge-management/annual-data-collection_en#data-collection-methodology)



SRIA. Moreover, the annual iterations of the data collection exercise provide the necessary input for the development of a database of project results over time (and trends in technology development).

The Clean Hydrogen JU continuously aims to meet the objectives outlined in the SRIA by engaging as many stakeholders in the hydrogen technology sector as possible. Actions taken by the JU reflect the views of its public and private members, as well as recommendations from the JRC (who supports independently the annual review), as summarized in its annual assessments, and the broader scientific community.

After the annual data collection exercise in Feb-March 2025, the JRC performed its detailed assessment, with observations on the major accomplishments of the projects, the difficulties encountered and an evaluation of the performance of the Programme against the KPIs (summary provided also above under the programme achievements).

Consequently, the Clean Hydrogen JU and the JR, prepared the Programme Review Report<sup>17</sup> for 2025 (based on achievements and data from projects in 2024). The contents of the Programme Review Report, allow it to go beyond the simple monitoring of the Programme, also becoming an important input (or feedback-loop) for the next Annual Work Programmes and the identification of research areas and topics for the forthcoming Calls.

Finally, the Annual Programme Review closes with the H2 Research and Innovation Days, formally Innovation Forum (for more information, see Section 2.1). The event took place fully physically on 24-25 November 2025 and was attended by a large audience, mostly coming from the research and private community active in the hydrogen sector. During its sessions, there were panels and presentations assessing the progress and achievements in the various pillars of the Clean Hydrogen programme including presentations of successful projects results and discussing ways forward and key issues concerning research and innovation in the clean hydrogen field.

#### *1.5.1.2 European Hydrogen Observatory (EHO)*

The JU contributes also to the monitoring of the deployment of hydrogen technologies, to the adoption of related policies and to academic activities and research results through the European Hydrogen Observatory (FCHO)<sup>18</sup>. EHO is an open platform providing data and up to date information about the entire hydrogen sector, aiming to address the lack of data publicly available at EU and national level concerning the uptake of fuel cell and hydrogen technologies on the EU market and the absence of a coordinated methodology on how to monitor their market evolution.

The Observatory was created for the use of policy makers, industry stakeholders and the general public equally, and is the main public portal for European hydrogen data. Initiated under FCH 2 JU, as the Fuel

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<sup>17</sup> [https://www.clean-hydrogen.europa.eu/document/download/33470293-31b2-4bcb-a9ce-8a2ae7890c90\\_en?filename=202502453\\_PDF\\_KJ0125166ENN\\_002.pdf](https://www.clean-hydrogen.europa.eu/document/download/33470293-31b2-4bcb-a9ce-8a2ae7890c90_en?filename=202502453_PDF_KJ0125166ENN_002.pdf)

<sup>18</sup> <https://observatory.clean-hydrogen.europa.eu/>



Cells and Hydrogen Observatory, EHO continues its activity as of November 2021 and for 4 more years under the support of the Clean Hydrogen Partnership.

EHO focuses on technology and market statistics, socio-economic indicators, policies and regulations, and financial support. It has been seeing a steadily increasing number of visitors since then, with the largest share of them in recent months entering via direct entry to the website, indicating its acknowledgement as an important source of information for hydrogen.

The Observatory website is being continuously developed and expanded with additional data sets and key information for the hydrogen sector's stakeholders. Moreover, increasing emphasis is placed on the improved visualisations and tools that it can offer. In 2025 the main novelties were the addition of a Levelized Cost of Hydrogen Calculator and the inclusion of all 4 waves of Important Projects of Common European Interest (IPCEI) projects related to Hydrogen.

#### *1.5.1.3 Knowledge Management Tools and Clean Hydrogen Knowledge Hub*

The 2025 year marks the launch of the Clean Hydrogen Knowledge Hub, which gathers, encompasses and analyses information and data coming from the Clean Hydrogen JU projects and the available internal tools/platforms of the Clean Hydrogen JU.

It is a single platform that not only addresses many of the aspects regarding the access to and handling of data, but also brings together information and data from the available tools/platforms into a new integrated system. The Clean Hydrogen JU is linked to several data sources, and is able to manipulate, analyse and visualise the information and data in order to allow Hub users to navigate through them based on their access rights. Apart from the Clean Hydrogen JU staff, other Hub users include the European Commission and shall be extended in the future to national and regional authorities, decision makers, international organisations, academics, members of industry and the general public, all with different roles and access levels. A public dashboard<sup>19</sup> with data collected via the Hub was published in 2025 and further visuals will be published in 2026.

### **1.5.2 Feedback to Policy**

The Clean Hydrogen JU is contributing to the activities of several services in the European Commission and therefore to the continuous update and development of different policies in line with its objectives (e.g. R&I, energy, transport, climate and industrial policies). Contributions vary in content and format, but the common goal is to provide fact-based information on the state-of-the-art of fuel cells and hydrogen technologies and their contribution to the EU initiatives and policies especially in the energy, transport and industry sectors and competitiveness and growth.

In practical terms, this means taking part in several technical groups organised by the EC (e.g. the Horizon Feedback to Policy Group<sup>20</sup>) and other international bodies, active participating in meetings,

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<sup>19</sup> [Projects dashboard - Clean Hydrogen Partnership - European Union](#)

<sup>20</sup> The Horizon Feedback to Policy Group is one of the pillars of the governance structure to coordinate implementation, according to the D&E Strategy for the post-H2020 period and the Horizon Europe.



providing written technical input and ensuring that fuel cells and hydrogen technologies are properly represented. It also involves providing feedback from projects and studies to the EC in contribution to relevant energy, transport, industrial, R&I and clean air policy files.

In 2025, the Clean Hydrogen JU Programme Office continued to reinforce the collaboration with policy makers in the European Commission by providing input in response to ad-hoc requests or in a more structured manner.

The European Hydrogen Observatory (EHO) maintained by the Clean Hydrogen JU is also an important resource in the context of the feedback to policy, as it contains useful information on hydrogen technologies, deployment, policies and funding and research-related information (publications, patents and trainings).

In addition, the JU has supported Clean Hydrogen H2 Alliance (managed by DG GROW) with further development of IPCEIs related website, as part of the Clean Hydrogen Observatory activities. Similarly and in support to Mission Innovation (DG RTD), the JU is continuously developing the H2 Valleys Platform. Finally, it also supports the Ports Initiative of the Clean Energy Ministerial (DG ENER) with fact-based studies.

## **1.6. Openness, cooperation, synergies and cross-cutting themes and activities**

### **1.6.1 Support to EU Policies**

#### **SET Plan**

In 2025, the Clean Hydrogen JU has continued to follow the work of 2 SET plan Temporary Working Groups, namely the group on Renewable Fuels and Bioenergy and the group on Hydrogen. In 2025 Clean Hydrogen JU has intensified its cooperation with the Temporary Working Group on Hydrogen by regularly participating in the meetings of the Group and contributing to drafting of their Implementation plan (a strategic vision on the long-term research perspective until 2050). In the document the JU has been identified as one of the key partners of the Group and important source of funding for the research and innovation on hydrogen. The JU plans to continue following both groups in 2026 and explore better alignment with Member States related plans.

#### **Support to Transport Policies**

The Clean Hydrogen JU continued supporting the European Hydrogen Refuelling Stations Availability System (E-HRS-AS), which provides information on hydrogen refuelling infrastructure across Europe and contributes to improving transparency and reliability of data on station availability.

In 2025, the E-HRS-AS continued operating while preparing the transition to the next phase of the system. As previously announced, the revamp of the platform was initiated during the year following the conclusion of the previous operational phase of the system. In parallel, the Clean Hydrogen JU prepared and launched a new service contract aimed at maintaining and further developing the platform in line with evolving policy requirements.



The updated platform, expected to go online in Q2 2026, is designed to align the system with the new obligations introduced by the Alternative Fuels Infrastructure Regulation (AFIR), notably regarding the provision and accessibility of static and dynamic data on hydrogen refuelling infrastructure. The upgraded system will support the integration of data flows with the emerging European alternative fuels data ecosystem, including National Access Points and other EU-level platforms, while continuing to serve as a reference source of information for hydrogen refuelling infrastructure in Europe.

On the maritime sector the collaboration with European Commission services and Zero Emission Waterborne Transport (ZEWI) on fostering the development of alternative powertrains and supply of zero emissions fuels was continuous. This consists of steady exchanges on projects, topics of call for proposals and strategic research and innovation agenda updates. So that the work of the two entities addresses the decarbonisation of the maritime in a concerted and synergetic manner. As an outcome, one topic of call 2026 on Multi-fuel SOFC powertrain for maritime transport will support two proposals: one from the JU budget and one from Horizon Europe Work Programme 2026-2027 - Climate, Energy and Mobility budget. This form of funding via "Indirectly managed actions" is for the first time experimented in the JU, which will evaluate the proposals and implement both projects.

## 1.6.2 Support to Industrial Policy

During 2025, the Clean Hydrogen JU continued taking part as an observer of the Steering Committee of the European Clean Hydrogen Alliance.

In March 2023, the European Commission released the "EU Net-Zero Industry Act" (NZIA) <sup>21</sup> proposal [https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-GB&rs=en-US&wopisrc=https%3A%2F%2Fchju.sharepoint.com%2Fsites%2FMfiles%2F\\_vti\\_bin%2Fwopi.ashx%2Ffiles%2F50cdbf2500d642448dd387b88a08a498&wdlor=cC1CF6292-33AB-489D-90A8-3A811CE3CD11&wdenableroaming=1&mssc=1&hid=644D3566-46EA-4590-8B39-F313DAB2FFCC.0&uih=sharepointcom&wdlclid=en-GB&jsapi=1&jsapiver=v2&corrid=0dac1547-8dd8-f231-90a1-c1dbf2f2c6c9&usid=0dac1547-8dd8-f231-90a1-c1dbf2f2c6c9&newsession=1&sftc=1&uihit=docaspx&muv=1&ats=PairwiseBroker&cac=1&sams=1&mtf=1&sfp=1&sdp=1&hch=1&hwfh=1&dchat=1&sc={"pmo"%3A"https%3A%2F%2Fchju.sharepoint.com"%2C"pmshare"%3Atrue}&ctp=LeastProtected&rct=Normal&wdorigin=Outlook-Body.Sharing.DirectLink.Copy.LOF&wdhostclicktime=1771965745173&afdflight=28&csirow=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified\\_SingleFlush](https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=en-GB&rs=en-US&wopisrc=https%3A%2F%2Fchju.sharepoint.com%2Fsites%2FMfiles%2F_vti_bin%2Fwopi.ashx%2Ffiles%2F50cdbf2500d642448dd387b88a08a498&wdlor=cC1CF6292-33AB-489D-90A8-3A811CE3CD11&wdenableroaming=1&mssc=1&hid=644D3566-46EA-4590-8B39-F313DAB2FFCC.0&uih=sharepointcom&wdlclid=en-GB&jsapi=1&jsapiver=v2&corrid=0dac1547-8dd8-f231-90a1-c1dbf2f2c6c9&usid=0dac1547-8dd8-f231-90a1-c1dbf2f2c6c9&newsession=1&sftc=1&uihit=docaspx&muv=1&ats=PairwiseBroker&cac=1&sams=1&mtf=1&sfp=1&sdp=1&hch=1&hwfh=1&dchat=1&sc={) as a means to execute the Commission's "Green Deal Industrial Plan for the Net Zero Age" <sup>22</sup>, released in February 2023. The NZIA aims to ensure the deployment and competitiveness of technologies associated with decarbonisation by strengthening Europe's net-zero technology products manufacturing ecosystem, and the proposed regulation sets out a variety of actions and instruments to strengthen the competitiveness of Europe's net-zero technology manufacturing ecosystem. One of the regulations is focused on enhancing skills, and the Act will ensure the availability of a skilled workforce for the clean

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<sup>21</sup> 2023/0081 (COD)

<sup>22</sup> COM(2023) 62



energy transition by supporting the set-up of specialised European Academies on strategic net-zero technologies, among which hydrogen technologies are included.

Following up on the discussions started in 2023, in 2025, the Clean Hydrogen JU has worked in close contact with DG EMPL in view of aligning the activities of the Clean Hydrogen JU to maximise the JU's contribution to the NZIA goals. Discussions are ongoing to potentially expand the H2 Academy activities in 2027.

Furthermore, the findings of the Clean Hydrogen JU contracted study and concluded in 2024 on the sustainable supply chain and industrialization of hydrogen technologies<sup>23</sup> are highly relevant to policymakers, including DG GROW and the Clean Hydrogen Alliance. These insights support the continuous monitoring and assessment of the competitiveness of hydrogen technologies and the strategic decision-making at both national and European levels. Notably, the study's results contributed to the Draghi Report on the future of European competitiveness, reinforcing the role of hydrogen in the EU's industrial and economic strategy. Additionally, the comprehensive database of EU entities engaged in the hydrogen supply chain is set to be integrated into the European Hydrogen Observatory, enhancing transparency, facilitating stakeholder collaboration, and supporting data-driven policy initiatives.

Work with and inputs provided to other DGs of the European Commission are included in the section 1.6.3 on synergies.

In this context in 2025, the Clean Hydrogen JU launched and implemented a study on the role of innovation in enhancing the competitiveness of the European hydrogen sector. The study aims to analyse the key factors shaping hydrogen competitiveness and assess the global positioning of the European hydrogen value chain, with particular attention to the contribution of research and innovation activities supported by the Clean Hydrogen JU and its predecessor programmes. The study also examines how innovation can strengthen Europe's industrial base in hydrogen technologies and support the development and deployment of competitive hydrogen solutions across the value chain. The work initiated in 2025 will continue in 2026, when the study is expected to be finalised and provide evidence to support EU policy objectives related to industrial competitiveness, the clean energy transition and the development of a resilient European hydrogen ecosystem.

### **1.6.3 Collaboration with JRC – Rolling Plan 2025**

The Commission's Joint Research Centre (JRC) undertakes high quality research in the field of fuel cells and hydrogen that is of considerable relevance to the implementation of the Clean Hydrogen JU activities. During the Horizon 2020 period, a Framework Contract between the FCH 2 JU and JRC was approved by the Governing Board on 23/12/2015 and signed by both parties on 18/02/2016. Under Horizon Europe, a new Framework Agreement between Clean Hydrogen JU was signed in the spirit and as continuous of the previous Framework Contract on 29/11/2022.

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<sup>23</sup> Summary report available via [https://www.clean-hydrogen.europa.eu/document/download/1864ecb1-8dc8-425f-9a32-a03035e58751\\_en?filename=Hydrogen%20supply%20chain\\_summary%20report\\_PUBLIC.pdf](https://www.clean-hydrogen.europa.eu/document/download/1864ecb1-8dc8-425f-9a32-a03035e58751_en?filename=Hydrogen%20supply%20chain_summary%20report_PUBLIC.pdf)



The scope of the new Framework Agreement covers the activities that JRC provides to the Clean Hydrogen JU, against payment from the Clean Hydrogen JU operational budget. In line with the JRC mission, these support activities will primarily support the formulation and implementation of the Clean Hydrogen JU strategy and activities in the areas of standardisation, technology monitoring and assessment and sustainability. In addition, Clean Hydrogen JU may call upon JRC to perform specific actions for individual projects, by which the JRC provides added value to programme objectives. These activities are discussed and agreed on an annual basis between the JRC and the Programme Office of the Clean Hydrogen JU, with involvement of representatives of Hydrogen Europe and Hydrogen Europe Research. As in previous years, the annual activities expected for 2025, were set out in a Rolling Plan, which was published as part of the Annual Work Plan 2025 of the Clean Hydrogen JU. For the annual rolling plan of year 2025, an indicative budget of 969K from the Clean Hydrogen JU operational budget was foreseen. The annual Rolling Plan 2025 describes the annual activities and their related deliverables provided by JRC to Clean Hydrogen JU against payment. In line with the JRC's mission, these support activities contribute to the formulation and implementation of the JU strategy and activities in the areas of RCS, safety, harmonisation of testing protocols, and technology monitoring and assessment.

#### **Support to formulation and implementation of RCS strategy**

JRC supports the industry led Regulations, Codes and Standards Strategy Coordination (RCS SC) Task Force. In general, RCS activities should consist of identifying and prioritising RCS needs of strategic importance for the EU. In addition, the necessary PNR activities to support the RCS priorities should be identified.

##### Support to RCS SC Task force contributing to its activities.

JRC participated to the RCS SC Task force meeting organised by the CHJU in 2025 and contributed to the meeting discussions.

##### Report on the international progress in the area of RCS by international bodies (UNECE, ISO/TC 197, IEC/TC9 & 105, IPHE) (December 2025).

JRC submitted a report on the international progress in the area of RCS by international bodies in February 2026. The report informs the JU of relevant standardisation activities in the following hydrogen-related European and international standardisation committees and working groups: CEN/CENELEC/JTC6, CEN/CENELEC/TC 268/WG 5, ISO TC 197, ISO TC 197 SC 1 and IEC TC 105. It includes also a summary of the work that is currently carried out within the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE). JRC encourages the CHJU secretariat to identify the CHJU-funded projects that perform pre-normative research in areas in which standards are currently being developed and to encourage the coordinators of those projects to approach the representatives of the CEN/CENELEC and/or ISO committee(s), to which they may be able to contribute to.

#### **JRC direct contribution to implementing RCS strategy (Harmonisation)**

The progress made and followed by JRC regarding international standardisation for fuel cells and electrolyzers (including JRC's contribution and impact) is described in Deliverable A.2.

JRC held a Q&A session with Heraeus concerning the JRC ZEROCELL test hardware. Heraeus manufactured this PEFC single-cell hardware in accordance with the JRC's design and manufacturing guidance<sup>24</sup>.

#### Report on experimental validation of EU harmonised test methods, testing procedure and protocols for electrolyser.

The deliverable has been postponed to 2026 due to several factors. The recently installed water electrolyser stack test bench has yet to be commissioned, and the necessary testing hardware is currently unavailable. Commissioning is scheduled for Q1 2026, with testing of the JRC's own 30 kW PEMWE stack planned for Q2, contingent upon successful commissioning. These stack tests will include sampling feed and exhaust water to measure PFAS release. The samples will be analysed by a contracted third-party laboratory.

Furthermore, the same stack will be utilised in the upcoming round robin testing exercise, focusing on the experimental validation of accelerated stress testing protocols with volunteering partners. This exercise may extend until 2027. JRC plans to hold a related hybrid workshop, possibly in Oct 2026 at Petten.

In 2027 and onwards, this test bench may be utilised to conduct verification testing of PEMWE prototype stacks developed by JU projects. Additionally, stacks of alkaline-free AEMWE may also be tested.

#### JRC ZEROCELL test hardware

In 2025, no ad-hoc requests were received for providing support regarding the design and manufacture guidance of the JRC ZEROCELL test hardware (DOI: 10.17632/c7bffd7yb.1). This link had 1066 views and 558 downloads (accessed: 27 February 2026). By the end of 2022 these two figures were 617 and 168.

#### **JRC contribution to programme monitoring and assessment**

The JRC provided an update of the historical analysis for stationary fuel cells by December 2025. The scope of the update were TRUST data collected, reported and validated between 2020 – 2024. This led to 27 analysed projects spanning over 2 fuel cell technologies (PEMFC and SOFC) and 8 KPIs each. Findings on the development of the KPIs was presented by a dedicated dataset with accompanied graphs (if applicable due to data availability) which were subdivided in three size categories (< 5 kW, 5 – 50 kW, > 50 kW). Confidential data points were included in anonymised cloud plots to increase quality and consistency of the presented dataset. A comparative analysis with the previous report was carried out where this was deemed useful in terms of KPI terminology.

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<sup>24</sup> <https://data.mendeley.com/datasets/c7bffd7yb/1>



### Update of the keyword structure and support to its implementation into a tool for the JU, together with the JUs IT experts/knowledge hub

The Joint Research Centre (JRC) provided support to the Clean Hydrogen Joint Undertaking (JU) by developing a keyword classification scheme to map the efforts of JU-funded projects. As part of this support, the JRC categorised the JU projects according to technology, application, and other criteria, enabling the comparison of the JU's project portfolio with those of other programs, such as CINEA and Horizon Europe.

### Report on methodology of TRUST data treatment

The JRC provided technical expertise for the integration of the TRUST dataset into the technical parameters database of the CH JU Knowledge Hub. To support this integration, the JRC harmonised data collected between 2016 and 2024 through the TRUST framework, involving the collection, aggregation, and manual harmonisation of over 1 300 technical parameter names and units. This harmonisation exercise, which took place from January to April 2025, also included coordination meetings, internal trainings, and data quality checks to ensure the data was ready for use in the Knowledge Hub.

### Summary of support provided to Knowledge Hub and the study on water management

The JRC provided support to the CH JU in the selection of the contractor for the study. Later, JRC presented the preliminary findings of their own study on the additional pressure caused by hydrogen production systems on European freshwater resources to the JU contractor RINA. The JRC also provided guidance on the available dataset sources.

### **2025 Annual Programme Technical Assessment**

The JRC has performed the 2025 Annual Programme Technical Assessment (APTA). The purpose of the APTA is to ensure that the CH JU Programme is aligned with the strategy and objectives set out in its Council Regulation and the Strategic Research and Innovation Agenda (SRIA).

Previously, the JRC had been submitting two separate reports: a confidential version containing project-specific confidential data and information and a non-confidential version that was distributed at the discretion of the Clean H2 JU. Starting from 2025, the Clean H2 JU and the JRC have adopted a new approach, as mutually agreed upon. This involves publishing a single, joint report that excludes confidential information and is made public. The process for creating this joint report involves the JRC preparing a technical assessment, which is then reviewed by the JU's Project Officers. Following incorporation of the JU's feedback, the JU harmonises the report's style, adds supplementary content (such as an introduction, financial information, and project posters), and finalises the report's formatting.

The 2025 assessment covered 114 ongoing projects distributed across eight thematic pillars and 30 research areas, along with 28 projects from the 2024 call. The analysis was based on data and information from project deliverables, the Clean H2 Knowledge Hub, TRUST datasets, project websites, and event presentations.



The State-of-the-Art (SoA) analysis encompassed both quantitative and qualitative project achievements, including key performance indicators (KPIs) compared to 2024 SRIA targets, scientific publications, and networking activities among companies, key players, and organisations. The Tools for Innovation Monitoring were employed to capture these metrics, highlighting the project's key accomplishments. Furthermore, an examination of international progress in areas related to the programme's pillars was done to contextualise the findings and identify gaps in the programme, including projects facing challenges in achieving their objectives and areas where international advancements surpass current progress. Ultimately, recommendations were provided to address these gaps.

The 2025 JRC assessment did not provide a detailed description of each individual project. Instead, while the progress of single projects was evaluated, only those projects that had made substantial progress towards achieving their targets were specifically highlighted, primarily in the "Highlights" section of the report. Another difference between the 2025 Assessment and the previous year's report is the inclusion of Pillar-specific conclusions, in addition to the general conclusions and recommendations chapter. These Pillar-specific conclusions provide a summary of the key findings from the analysis, offering a more detailed overview of the results. To streamline the report and improve its concision, the assessment methodology has been published as a standalone document (JRC144376), allowing the main report to focus on key findings and results.

#### **JRC Contribution to assessment of sustainability of hydrogen and fuel cells**

In 2024, JRC continued to support the Clean Hydrogen JU by offering ongoing advice and delivering reports aimed at assisting the JU and its funded projects in evaluating, reporting, and mitigating the environmental impact of hydrogen technologies. In particular:

- Development of a methodology to quantitatively evaluate the quality of LCA deliverables produced by JU projects in collaboration with the EHS&CP.
- Reporting the outcomes of the regular review and assessment of the life cycle-based deliverables of all ongoing JU projects (i.e., spreadsheet with the review of each deliverable, and a summary of the main outcomes of the review).
- Reporting the outcomes of the application of the framework for assessing the social risk and impacts, including safety aspects, related to hydrogen technologies and their value chains to a case study (i.e., import of hydrogen to a European port).
- Reporting on the support JRC will provide to the activities of the EHS&CP.
- Support provided by JRC to the JU-funded projects HyPEF and NHyRA
- Developing Life Cycle Inventory (LCI) datasets and integrating hydrogen-related data into the Life Cycle Data Network (LCDN).

#### **JRC Contribution to safety, and safety awareness**

JRC has continued to work in 2025 on maintaining, updating and upgrading the public European Hydrogen Incidents and Accidents Database HIAD. This annual work consists of two parallel work streams targeting two objectives: (i) to guarantee continuity of business (continuous quality improvement, events collection, input and validation, engagement with the users, assessment and dissemination activities), and (ii) to prepare the uptake of ownership of the databases by the JU. The report describes the achievements of these two work streams in 2025.

## 1.6.4 Synergies

Following up on the 2024 audit report on operational synergies in the Clean Hydrogen Joint Undertaking by the EC's Internal Audit Service, the JU has initiated a tender to develop a synergies strategy to help the JU to prioritise and streamline its synergies activities in the current multiannual framework (2021-2027) and beyond. The contract was signed in July 2025 and by the end of 2025 the contractor has provided the draft of the Synergies strategy. In December 2025 the draft was shared for consultation with the State Representatives Group, Shareholders Group, European Commission, Hydrogen Europe and Hydrogen Europe Research. The final Synergies strategy will be endorsed in 2026. The Strategy will provide guidance for the JU in four areas of synergies priorities: to strengthen JU's synergy governance and intelligence, cross-partnership and cross-programme alignment, multi-level territorial cooperation and international cooperation.

### 1.6.4.1 Synergies at the programming level

This section explains how the synergies at the programming level, including activities to prepare new initiatives or calls for proposals were implemented during 2025.

#### **Synergies implemented via Call for Proposals**

Since the early stages of the preparation of the topics included in the call for proposals 2025, the Clean Hydrogen JU has interacted with the members of its Stakeholder Group and with a number of European partnerships and other entities responsible for different EU programmes. Given that only a limited number of European partnerships are represented under the Stakeholders Group – an advisory body to the Governing Board of the Clean Hydrogen JU – this cooperation took on different formats but managed to take all of their views into account, to the extent possible, in the design of the call for proposals. All these allowed to identify synergies (including with other European and even national programmes) although on an ad-hoc basis and to avoid potential overlaps during the drafting process of the Call. As a result, a number of the projects supported under the Call 2025 have included specific activities aiming to materialise these synergies<sup>25</sup>.

For Hydrogen valleys, applicants were encouraged to consider additional synergies with other Programmes (e.g. European Structural and Investment Funds, Recovery and Resilience Facility, Just Transition Fund, Connecting Europe Facility, Innovation Fund, Modernisation Fund, LIFE, etc.) and/or to cluster with other projects within Horizon Europe or funded under other EU, national or regional programmes, or projects with loans through the EIB or other promotional or commercial banks. As a

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<sup>25</sup> For more information on the synergies identified in the topics included in the Clean Hydrogen JU Call for Proposals 2025, see the Clean Hydrogen Partnership Annual Work Programme 2025



result, the proposals received under the Hydrogen valleys topics provided early funding and financing strategies including public funding, private organisations own funds and bank loans.

In addition, for Hydrogen Valleys topics in the Call 2026 the STEP Seal<sup>26</sup> (so called “Sovereignty Seal” under the STEP Regulation) will be awarded to proposals exceeding all of the evaluation thresholds set out in this Annual Work Programme. The STEP Seal is a label, which aims to increase the visibility of quality projects available for funding and help attract alternative and cumulative funding, and simultaneously to provide a potential project pipeline for regional and national programmes. The STEP Seal is focused on projects contributing to the development or manufacturing of critical technologies throughout the Union, or safeguarding and strengthening the respective value chains in clean and resource efficient technologies, including net-zero technologies.

In addition, the projects supported by the JU on the back of the Call for Proposals 2025 which started in 2025, have included specific activities in their Description of Actions, aiming to materialise the synergies identified in the Annual Work Programme 2025.

#### *1.6.4.2 Other synergies at programming level*

Outside the Call for Proposals, the Clean Hydrogen JU have exchange with other Commission services and partnerships, to better plan joint activities and identify opportunities for synergies. This included regular exchanges between the Clean Hydrogen JU and the Clean Aviation JU for the coordination of the activities that both JUs are implementing. Cooperation with EU rail has also continued in 2025 with ad-hoc exchanges on progress of FCH2RAIL project and H2 needs and issues in the rail sector. Furthermore, the JU had intensified its exchange with the Clean Energy Transition Partnership to broaden the collaboration.

In addition, the Clean Hydrogen JU has continued supporting Commission services as necessary. This includes continuous cooperation with DG CLIMA on EU competitiveness and knowledge sharing, DG ENER on follow-up hydrogen in ports study and support to implementation of the SET plan and DG RTD with support to work of Clean Hydrogen Mission of Mission Innovation. In 2025, the Clean Hydrogen JU also participated in the discussions of the Hydrogen technical group of the SET-Plan (see above under Policy). Regarding skills, the Clean Hydrogen JU has initiated an exchange with colleagues in DG EMPL, now responsible for the skills portfolio (including skills related to NZIA). This is of relevance in the context of the activities the Clean Hydrogen JU is supporting on education and training and in particular in the context of the Hydrogen Academy project supported by the Clean Hydrogen JU. In addition, during 2025, the Clean Hydrogen JU continued taking part as an observer of the Steering Committee of the European Clean Hydrogen Energy Alliance.

Of significance are the exchanges the JU had with the DG BUDG concerning the Strategic Technologies for Europe Platform. This led to the adoption of the STEP Seal as part of the Clean Hydrogen Partnership annual Work Program 2025 and has continued in 2026.

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<sup>26</sup> [https://strategic-technologies.europa.eu/about\\_en#paragraph\\_207](https://strategic-technologies.europa.eu/about_en#paragraph_207)



In 2025 the JU has also intensified its cooperation with Committee of the Regions, with the exchange on best practices for regional and cross-border H2 projects. CoR has also participated in 2025 edition of H2 Valley Days (24-25 June) and JU participated in the Regions Week (14-15 October 2025)

At the Member States level, the Clean Hydrogen JU has continued exchange with national representatives (e.g. German NOW, French ADEME) on key strategic areas such as Hydrogen Valleys, and also with representatives of other Member States, either via the Clean Hydrogen JU States Representative Group (SRG) e.g. feedback provided during the process of drafting the 2025 Clean Hydrogen JU AWP/Call or through bilateral exchanges.

#### *1.6.4.3 Collaborations with other programmes, agencies and partnerships to deliver synergies (at implementation level)*

In addition, in 2025 the exchange continued between H2020/HE projects on hydrogen releases (JU project NHyRA & CINEA project HYDRA)). Exchange with HADEA on Cluster 4 'Process4 Planet Partnerships' has also continued in 2025 at project officer level (e.g. attendance to KoMs, exchange of information on similar projects).

In 2025 the JU had an extensive exchange with the EIC on their experience with SMEs/start-ups to gain more insight for the development of the dedicated tender for the support of start-ups in the hydrogen sector (to be published in 2026).

#### *1.6.4.4 Supporting regions and Member States*

Cooperation with the Member States has continued in 2025 with exchanges in the JUs States Representative Group. In addition, the JU has continued with other types of consultation, such as on the informal opinion on the Call 2026 topics in June 2025 and opinion on the annual work programme 2026 in November 2025 (comments on topics, clarifications on the budget and additional support to hydrogen valleys and alignment with national strategies/support schemes).

Following the signing of 10 Memoranda of Cooperation with Regional and National Managing Authorities in 2024, in June 2025, the Clean Hydrogen Partnership organised the first meeting of this network, back-to-back with the second edition of the Hydrogen Valleys Days. The meeting included an update on the Clean Hydrogen Partnership strategy to work with regions and Member States (including Hydrogen Valleys), presentations by each managing authority on their ambitions and main challenges, and dedicated presentations by the regional Managing Authorities of Friuli-Venezia-Giulia, Italy, and Noord-Holland, The Netherlands, on their research infrastructure and overall hydrogen plans, respectively. The results highlighted the need for regular group meetings and reinforced the importance of bilateral discussions between each managing authority and the Clean Hydrogen Partnership.

At a network level, communication with the Managing Authorities included information on the opening of the call and info day, information on the public consultation on the next MFF, dissemination of the open call for Project Development Assistance under the Hydrogen Valley Facility, and advertising of the Hydrogen Week and the Clean Hydrogen Partnership's organised Innovation Forum.



Bilaterally, the JU has liaised with projects JIVE and JIVE 2 to support Slovenia's Managing Authority in preparing a hydrogen buses' project in the country. The JU has also participated in events organised by regional Managing Authorities, namely Friuli-Venezia-Giulia, in Italy, and Wielkopolska, in Poland.

In 2025, the Hydrogen Valleys (H2V) Facility kicked-off its activities. Funded by the Clean Hydrogen Partnership, the H2V Facility aims to unlock transformative support for Hydrogen Valleys progressing toward FID and for the broader hydrogen community. It supports the European Commission's target of having 50 valleys operational or under construction in the EU by 2030. The Clean Hydrogen Partnership has mandated Roland Berger, together with its consortium partners Worley and Inycom, to set up and implement this five-year project.

The H2V Facility provides dedicated non-financial support over five years through three pillars: 1) Project Development Assistance (PDA), 2) the H2V Knowledge Centre, and 3) the H2V Platform. In particular, in July 2025 a first Call for Applications for Project Development Assistance (PDA) programme for Hydrogen Valleys was launched (with a deadline of 19 September). The PDA services consist of tailored expert assistance, free of charge, to help advance Hydrogen Valleys in commercial, technical, regulatory and valley governance aspects towards the Final Investment Decision (FID). In total, the Clean Hydrogen Partnership received 36 applications for PDA support, from 18 EU and Horizon Europe countries. The PDA support for all selected 15 PDA Beneficiaries started in November. Results are still to be published. Also in 2025, the Hydrogen Valleys Facility saw also the launch of the Hydrogen Valleys Knowledge Centre to share knowledge and provide capacity building for Hydrogen Valleys and the broader hydrogen community. These activities will continue in 2026.

### **1.6.5 Regulations, Codes and Standards Strategy Coordination (RCS SC)**

The implementation of suitable and hydrogen-specific regulatory and enabling frameworks is crucial for the EU-wide deployment of hydrogen, fuel cells, and hydrogen-based technologies to meet the goals set out in the EU Hydrogen Strategy.

Whilst most of the Pre-Normative Research (PNR) activities in the JU Programme will be implemented as part of the activities within Horizontal Activity 1: Cross-cutting Issues (JU SRIA, Section 3.6), a strategic and coordinated approach is needed at the Programme level. To this end, the Clean Hydrogen JU set up in 2022 a Regulations, Codes and Standards Strategy Coordination (RCS SC) Task Force, composed of representatives of the European Commission, Hydrogen Europe and Hydrogen Europe Research secretariats, and the JU Programme Office.

The main goal of the RCS SC Task Force is the definition, coordination and monitoring of the strategy related to RCS within the Programme with the ultimate goal of increasing the EU impact in RCS development in Europe and beyond, with the focus, but not limited to, Standards.

In 2025, the RCS SC Task Force kept holding regular meetings in line with the tasks entrusted:

- I. Coordination for the identification of PNR needs of strategic importance in Europe that can be addressed as topics in the subsequent JU calls for proposals



- II. Design and deploy measures to increase the impact of the RCS/ PNR-related activities at the programme and the project level in standardisation.

Concerning the identification of PNR needs, in 2025, Task Force members continued reviewing relevant reports where different organisations flagged the gap/need for PNR activities relevant to hydrogen and fuel cell technologies in the EU, with the objective of identifying what priorities can be addressed within the JU Programme in the years to come. Besides, members of the Task Force were involved in the preparation of the JU Annual Work Plan 2026, in which one of the PNR needs identified by the RCS SC Task Force was selected as a priority, becoming a topic for the 2026 call for proposals (HORIZON-JU-CLEANH2-2026-05-02: Pre-Normative Research on hydrogen odourisation).

On the other hand, in 2025, the Task Force also continued assessing potential measures to increase the impact of the JU projects in the relevant RCS. In particular, activities in 2025 were focused on the implementation of a process concerning the projects' obligation to report up to 4 years after the end of the project if the results of the project have effectively contributed to European or international standards, and how to collect this information.

In conclusion, the RCS SC Task Force activities in 2025 contributed to better steering and coordination of the RCS-related matters in the JU, and increasing the impact of the JU Programme in this domain.

### **1.6.6 European Hydrogen Safety Panel (EHSP)**

The European Hydrogen Safety Panel (EHSP) initiative<sup>27</sup> was launched by the JU in 2017. The mission of the EHSP is to assist the JU both at programme and at the project level in assuring that hydrogen safety is adequately managed, and to promote and disseminate hydrogen safety culture within and outside of the JU Programme.

The EHSP is composed of a multidisciplinary pool of experts that collectively have the necessary scientific competencies and expertise covering the technical domain needed to make science-based recommendations to the Clean Hydrogen JU.

Following the signature of the service framework contract for the provision of support for coordinating and managing the EHSP at the end of 2024, awarded to IDOM CONSULTING, ENGINEERING, ARCHITECTURE S.A.U., and ARIEMA ENERGIA Y MEDIOAMBIENTE SL, in 2025, the EHSP and the secretariat have been set up alongside all the organizational aspects to keep delivering high-quality work.

Following up on a public Call for Expression of Interest, the EHSP members were selected and grouped in ad-hoc working groups (task forces) according to the tasks to be performed and to expertise. As a result, the EHSP in 2025 is composed of a group of 14 experts from 9 countries, who have been working in line with the work areas entrusted.

The following sections provide a summary of the activities performed by the EHSP over 2025, per task force.

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<sup>27</sup> [https://www.clean-hydrogen.europa.eu/get-involved/european-hydrogen-safety-panel-0\\_en](https://www.clean-hydrogen.europa.eu/get-involved/european-hydrogen-safety-panel-0_en)

### TF.1 Support at project level

ESHP activities under this category aim at coordinating a package of measures to avoid any accidents by integrating safety learnings, expertise, and planning in the JU-funded projects by ensuring that all projects address and incorporate the state-of-the-art in hydrogen safety appropriately.

In 2025, the EHSP activities were notably focused on the assessment of safety plans of JU-funded projects, covering 25 safety plans (initial and final) from 20 projects, and providing recommendations and guidance for their improvement where necessary. In addition, the EHSP also started with the review of the “Safety Planning and Management in EU hydrogen and fuel cell projects – guidance document”, for which a new and updated version is expected to be released in mid-2026. Besides, the EHSP continued providing support in case a project consortium did not have its own safety expertise or wished for an independent view. In this sense, for example, it is worth to mention the initial contacts with the HiWHyV project<sup>28</sup>, that will establish Sweden’s first large-scale hydrogen valley.

### TF.2 Support at programme level

EHSP works under this category include a set of activities intrinsically linked with the activities of the previous task force but with a broader and cross-cutting dimension, focused on the JU Programme itself and how safety-related aspects can be enhanced within the overall programme and activities.

The activities within this task force in 2025 were focused on developing a procedure for an incident response, aiming at providing a structured response to any incident or safety threat to a project. Besides, it has started contacts with key stakeholders, such as the International Association IA HySafe, in view of seeking synergies and topics of mutual interest.

### TF.3 Data collection and assessment

As learning from others is an essential element of a high-level safety culture, activities in this category are centred on the collection and analysis of hydrogen safety-related data to derive lessons learned and provide further general recommendations to all stakeholders

In 2025, in close collaboration with the JRC, the EHSP activities were focused on the improvement of the HIAD 2.1 database structure, in particular, on the definition of several new identifiers associated with the revamped structure of the online database to be hosted in the JU knowledge hub (the so-called HIAD 3.0). In addition, the EHSP started with the assessment of the data contained in the database in view of publishing a new document, in mid-2026, with the “Statistics, lessons learnt and recommendations from the analysis of the Hydrogen Incidents and Accidents Database (HIAD)”. Besides, the EHSP also started to update the lists of the phenomenological models, risk assessment approaches, and computational fluid dynamics (CFD) models for hydrogen safety engineering applications developed from JU projects and elsewhere relevant to fuel cells and hydrogen technologies, which will be published in 2026 as an updated version of the “Hydrogen Safety Engineering - Guidance document”.

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<sup>28</sup> <https://cordis.europa.eu/project/id/101251367>



#### TF.4 Public outreach

Framed within the context of the intended broad information exchange, in 2025 the EHSP has concluded its communication strategy for the years to come. This internal document outlines clear and measurable communication goals and objectives, provides an analysis of the target audience for communication, prioritised by groups, etc. It also provides a summary of relevant communication channels and a list of key messages.

In addition, the EHSP worked on the new visual identity and dedicated EHSP webpage<sup>29</sup>, which is meant to become the main gateway to the EHSP, its members and activities, documents, etc., acting as one of the main channels for communication and interaction with the panel. Last, outreach activities of the EHSP in 2025 included a presentation at the EU Hydrogen Research and Innovation Days (24-25 November 2025).

### 1.6.7 European Hydrogen Sustainability and Circularity Panel (EHS&CP)

The European Hydrogen Sustainability & Circularity Panel (EHS&CP) was established in February 2024 to enhance the integration of sustainability and circularity (S&C) principles into hydrogen technologies. The EHS&CP, composed of 15 independent experts, was managed on behalf of the Clean Hydrogen Partnership by few consulting partners led by Ecorys Europe together with TNO and Grant Thornton.

The Panel **concluded its first mandate in the first half of 2025**. During this period, it developed a common understanding of the relevant EU policy and regulatory framework and assessed the extent to which sustainability and circularity were reflected in the JU SRIA, call topics and the JU-funded projects. The Panel's work highlighted key risks and trade-offs linked to large-scale hydrogen deployment—particularly reliance on critical raw materials (e.g. platinum and iridium), as well as local water-use and land-use considerations—and proposed indicator sets and a multi-objective approach to support balanced decision-making across cost, emissions, circularity and socio-environmental impacts. Collaboration with institutions such as the Joint Research Centre (JRC) supported the further refinement of the sustainability framework and its applicability to JU-funded projects.

Stakeholder engagement was a central element of the Panel's activities. Three internal workshops were organised to support the Panel's work, with the final workshop taking place in January 2025. In addition, the Panel's activities and preliminary findings were presented in a public workshop organised in May 2025, which included contributions from Panel members as well as the JRC, DG RTD and JU-funded projects. The Panel's key findings, identified gaps and strategic recommendations are summarised in the **final report published** on the Clean Hydrogen JU website.

Building on the achievements and lessons learned from the first mandate, and with the intention to continue the Panel's activities for up to four years, the Clean Hydrogen JU launched a **new public tender**

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<sup>29</sup> <https://ehsp.eu/>



in May 2025 (CLEANH2/2025/OP/0002). Ecorys Nederland B.V., in consortium with Grant Thornton, has been contracted to set up and coordinate the renewed EHS&CP, with the relevant framework contract being signed in October 2025. The first step under the new contract is the launch of a call for expression of interest to define the Panel composition based on the required expertise. The Panel is expected to be re-established and resume its activities by Q1 2026. Updates on the Panel's activities are published on the Clean Hydrogen JU website.

### 1.6.8 International Cooperation

As the deployment of fuel cells and hydrogen technology is carried out globally and key stakeholders of the Clean Hydrogen JU are involved in these developments, the establishment of links with other major hydrogen related programmes globally and with international organisations monitoring the developments in the hydrogen sector is important.

In 2025, the Clean Hydrogen JU in agreement with European Commission representatives continued to participate in the IEA Hydrogen Technology Collaboration Programme (TCP) **Task 42 on Underground Hydrogen Storage**, on **Task 41 'Analysis and Modelling of Hydrogen Technologies'**, and is now a member of the Task 49 'Natural Hydrogen', and **participated in the definition of Tasks on 'Renewable Hydrogen' and 'Hydrogen Export value chains'** and presented at the TCP Advanced Fuel Cell workshop on 'Fuel Cell Applications for Maritime Sector'.

In addition, in June 2024, on the occasion of the Japan-EU Hydrogen High-Level Business Forum, a cooperation agreement between the Clean Hydrogen Partnership and the New Energy and Industrial Technology Development Organization (NEDO) of Japan was signed<sup>30</sup>. The agreement explores the possibility of synergies and promoting joint research and demonstration projects and is expected to promote the collaboration between research centres and industries in Europe and Japan. As a first follow-up, a first workshop was organized as a side event of the Hydrogen Week in November 2024, to discuss detailed ideas for possible collaborations in the field of electrolysis as a mutual area of interest.

In 2025, the Clean Hydrogen Partnership and the **New Energy and Industrial Technology Development Organization (NEDO)** strengthened their cooperation by hosting a high-level workshop in Kobe<sup>31</sup> on 26 March 2025, focusing on the future of hydrogen and ammonia combustion technologies.

Building on the cooperation agreement<sup>32</sup> signed in Tokyo in June 2024, the workshop brought together leading researchers, industry representatives, and policymakers from Europe and Japan. The event

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<sup>30</sup> [https://www.clean-hydrogen.europa.eu/media/news/clean-hydrogen-partnership-signs-cooperation-agreement-japans-nedo-2024-06-03\\_en](https://www.clean-hydrogen.europa.eu/media/news/clean-hydrogen-partnership-signs-cooperation-agreement-japans-nedo-2024-06-03_en)

<sup>31</sup> [https://www.clean-hydrogen.europa.eu/media/news/advancing-hydrogen-combustion-technologies-through-international-collaboration-2025-03-26\\_en](https://www.clean-hydrogen.europa.eu/media/news/advancing-hydrogen-combustion-technologies-through-international-collaboration-2025-03-26_en)

<sup>32</sup> [https://www.clean-hydrogen.europa.eu/media/news/clean-hydrogen-partnership-signs-cooperation-agreement-japans-nedo-2024-06-03\\_en](https://www.clean-hydrogen.europa.eu/media/news/clean-hydrogen-partnership-signs-cooperation-agreement-japans-nedo-2024-06-03_en)



highlighted the strategic importance of international collaboration in advancing hydrogen combustion technologies and scaling up sustainable energy solutions.

As the second major workshop organised under the cooperation agreement, it provided a platform to exchange knowledge and explore innovative pathways for clean hydrogen and ammonia combustion, reinforcing the value of cross-border cooperation in addressing global climate and energy security challenges.

During the event, eight hydrogen combustion projects funded by the Clean Hydrogen Partnership were presented, representing €33.15 million in investment and demonstrating Europe's commitment to advancing hydrogen innovation across multiple Technology Readiness Levels (TRLs).

The workshop illustrated how sustained cooperation between Europe and Japan can accelerate progress in clean hydrogen technologies and highlighted the Clean Hydrogen Partnership's role in connecting regions, industries, and research communities to support shared climate and energy goals.

### **1.6.9 Openness**

In addition to the cooperation and synergies mentioned in the above sections, specific activities were included to preserve the openness of the Clean Hydrogen JU activities in line with the SBA and the Clean Hydrogen JU strategic document, SRIA.

More specifically, the Clean Hydrogen JU continued its usual practice of making no exception to the 'open calls' principle, and the call of 2025 followed this same approach.

As per the rules stated in the Horizon Europe Regulation<sup>33</sup>, any legal entity, regardless of its place of establishment and including legal entities from non-associated third countries or international organisations, may participate in actions under the Programme, provided that the conditions laid down in the Horizon Europe Regulation have been met together with any conditions laid down in the work programme or call for proposals.

In particular, the call for proposals in the AWP 2025, including evaluation and award procedures, were managed according to, and the proposals complied with, the General Annexes to the Horizon Europe Work Programme 2025-2026 that applied *mutatis mutandis* to the call covered in the AWP 2025 (with limited exceptions introduced in specific topic conditions as explained below).

In line with the SBA, one additional condition was included for some specific topics that at least one beneficiary in the consortium must be a member of one of the Clean Hydrogen JU private Members (i.e. Hydrogen Europe or Hydrogen Europe Research). This requirement concerned only those topics targeting activities where the industrial and research partners of the Clean Hydrogen JU were seen to apply a key role, such as large-scale demonstrations, ensuring a balance between commitment from

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<sup>33</sup> Regulation (EU) 2021/695 of the European Parliament and of the Council of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013 (Text with EEA relevance). OJ L 170, 12.5.2021, p. 1–68



partners and openness. This specific condition was applied to in accordance with the SRIA of the Clean Hydrogen JU, as described under its *Section 5.2. Conditions for participation and eligibility for funding*.

Note that none of these additional conditions changed the open nature of the call.

Furthermore, the JU continued to apply a number of measures to attract newcomers to the Clean Hydrogen JU activities, as follows:

- Concerning the call for proposals, in addition to the general Info Day organised in Brussels, that was widely advertised, easy to access and register, as well as the possibility to follow online or watch the recording afterwards, several dedicated (national) Info Days took place in different countries, including those with a history of limited participation in EU R&I programmes.
- In addition, the JU has regularly updated the Hydrogen Valleys S3 Partnership<sup>34</sup>, on the funding opportunities in the JU Call for Proposal, with a view to expanding the European regions interested to benefit from the JU support for Hydrogen Valleys.

## **1.7. Progress against Key Impact Pathways and JU's Key Performance Indicators**

### **1.7.1 Progress against Horizon 2020 legacy Key Performance Indicators**

The legal basis of Horizon 2020 specified a list of compulsory Key Performance Indicators to be taken into account in its evaluation and monitoring system. They were intended to provide a solid and coherent basis for the monitoring and evaluation system of Horizon 2020, coupled with the focus on measuring the results and impacts of the Programme. In addition, the legal basis indicated a list of 14 cross-cutting issues that serve to monitor basis Horizon 2020 programme implementation on an annual and which were reported in the Annual Horizon 2020 Monitoring Report.

In terms of the scoreboard of common KPIs (Annex 5.6), the indicators reflecting the impact and outcomes of the H2020 Programme have been steadily increasing. There were 166 more publications in peer-reviewed journals, and there were 2 more patents awarded while there are still 6 patent applications pending. New products, processes, methods and prototypes continue to be reported, reaching a total of 722 prototypes, a marginal increase from previous reporting.

In contrast, SME indicators show a decline compared with 2024: turnover decreased from EUR 7,788.6 million to EUR 1,802.4 million, and employment from 82,877 to 18,641 employees. This may reflect the closure of H2020, with only a few ongoing projects still reporting results.

As expected for a research funding programme, many impacts materialise in the first years after project completion. Indicators for cross-cutting issues (Annex 5.5.2) have largely stabilised post-H2020, as they concern mainly call participants and Clean Hydrogen JU beneficiaries.

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<sup>34</sup> [Inforegio - Hydrogen Valleys S3 Partnership](#)

## 1.7.2 Progress against General Horizon Europe Key Impact Pathways Indicators (KIPs)

Horizon Europe (HE) incorporates a novel approach to capturing and communicating impacts via the Key Impact Pathways (KIPs)<sup>35</sup>. The objective of this approach is to enable policy makers and the wider public to gain regular insights into the effects and benefits of the Programme over time in relation to European science, economy and the wider society.

The nine Key Impact Pathways<sup>36</sup> cover areas of scientific, societal and technological/economic impact. A full list of these KPIs can be found in the table of Section 6. The KIPs do not aim to represent the full set of pathways that can lead to impacts of the Framework Programme – which would, in most cases, be non-linear – but instead they reflect key dimensions on which information is collected over time to track and report progress. All of the KIPs focus on the impact of the Horizon Europe Programme as a whole.

The Key Impact Pathways are designed to enable continuous insights even after the end of funded activities without requiring input from beneficiaries. They are inherently time-sensitive and monitor impact across the short, medium, and long term. Given that research and innovation (R&I) results often emerge well after project completion, this forward-looking approach is essential for capturing the full extent of programme impact over time and assessing the long-term effectiveness of the R&I framework.

Within this framework, the performance of the Clean Hydrogen JU illustrates how these indicators translate into measurable outcomes.

In terms of **scientific impact**, Clean Hydrogen produced 59 peer-reviewed articles between 2023 and 2025 (peak year, 2024), demonstrating strong research productivity across the project lifecycle. In the area of human capital development, the programme supported 2,092 researchers in various upskilling activities. One of the major strengths is its use of open science practices, with 82.93% of research outputs available through open access or fully open access, and 100% of research datasets made available via fully open access, which aligns closely with the principles of Horizon Europe.

Regarding **societal impact**, Clean Hydrogen JU shows strong alignment with European policy priorities and global challenges. Approximately 39% of projects contribute to EU policy priorities, 38% to the Sustainable Development Goals (SDGs), and 57% are climate-relevant, highlighting the programme's strategic contribution to the EU's climate agenda. In addition, 45.78% of projects involve citizens or end-users in co-creation activities, reflecting a relatively high level of societal engagement, although further expansion could enhance impact. Key Impact Pathway 5 (R&I missions) does not apply to the JU, and no data has been reported in relation to this pathway.

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<sup>35</sup> The General HE KPIs are available here: Regulations establishing HE - Annex V (page 65) <https://eur-lex.europa.eu/eli/reg/2021/695/oj>

<sup>36</sup> For a more detailed description and methodology of the KIPs see: European Commission, Directorate-General or Research and Innovation, Nixon, J., Study to support the monitoring and evaluation of the framework programme for research and innovation along key impact pathways: indicator methodology and metadata handbook, Nixon, J. (editor), Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2777/44653>



In terms of **technological and economic impact**, the programme has generated 54 innovative outputs across products, processes, and methods, with product innovation representing the largest share. However, no intellectual property rights (IPR) applications were reported. The programme supported approximately 981 full-time equivalent jobs, demonstrating a strong contribution to employment. Furthermore, it mobilised around €957 million in co-investment between 2022 and 2025, largely representing beneficiaries' own financial contributions. This highlights a strong leverage effect and the capacity of the programme to stimulate significant additional investment beyond EU funding.

In summary, Key Impact Pathways present the quantitative results of Clean Hydrogen JU projects across scientific, societal and technological/economic dimensions. This data shows how project output and activity were reported over time, and contributes to the overall monitoring of Horizon Europe.

### 1.7.3 Progress against HE Common JUs Key Performance Indicators

Horizon Europe introduces common criteria for all Partnerships:

- Directionality and Additionality;
- International visibility and positioning;
- Transparency and Openness;
- Coherence and Synergies;
- Flexibility of implementation.

An independent Commission Expert Group has developed a set of indicators to monitor progress towards the performance of European Partnerships, including the Clean Hydrogen JUs, in relation to these criteria. The common indicators are complementary to the KIPs and individual partnership KPIs.

In its first interim report<sup>37</sup>, the Expert Group focused on developing a framework on reporting and monitoring the progress made by all forms of European partnerships – individually ('partnership-specific indicators') and as a whole ('common indicators'), while making sure it is aligned with the Horizon Europe monitoring system and its Key Impact Pathways.

In particular, the Expert Group has proposed a set of Horizon Europe Common JU KPIs, including recommendations to make them operational, such as methodologies and the identification of the data required to monitor these indicators. The aim of these indicators is to monitor quantitative and qualitative information and aspects, which should be able to capture the full value the partnerships, an aspect not well developed in the past. This framework should enable monitoring across the partnerships landscape and allow their evaluation as an integral component of Horizon Europe and put into perspective with other Horizon Europe modalities and instruments. This will allow to assess European Partnerships and their impact in their proper policy context.

On May 2024 the Commission released its Biennial Monitoring Report 2024 on Partnerships under Horizon Europe (BMR 2024)<sup>38</sup>. The report provides an overview of the new Partnership landscape

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<sup>37</sup> A robust and harmonised framework for reporting and monitoring European Partnerships in Horizon Europe, 2021, RTD, [https://horizoneuropencportal.eu/sites/default/files/2022-05/ep\\_m-fanza.pdf](https://horizoneuropencportal.eu/sites/default/files/2022-05/ep_m-fanza.pdf)

<sup>38</sup> [Performance of European partnerships - Publications Office of the EU](#)



under Horizon Europe and establishes the basis for assessing the partnerships' progress in future reports.

The reporting on the HE Common JU KPIs can be found in the table of Annex 5.7. The methodology followed was based on the guidance of DG R&I in 2023, provided through a series of four meetings dedicated for this purpose. The subsequent sections provide additional qualitative information for the reported indicators, split by the criterion they address.

### *1.7.3.1 Additionality*

The main added value of European Partnerships derives from the additional private and/or public R&I investments in EU priorities (additionality) that can be translated into a leverage effect resulting from the Union intervention. The alignment of these investments and contributions with common objectives (directionality) and the achievement of impacts that cannot be created by other Horizon Europe or national actions alone are a main justification for using a partnership approach.

There are two HE Common JU KPIs measuring the criterion of additionality, KPI-1 on the progress towards contributions from partners other than the Union and KPI-2 on additional investments triggered by the EU contribution, as presented in Annex 5.7.

For KPI-1 on Additionality, detailed information is provided in Section 1.2.4 'Information on quantitative and qualitative leverage effects.

In terms of KPI-2, the Clean Hydrogen JU supports three activities that aim to deliver additional investments:

1. Technical Assistance Study<sup>39</sup>;
2. Project Development Assistance Study<sup>40</sup>;
3. Provision of Seals of Excellence to successful Hydrogen Valley projects that could not be funded by the Clean Hydrogen JU.

These actions are described in more detail in Sections 1.6.3.1 and 1.6.3.3.

### **Directionality**

Directionality addresses the focus of EU funding through the partnerships, but also the level of partnership alignment with the EU policies and priority areas and how the partnership contributes towards them.

There is one HE Common JU KPI measuring the criterion of directionality, KPI-3 on overall investments mobilised towards EU priorities, as presented in Annex 5.7. This indicator shows that 100% of the overall investment is mobilised towards the Green Deal and Europe's 2030 climate ambition.

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<sup>39</sup> <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=11585>

<sup>40</sup> <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=9759>



### *1.7.3.2 International visibility and positioning*

The partnerships act as global ambassadors for the European R&I system. They establish global relevance and achieve scientific and technological reputation in the international context and serve as hubs for international cooperation, where appropriate. To this end, it is expected that there should be a minimum level of international cooperation at partnership and project level, resulting in visibility for the European Partnership.

The activities of the Clean Hydrogen JU in relation to international cooperation are presented in detail in Section 1.6.7.

There are two HE Common JU KPIs measuring the criterion of international visibility and positioning, KPI-4 on international actors involved and KPI-11 on the visibility of the partnership in national, European and international policy/industry cycles, as presented in Annex 5.7.

In terms of KPI-4, a very large number of actors were involved in the activities of the Clean Hydrogen JU, be it participation in proposal submissions, following events and workshops organised by the Clean Hydrogen JU or reading its publications. As this is a newly introduced KPI, the Clean Hydrogen JU can only report (like last year) only on the available data of total number of international applicants to the Clean Hydrogen JU Calls, which as can be seen in Annex 5.7, just for Calls 2022, 2023, 2024 and 2025, this has already exceeded the total number of international applicants over all FCH 2 JU Calls.

In terms of KPI-11, the Clean Hydrogen JU has organised or participated in a number of international and national events. It also produced and published different publications and supported hydrogen related web platforms to promote its work, increase its visibility and strengthen the public awareness of hydrogen technologies, obtaining a synergic effect. It has also obtained visibility through the media opportunities throughout various countries and increased social media efforts across different channels. The activities are summarized in Table 47 of Annex 5.7 and described in more detail in Section 2.1.

### *1.7.3.3 Transparency and openness*

A European Partnership should aspire to be open and serve the interests of all relevant stakeholders. Consequently, the implementation of the partnership should include regular activities that allow new players to enter, participate in and benefit from its activities.

There are three HE Common JU KPIs measuring the criterion of transparency and openness, KPI-5 on the share and type of stakeholders and countries engaged, KPI-6 on the number and types of newcomer members in the partnership and KPI-7 on the number and types of newcomer beneficiaries, as presented in Annex 5.7.

As regards KPI-5, a large number of stakeholders from different countries and of different types were invited to and engaged in activities of the Clean Hydrogen JU, be it through participation in proposal submissions and projects, being members of the governance structure of the Clean Hydrogen JU or participating in the panels and groups supported by the Clean Hydrogen JU. In terms of reporting, the



Clean Hydrogen JU reports (similar to last year) only on the total beneficiaries to the Clean Hydrogen JU Calls so far (i.e. Calls 2022, 2023, 2024 and 2025), including the type and country of origin of the beneficiaries. As can be seen in the tables in Annex 5.5, the Clean Hydrogen JU already has 3507 beneficiaries from 73 countries, compared to the 1505 FCH 2 JU beneficiaries from 48 countries. The fact that in just its first 2 years the Clean Hydrogen JU has almost the same amount of beneficiaries as the whole FCH 2 JU Programme and with the participation of 25 more countries, confirms the high interest in the Clean Hydrogen JU Programme. In terms of the types of beneficiaries, there has been a change in participation since 2024, which can be attributed to the Hydrogen Valley topics that were included in Call 2022-2, Call 2023, Call 2024 and Call 2025. For these topics, there were high levels of interest from public organisations and other organisation types (apart from private companies, research centres and higher education schools), which lead to a higher number of participants than the whole FCH 2 JU Programme. This increased participation came with the loss of the participation of research centres and higher education schools.

In terms of KPI-7, in the past FCH 2 JU exhibited a very high number of new beneficiaries in funded projects, something expected considering the emerging hydrogen sector. More than 55% of the total beneficiaries of FCH 2 JU were new beneficiaries. Nevertheless, it is interesting to see that the Clean Hydrogen JU continues to attract new beneficiaries: more than one third of its beneficiaries in Calls 2023 and 2024 were new, with two thirds of them being new private for-profit companies.

KPI-6 'Transparency and openness' is not applicable to the Clean Hydrogen JU in its current definition as the Clean Hydrogen JU's membership is defined and fixed Article 75 of SBA. The actions of the Clean Hydrogen JU, especially the calls for proposals, are fully open.

#### *1.7.3.4 Coherence and synergies*

Partnerships do not act in isolation but in the broader landscape of R&I and sectoral policies. In order to improve their additionality and directionality, European Partnerships should seek and exploit synergies with related Horizon Europe and other Union initiatives as well as national/sectorial initiatives.

The activities of the Clean Hydrogen JU in relation to coherence and synergies are presented in detail in Section 1.6.3.

There are three HE Common JU KPIs measuring the criterion of coherence and strategies, on the number and type of coordinated and joint activities with other European Partnerships (KPI-8) and with other R&I initiatives (KPI-9), as well as KPI-10 on the complementary funding from other Union funds, as presented in Annex 5.7. Moreover, KPI-2 described under additionality also contributes to the measuring of this criterion.

KPI-8 reports on the number and type of coordinated and joint activities with other Partnerships. The Clean Hydrogen JU has been collaborating with all relevant Partnerships on an ad-hoc basis, starting with the identification of possible synergies already in its SRIA. Moreover, it has been participating with other Partnerships in the inter-partnership assembly and working together with the other JUs in the implementation of the back-office arrangements, while a number of Partnerships are participating in its Stakeholder Group.



The Clean Hydrogen JU has also collaborated with two other Partnerships—Clean Aviation, and Zero Emission Waterborne Transport on preparation of joint topics for 2026 call for proposals. The Clean Hydrogen JU has also continued participation in activities concerning hydrogen projects supported under the Process4Planet Partnership (P4P) managed by HADEA.

KPI-9 reports on the same topic, but for other R&I initiatives at EU, national, regional and sectorial levels. In terms of funding, a number of Hydrogen Valleys projects have been signed (which by definition require synergies with other sources of funding), but most of the H2 valley projects are still in the early stages and their funding plans are still not confirmed in practice. However, there are a few examples of JU's projects co-funded from other sources, such as EPHYRA (co-funded from the Greek Recovery and Resilience Facility) and DJEWELS (co-funded from Dutch Waddenfonds).

A number of joint activities, in the form of ad-hoc collaboration, were performed with CINEA. A joint event was organised to formalise the collaboration between the Clean Hydrogen JU H2-ACCELERATE-TRUCKS project (deployment of 150 trucks) and several HRS projects supported by CEF-T, to formalise the collaboration among these projects. Also with CINEA, there was coordination during the grant agreement preparation of two related and interlinked projects looking at hydrogen releases in the atmosphere. The Clean Hydrogen JU continued its collaboration with EIC on activities looking at the production of hydrogen using renewable energy sources, including the co-organisation of a June 2023 workshop on the use of seawater for renewable hydrogen production. In relation to the Innovation Fund, the Clean Hydrogen JU and its projects participated in workshops on "hydrogen knowledge sharing", creating synergies between these projects and the Innovation Fund.

In terms of other coordinated and joint activities, in addition to the ones reported in AAR 2024, there were joint activities with the Marie Skłodowska-Curie actions (MSCA) Staff Exchanges programme. In addition, the Clean Hydrogen JU has fulfilled ad-hoc requests for participation, including participation in events organised by ERA-LEARN and provided regular updates for the Energy and Managing Authorities Network of the European Commission and for the Hydrogen Valleys S3 Partnership. Finally, in collaboration with Mission Innovation 2.0, the Clean Hydrogen JU has continued to support the activities of the Hydrogen Valley platform. It currently features 90 hydrogen valleys worldwide, of which 60 are in Europe. In 2025, also collaborated with the European networks of Horizon Europe National Contact Points Greenet and NCP\_WIDERA.NET, who co-organized a pitching session focused on Hydrogen Valleys during the Hydrogen Week.

In terms of KPI-10, there are no validated qualitative data to report yet, as the first grants from Call 2022 were only signed in December 2022, although – as mentioned above - significant complementary funding is expected, at least for the Hydrogen Valleys funded by the Clean Hydrogen JU.

## **1.7.4 Progress against JU-specific Key Performance Indicators**

### *1.7.4.1 Resources (input), processes and activities*

In its first few years of activity the Clean Hydrogen JU took a number of actions and performed a number of activities, in line with its operational objectives and additional tasks described in the SBA, in order to put in place the building blocks for the specific and general objectives of the Clean Hydrogen JU. Three broad areas of activities are identified in the SRIA and the Clean Hydrogen JU's Strategy Map:

- Supporting climate neutral and sustainable solutions



The Clean Hydrogen JU has aligned its work with its new objectives by using the majority of its Horizon Europe Calls for Proposals budget to support sustainable solutions. Already the budget of the projects supported by the Clean Hydrogen JU that have research objectives related to either end-use solutions in hard to abate sectors or on circular and sustainable solutions has reached 32% and 14% respectively of the total JU budget (including REPowerEU, so of the EUR 1.2 billion), surpassing the related targets for 2025.

- Research and Innovation for hydrogen technologies

More than half (71 of 116) of the projects of the Clean Hydrogen JU are low TRL projects (TRL 2 or 3) and have already reached 17% of the total JU budget. It is worth mentioning that this is already 30% higher than the 10% minimum budget allocation set out in the SRIA, and thus this target is expected to be significantly surpassed.

At the same time, another 6 grants were signed with demonstration or flagship projects (TRL 7 or 8), corresponding to 37% of the total Clean Hydrogen JU budget. This shows that the Clean Hydrogen JU focuses on both sides of the TRL scale, the early research side having plentiful low TRL projects and the demonstration side using a significant part of the budget.

- Supporting market uptake of clean hydrogen applications

The Clean Hydrogen JU performed a number of activities related to the monitoring of technology progress and economic and societal barriers to market entry, as part of its knowledge management activities. These are described in Section 1.5.1.

Moreover, it contributed to the development of regulations and standards, under the Commission's policy guidance and supervision, and supported the Commission, including through technical expertise, in its international initiatives on the hydrogen strategy. These are described in Sections 1.6.4 and 1.6.7.

Additionally, there are three projects related to education and training including hydrogen valleys which foresee such activities.

#### *1.7.4.2 Outcomes*

The activities planned and implemented through the Programme aim to achieve the two sets of specific objectives, as defined in the SBA. They both focus on the acceleration of the transition towards the goals set by the Green Deal, the enhancement of the research and innovation ecosystem, including SMEs and involving stakeholders in all MS, as well as the delivery of innovative technology solutions and their uptake by the market, with a view to local, regional and Union-wide deployment. The specific level objectives of the Clean Hydrogen JU identify what should be the main direct outcomes and results from the activities of the Clean Hydrogen JU. These should be contributing to the general level impacts of the Clean Hydrogen JU.

The specific objectives of the Clean Hydrogen JU were translated into five specific-level outcomes in the Clean Hydrogen JU's Strategy Map. The first two are:

- Limiting environmental impacts
- Improving cost-effectiveness



These two outcomes are linked to the R&I results coming from the projects. As the first grants were only signed in December 2022, no results are available yet to show the progress towards these objectives.

- Synergies with other partnerships

The Horizon Europe Programme places a lot of emphasis on developing synergies between EU Partnerships & Programmes, but also with Regional and National Programmes. Clean Hydrogen JU has been very active in setting up such synergies and collaborating with various Programmes. The related actions are presented in detail in Section 1.6.3.

In terms of the specific KPI following the progress in this area, the first synergy - between the Clean Hydrogen JU and CEF - has been materialised, within the H2Accelerate TRUCKS project and CEF. Together with the 18 grants given to hydrogen valleys, the number of synergies has already reached 19 surpassing even the 2025 target.

- Increasing Public Awareness

Increasing public and private awareness, acceptance and uptake is a key objective of the Clean Hydrogen JU. A public opinion survey was conducted in 2022 to examine public awareness and perception of hydrogen. The section 2.1 contains all the relevant details.

- Reinforcing EU scientific and industrial ecosystem, including SMEs

The Clean Hydrogen aims to strengthen the knowledge and capacity of scientific and industrial actors along the Union's hydrogen value chain, while supporting the uptake of industry-related skills.

The inherited JU projects (73) continue to show increased activity in terms of academic and research results. In 2025 there was an almost equal number of publications (166 in total) in peer-reviewed journals from the Clean Hydrogen JU projects, as well as 2 more patents were approved, bringing the total of patents approved to 25, while 12 more pending approval.

Regarding trainings, outcomes are closely linked to the R&I results generated by the projects. As the first projects on education and training were only launched in 2023, no measurable results are yet available. Nevertheless, the total number of people trained across all categories over the JU's lifetime has reached 6,200.

In terms of the reinforcement of the industrial ecosystem and the specific KPI monitoring this, despite Call 2022-1 not including any projects promoting cross-sectoral solutions, Calls 2022-1, Call 2023 and Call 2024 led to 26 such grants being signed, 18 of them being hydrogen valleys. This way the target of 2025, of 15% of the total Clean Hydrogen JU budget being directed in such solutions, has almost already been met.

### 1.7.4.3 Impacts

The Clean Hydrogen JU is expected to contribute towards a number of EU policy objectives related to the clean energy transition and climate neutrality, most notably towards the Green Deal and the Hydrogen Strategy.

The set of KPIs under “impact” report the progress of the hydrogen sector at the EU level, to which the Clean Hydrogen JU is contributing. Targets for KPI-14 to KPI-17 are based on the related ambition set in the EU’s Hydrogen Strategy. Targets for KPI-18a and KPI-18b are based on current trends and expectations for the sector, while KPI-18c reflects the 2025 target mentioned in the Joint Declaration signed between the European Commission and the European electrolyser manufacturers in May 2022. For this set of KPIs, the status refers to Europe as a whole and not on the individual actions of the Clean Hydrogen JU, helping to identify where more effort should also be placed by the Clean Hydrogen JU in the coming years. For all the KPIs, the source of the reported values is the European Hydrogen Observatory.

Considering these general objectives and placing them in the context of the macro level objectives of the Horizon Europe Programme related to major societal challenges, led to the following three major areas that the Clean Hydrogen JU should have an impact on, according to its Strategy Map:

- Action against climate change by drastically reducing greenhouse gas emissions

The development and scale-up of hydrogen technologies, replacing existing fossil use, will unquestionably have an impact on the reduction of greenhouse gas emissions. In order to assess the possible impact of supporting such activities, the Clean Hydrogen JU developed a complex methodology with the contractor of the European Hydrogen Observatory to calculate the expected avoided emissions. For the moment the indicator is off-track, as generally the deployment of hydrogen technologies in Europe is lagging behind to the ambitious EU targets.

- Transition to a clean energy system with renewable hydrogen as one of its main pillars

The EU’s hydrogen strategy (74) has put forward a comprehensive framework to support the uptake of renewable and low-carbon hydrogen to help decarbonise the EU in a cost-effective way and reduce its dependence on imported fossil fuels. Among its major targets, it set as strategic objectives to install at least 6 GW of renewable hydrogen electrolyser in the EU and the production of up to 1 million tonnes of renewable hydrogen by 2024, and 40 GW and 10 million tonnes respectively by 2030.

The Clean Hydrogen JU’s activities will particularly contribute towards these two areas, considering the significant focus on both hydrogen production and hydrogen end-use (which is necessary to make the increase in the hydrogen production meaningful) and on the necessary distribution and storage of hydrogen.

The two indicators selected in the strategy map to best monitor the progress towards these goals are the deployment of electrolyser and the market uptake of clean hydrogen. The KPI values reported in Section 5 - and thus KPI 14 which is directly linked to them - are off track, as despite the ambitiousness of the Hydrogen Strategy, hydrogen technologies require more time and research to be ready for commercialisation and scaling up. Nevertheless, the significant funding planned from the European Hydrogen Bank and other European, regional and national instruments may be able to turn this around in the coming years. This can be further supported by the activities of the Clean Hydrogen JU. Although

it may have a limited direct impact on these deployment figures due to its small budget and large ambition, the JU can play an important role in increasing the technology readiness of the hydrogen solutions, allowing their faster market uptake.

- Emergence of a competitive and innovative European hydrogen value chain.

The third area that the Clean Hydrogen JU actions should contribute to is the emergence of a competitive and innovative European hydrogen value chain. The total costs of hydrogen in end-uses should be significantly reduced to make hydrogen competitive as a fuel. This will be partly achieved by improving the performance of the hydrogen technologies, but also by scaling-up production and increasing the size of the sector across the value chain.

For this reason, two indicators in the strategy map will be used to monitor progress in this area, both developed in collaboration with the contractor of the European Hydrogen Observatory. The first indicator looks at the cost of producing renewable hydrogen, while the second looks at the developments in the sector in terms of the numbers of active companies and projects in the pipeline and electrolyser manufacturing capacity. Based on the latest statistics and trends / announcements, all indicators are either on track or expected to be on track in 2024.

## 1.8. Dissemination and information about project results

Closely aligned with the knowledge management objectives, the monitoring of the dissemination and exploitation activities of Clean Hydrogen JU projects under the H2020 programme (75) continued during 2024, while implementation of the new Programme under Horizon Europe started with the first call. Following the best practices already inaugurated by its predecessors, the Clean Hydrogen JU continues to support efforts to increase the impact of the R&I activities through the dissemination and exploitation of project results.

**Dissemination and Exploitation Internal Guide:** The Clean Hydrogen JU strongly and actively supported the initiatives of the EC to reinforce the Dissemination and Exploitation (D&E) of the results of the projects. In 2021, the Programme Office endorsed an internal D&E Guide to support the project officers in their project monitoring activities and to enhance and customize the D&E monitoring good practices that are implemented by the projects before and after their conclusion. The guide maps the steps undertaken by the Clean Hydrogen JU to reinforce the monitoring of the D&E at the project level. It complements the list of consecutive steps with detailed guidelines on each step to be performed by the Project Officers, that extends from the Call for Proposals and the Model Grant Agreement (76) provisions to the period of up to 4 years after the end of the project. This project-level approach is being complemented by a thorough mapping of overarching activities that the Clean Hydrogen JU performs annually to support the D&E function at the programme level and increase the impact of the programme.

**Finished projects – Continuation of D&E Activities:** One of the main issues regarding the project implementation remains the continuation of the D&E activities of the project beneficiaries after the final reporting and the end of the funding period. According to Article 28.1 of the H2020 MGA and the Annex 5 of the Horizon Europe Lump Sum MGA, beneficiaries must take measures aiming to ensure the ‘exploitation’ of their results up to four years after the end of a project. However, it remains challenging for the Programme Office to follow up any D&E activities performed by the beneficiaries after the end of the project, although continuous reporting avenues on the Funding and Tenders

platform remain accessible to the project for it to update information on D&E activities, including patents and scientific publications.

As also reflected in the internal D&E guide, the Programme Office reach out to the project coordinators of completed projects 18-24 months after the end of the project, to motivate the consortium to continue disseminating the results, to remind them about the existing EC tools and services (e.g. the Horizon Results Platform, the HR Booster etc) available to support them, and to encourage them to inform the Clean Hydrogen JU of any D&E activities performed and report them through continuous reporting.

**Horizon Groups:** Under the new Dissemination & Exploitation (D&E) Strategy (77) for Horizon Europe established in and implemented since 2021, the governance structure consists of the following coordination groups:

- The Horizon Dissemination & Exploitation Group (D&E Group), and
- The Horizon Feedback to Policy Group (F2P Group).

The 8th D&E group meeting took place in January 2024. The Clean Hydrogen JU is following the group closely and contributes to all the meetings.

Horizon Results Platform (HRP) (78): The HRP is a platform launched by DG-RTD in 2019, aiming to assist projects in presenting their prominent exploitable results to targeted audiences (e.g. business partners, angel investors, venture capital, policy makers or business development assistance) and help the result owners to exploit the results accordingly. By the end of 2025, 11 Clean Hydrogen JU projects have uploaded 27 results in total in the platform (Table 14). All Clean Hydrogen JU projects are continuously encouraged to upload their exploitable results, thus increase visibility and chances to exploit them.

**TABLE 14. CLEAN HYDROGEN PROJECT RESULTS IN THE HORIZON RESULTS PLATFORM**

Programe	Project Acronym	Thematic priority	Result Title	Result Type	Project Result Id
FP7	UNIfHY	ENERGY	120 hours of continuous pure hydrogen production (99.99% H <sub>2</sub> ) from biomass	Scientific or Technological R&D Result including ICT Hardware	30277
FP7	ene.field	ENERGY	Environmental benefits of Fuel Cell micro-CHP	Policy Related Result	14259
FP7	ene.field	ENERGY	Fuel Cell micro-CHP consumer benefits and end-users' satisfaction	Policy Related Result	14273
FP7	ene.field	ENERGY	Energy system benefits of FC micro-CHP	Policy Related Result	14200
H2020	FCHgo	ENERGY	FCHgo educational toolkit for teaching hydrogen energy and fuel cell technology in schools	Other	19884
H2020	INLINE	TRANSPORT	Assisted assembly station	Scientific or Technological R&D Result including ICT Hardware	14348

H2020	INLINE	TRANSPORT	Automated endoscopic burr detection in tank valves	Scientific or Technological R&D Result including ICT Hardware	14271
H2020	INLINE	TRANSPORT	Smart camera sensor with adaptive light control for assisted assembly	Scientific or Technological R&D Result including ICT Hardware	14581
H2020	TeachHy	ENERGY	MSc blended learning degree in Fuel Cell and Hydrogen Technologies	Services	29573
H2020	BIG HIT	ENERGY	BIG HIT: Demonstration of the use of hydrogen and RES locally, in an integrated manner	Scientific or Technological R&D Result including ICT Hardware	14554
H2020	MEMPHYS	ENERGY	Toolbox for the evaluation of stamped metallic bipolar plates	ICT Software Digital solution	21665
H2020	MEMPHYS	ENERGY	Forming of metal plates for compression and purification stacks.	Scientific or Technological R&D Result including ICT Hardware	21845
H2020	MEMPHYS	ENERGY	Cost analysis for electrochemical hydrogen purification (EHP) system	Other	21525
H2020	MEMPHYS	ENERGY	Computation fluid dynamics model for electrochemical hydrogen separation and compression	ICT Software Digital solution	21675
H2020	MEMPHYS	ENERGY	New approaches for operation, control and condition monitoring of electrochemical systems	Scientific or Technological R&D Result including ICT Hardware	21501
H2020	MEMPHYS	ENERGY	Effective Poison Mitigation Strategies for Hydrogen pumps with a Reformate Feed or contaminated hydrogen	Scientific or Technological R&D Result including ICT Hardware	21331
H2020	HPEM2GAS	ENERGY	Project workshop	Other	13891
H2020	HPEM2GAS	ENERGY	Scalable PEM electrolyser system	Scientific or Technological R&D Result including ICT Hardware	13890
H2020	HPEM2GAS	ENERGY	ionomer membranes for PEM water electrolysis application	Scientific or Technological R&D Result including ICT Hardware	13893
H2020	HPEM2GAS	ENERGY	Renewable power sources with cost-competitive electrolysis plants	Scientific or Technological R&D Result including ICT Hardware	13894
H2020	HPEM2GAS	ENERGY	products for electrochemical systems and development of components and MEAs	Scientific or Technological R&D Result including ICT Hardware	13892
H2020	Cell3Ditor	ENERGY	Nanoscale Dispersions of YSZ, NiO-YSZ and LSM	Other	14499
H2020	Cell3Ditor	ENERGY	Multi-material 3D printer for advanced ceramic materials	Scientific or Technological R&D Result including ICT Hardware	14317
H2020	QualyGridS	ENERGY	Standardized Testing protocols for electrolysers performing grid service	Other	14462

H2020	Fit-4-AMandA	TRANSPORT	BPP design for moulding verified	Scientific or Technological R&D Result including ICT Hardware	13859
H2020	Fit-4-AMandA	TRANSPORT	Commissioning of the mass manufacturing machine for automatic fuel cell stack assembling	Scientific or Technological R&D Result including ICT Hardware	13858
HORIZON	ENDURE	ENERGY	Porous transport electrodes for alkaline electrolysis	Scientific or Technological R&D Result including ICT Hardware	85823

NB: ICT, information and communications technology; R & D, research and development.

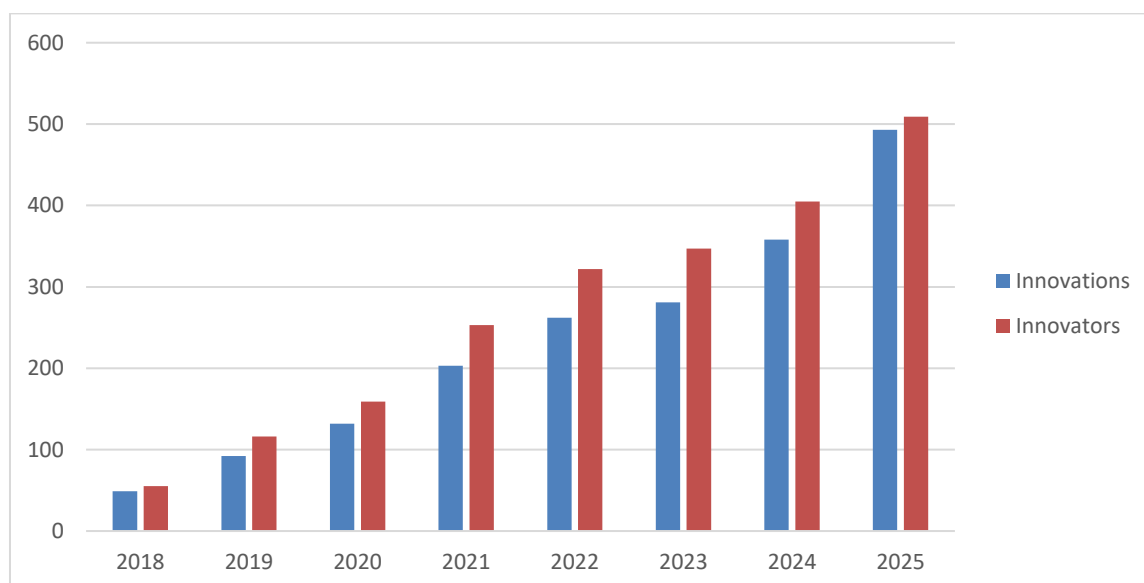
Source: RTD.G.6

**Innovation Radar (IR):** The Innovation Radar is a European Commission initiative aiming to identify and increase the visibility of high potential innovations and innovators in EU-funded research and innovation projects. Via the IR platform, innovations and innovators become accessible by the right audiences, encouraging the development of a dynamic ecosystem of incubators, entrepreneurs, funding agencies and investors that can help get EU-funded innovations moving to ‘make it happen’ faster and more efficiently.

In the project mid-term review, an external expert analyses potential innovations related to the project objectives through a questionnaire incorporated into the workflow of Project Monitoring. The Innovation Radar expert provides concrete recommendations on the innovation aspects of the project and for individual innovator organisations within the consortium. These recommendations are also integrated into the formal review report.

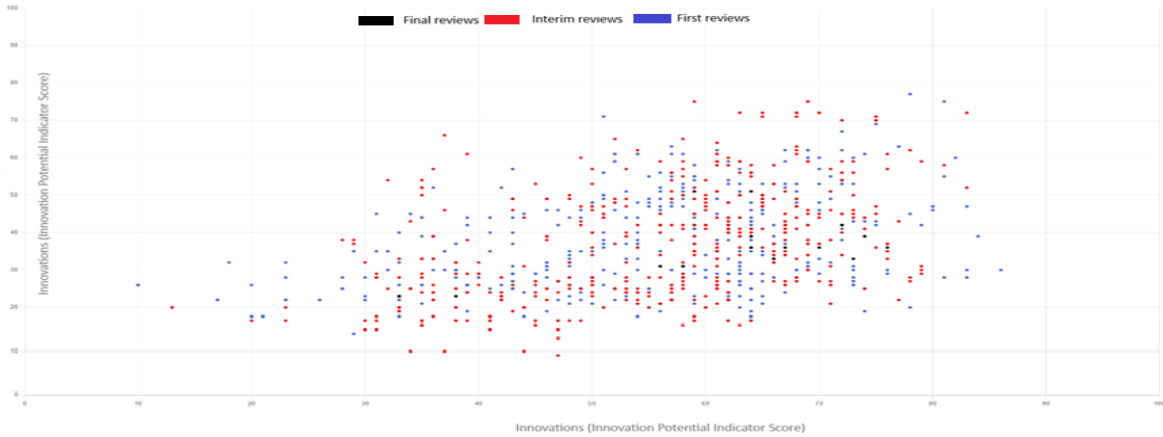
The Clean Hydrogen JU projects have been participating in the IR initiative since its pilot in 2018. So far, innovations of 168 JU projects have been analysed: a total of 493 innovations (more than half of which are considered “very innovative” or “obviously innovative and [having] easily appreciated advantages to customer”), coming from 249 innovators, have been analysed and uploaded to the platform (Figures 11 and 12).

**FIGURE 11. TOTAL NUMBER OF INNOVATIONS AND INNOVATORS IN THE INNOVATION RADAR**



Source: IR Dashboard V2

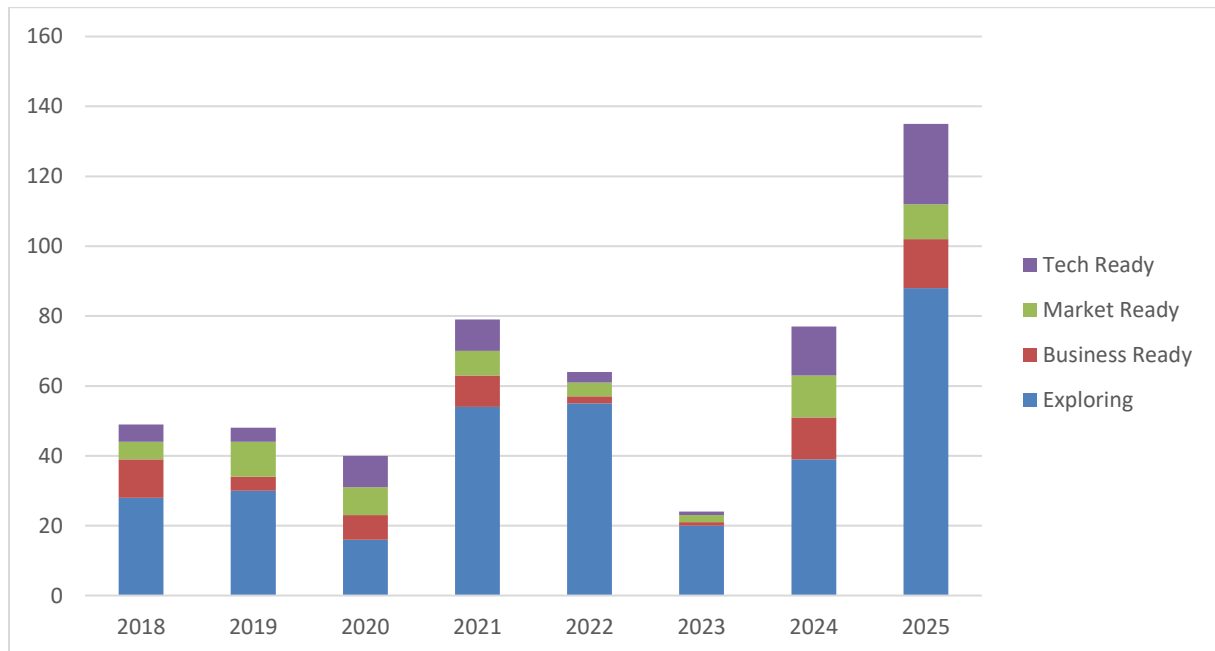
**FIGURE 12. CLASSIFICATION OF CLEAN HYDROGEN PROJECTS INNOVATIONS BASED ON THEIR INNOVATOR CAPACITY SCORE AND THE INNOVATION POTENTIAL INDEX**



Source: IR Dashboard V2

Based on the Innovation Radar methodology, innovations are classified between ‘exploring’, ‘business ready’, ‘market ready’ and ‘tech ready’ (Figure 12). This classification is meant to span the path between the most basic TRLs of ‘exploration’ to the most advanced and closest to the market, further research or standardization activities. A very positive result has also been the identification of at least 104 innovations that scored 50 points and above in the innovation potential indicator (IPI), making them ideal first candidates for follow-up actions for exploitation proposals. As the projects have not been finished, the number of final reviews, represented by the black dots, is fewer than the other reviews.

**FIGURE 13. CLUSTERING OF INNOVATIONS BASED ON THE MATURITY LEVEL**



Source: IR Dashboard V2

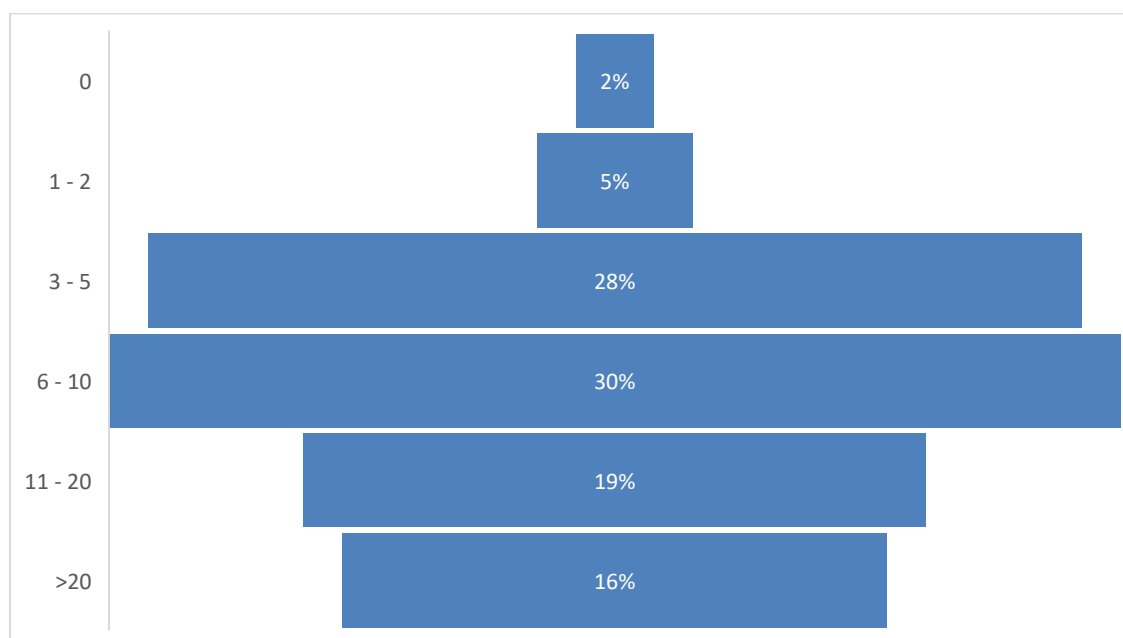
Since the pilot launch of the IR, the Clean Hydrogen JU has collected valuable feedback to communicate with EC (e.g. DG R&I, DG CONNECT etc) and has participated in the Innovation Radar R&I family meetings to support further improvement of Innovation Radar and explore how the information collected can be further utilised by other EC services that support further exploitation of research results (e.g. Horizon Results Booster, Horizon Results Platform etc.)<sup>41</sup>.

D&E Activities of the on-going Projects: The data collection exercise is a key component of the Programme Review and plays a vital role in the Clean Hydrogen JU’s ability to meet its increased monitoring and reporting obligations under the Horizon Europe Programme. The tool used to conduct this data collection is the Knowledge Hub.

Based on data provided by 86 out of 115 active projects in 2024 on their D&E activities and key exploitable results (KERs):

- 26 projects reported conducting 6 - 10 dissemination activities in the last year (see figure 14).
- 42 projects reported engaging in 96 exploitation activities over the past year.

**FIGURE 14. DISSEMINATION ACTIVITIES OF LAST YEAR**



In total the projects reported 635 scientific publications and 6 new patent applications (see Annexes 5.3 and 5.4 respectively).

### Dissemination Activities Performed by Projects

The types of dissemination activities reported fall into four main categories:

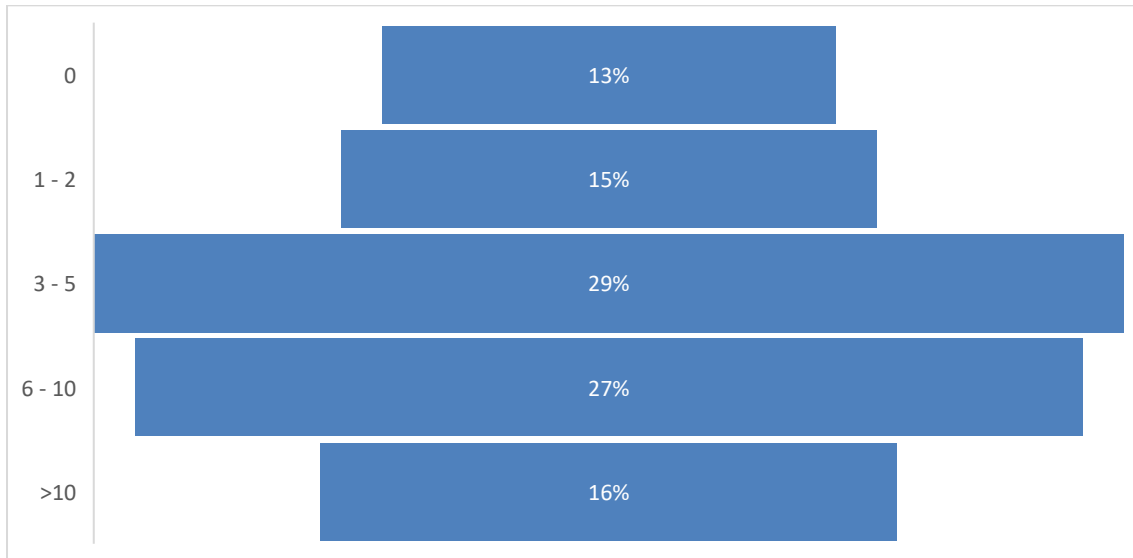
- 29% of projects reported having 3-5 presentations of results at conferences, events, and workshops (see Figure 15).

<sup>(41)</sup> Furthermore, a service offered to the innovations analysed by the IR, the [Dealflow.eu](https://dealflow.eu), is available to support the innovations/innovators in further exploiting their results, especially in commercializing their innovations (“go-to-Market”), by facilitating access to clients and investors and providing high-end coaching services (e.g. venture-building, preparation for fundraising, networking, pitching to possible investors, etc).

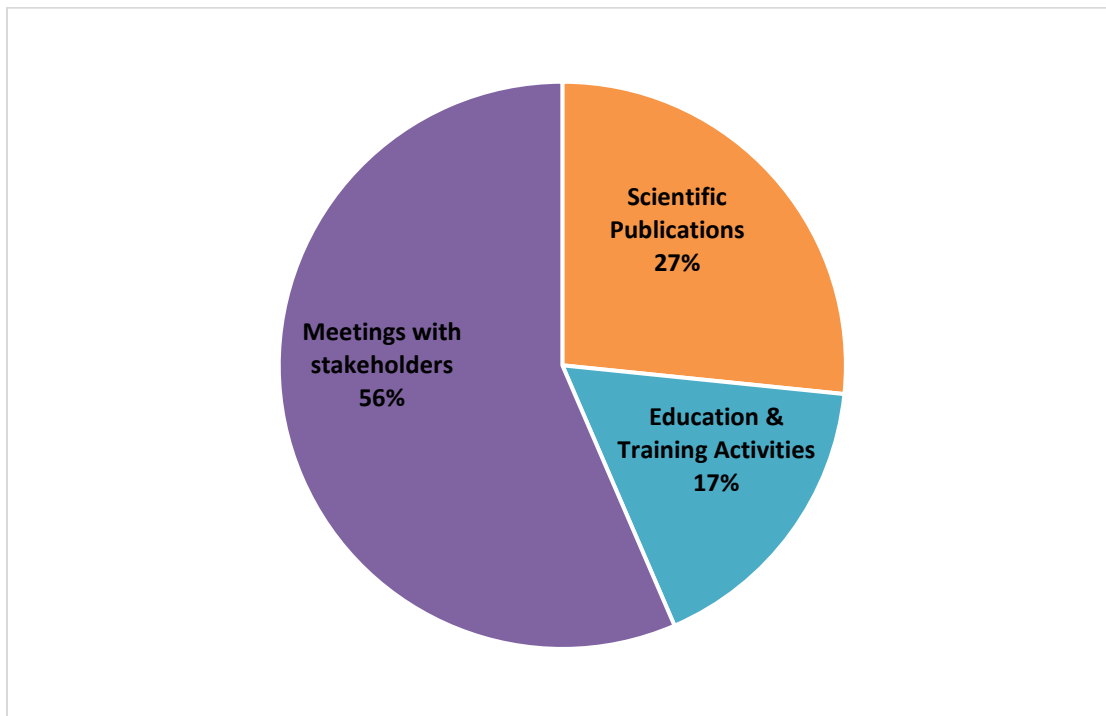
The remaining dissemination activities were divided as follows:

- » 56% were related to meetings with stakeholders.
- » 17% involved education and training.
- » 27% focused on scientific publications (see Figure 16).

**FIGURE 15. PRESENTATION OF RESULTS IN CONFERENCES, EVENTS AND WORKSHOPS**

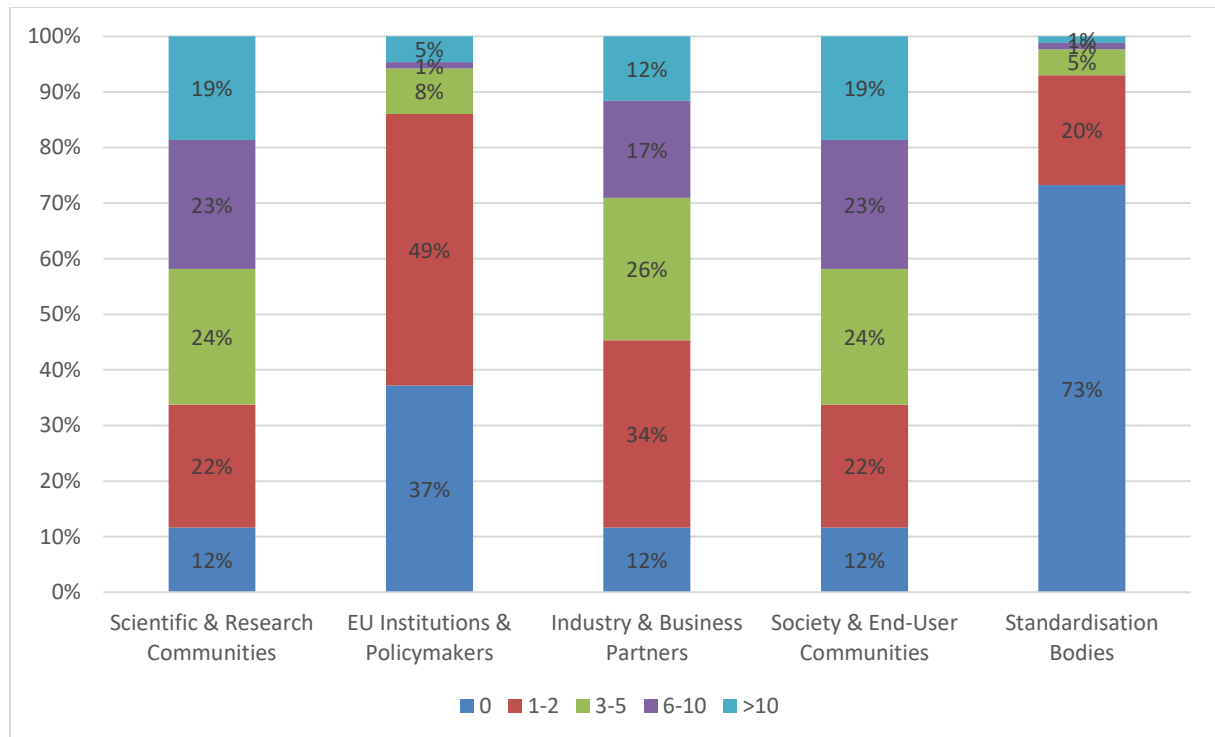


**FIGURE 16. REMAINING TYPES OF DISSEMINATION ACTIVITIES CONDUCTED BY CLEAN HYDROGEN JU PROJECTS**



The dissemination activities of the projects targeted five key audiences. The analysis of the reported data highlights significant variations across these groups (Figure 17).

**FIGURE 17. DISSEMINATION ACTIVITIES BY TARGET AUDIENCE**



**1. Scientific and Research Communities:** Dissemination activities targeting the scientific and research communities are the most prominent. Overall, 88% of projects reported at least one activity, with engagement distributed across activity levels (22% reporting 1–2 activities, 24% reporting 3–5, and 23% reporting 6–10). A further 19% of projects reported more than 10 activities, highlighting the strong focus on knowledge exchange within the research community.

**2. EU Institutions and Policymakers:** Engagement with EU institutions and policymakers is more limited. While 37% of projects reported no dissemination activities, 49% reported 1–2 activities. Only a small share of projects reported higher engagement levels (8% reporting 3–5 activities and 5% reporting more than 10), indicating that dissemination towards policymakers remains relatively targeted.

**3. Industry and Business Partners:** Dissemination towards industry and business partners shows moderate to high engagement, with 88% of projects reporting at least one activity. Most projects reported between 1 and 10 activities (77%), while 12% reported more than 10 activities, reflecting continued efforts to engage industrial stakeholders.

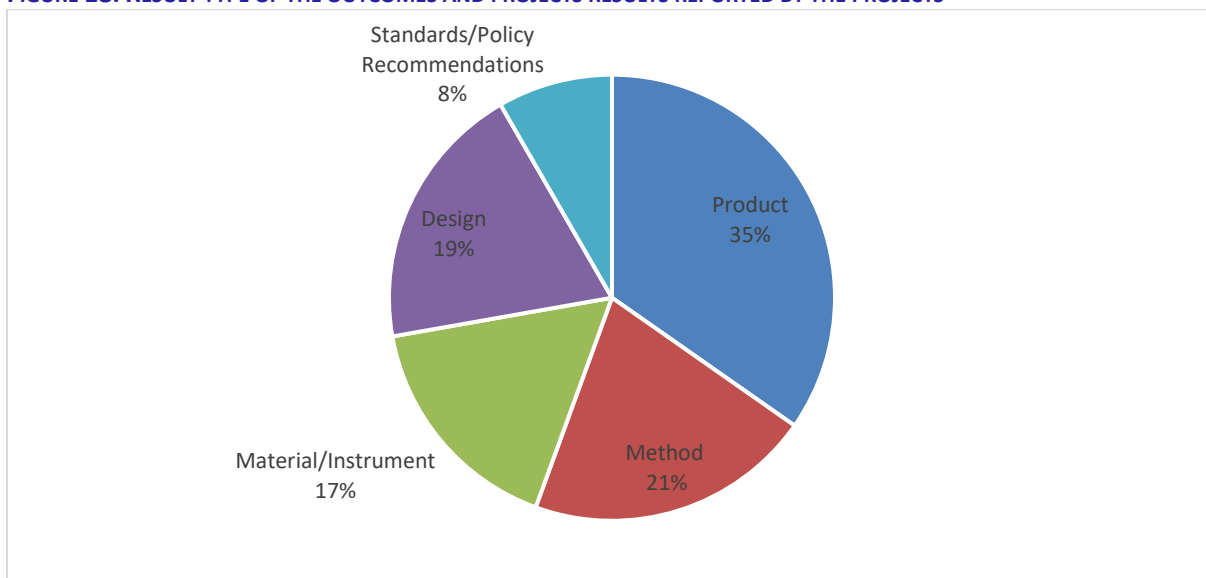
**4. Society and End-User Communities:** Dissemination targeting society and end-user communities is also significant, with 88% of projects reporting at least one activity. Activities are distributed across all ranges, including 22% reporting 1–2 activities, 24% reporting 3–5, and 23% reporting 6–10, while 19% reported more than 10 activities.

**5. Standardisation Bodies:** Standardisation bodies remain the least targeted audience, with 73% of projects reporting no dissemination activities. Only 20% reported 1–2 activities, and very few projects reported higher engagement levels, indicating limited involvement in standardisation-related dissemination.

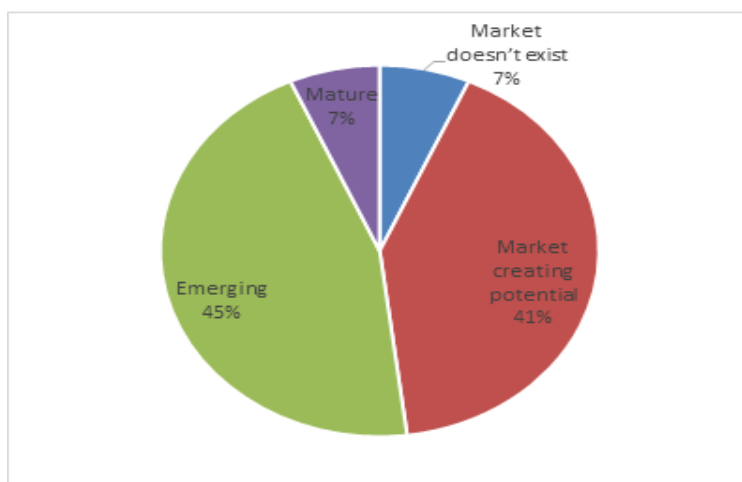
Achievements and results in the reference period are identified as products in 35% of the cases, whereas methods account for 21%, design 19%, standards and policy recommendations 8% and material/instruments for 17% (Figure 18).

The market maturity analysis of the results and outcomes shows that almost half of them (45%) are considered to be pointing to emerging markets, which is expected in terms of maturity of hydrogen technologies in general. Another 41% are flagged as having potential to create a market, while for 7% of them a market currently doesn't exist and only 7% of them are mature enough to be introduced into the market (Figure 19).

**FIGURE 18. RESULT TYPE OF THE OUTCOMES AND PROJECTS RESULTS REPORTED BY THE PROJECTS**



**FIGURE 19. MARKET MATURITY LINKED TO THE RESULTS**

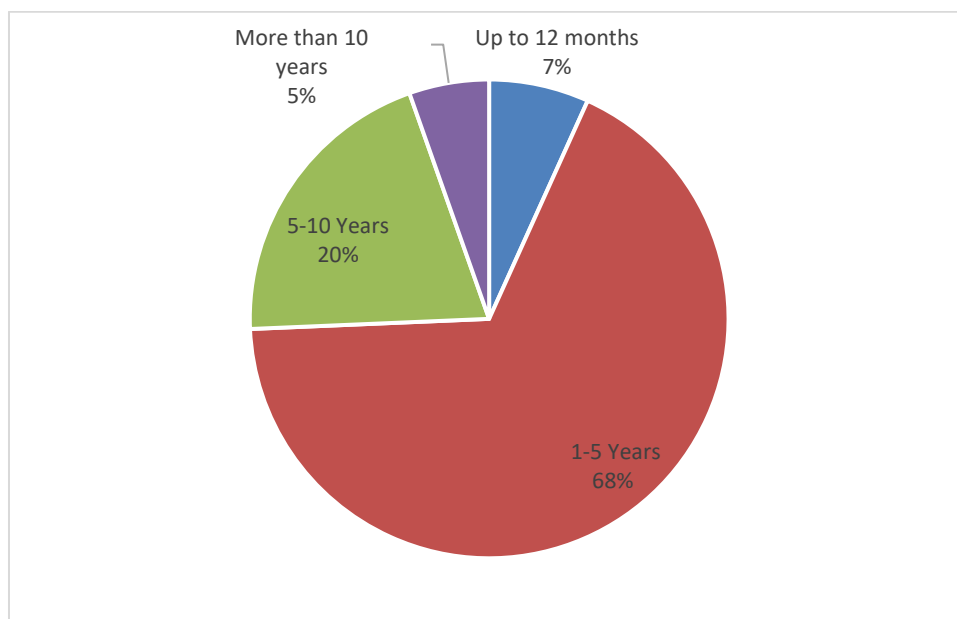


Regarding the expected timeframe for impact, most results are anticipated to generate impact in the medium term. The majority (68%) are expected to have an impact within 1–5 years, while 7% are expected to deliver impact within 12 months.

The remaining results are associated with longer-term impacts, with 20% expected to materialize within 5–10 years and 5% in more than 10 years.

This distribution reflects the technological maturity and development cycles typical of hydrogen technologies, where significant impacts are expected to materialize progressively over the coming years.

**FIGURE 20. EXPECTED TIME TO IMPACT OF THE RESULTS REPORTED**



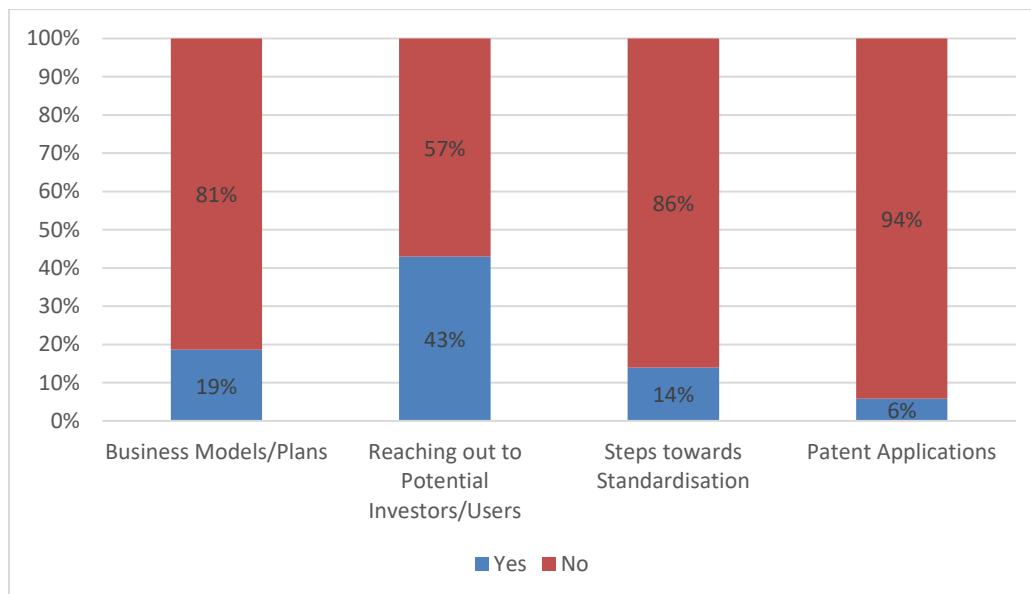
### Exploitation Activities Performed by Projects

Projects reported several types of exploitation activities aimed at supporting the uptake and potential commercialization of their results. Among these, reaching out to potential investors and users was the most common activity, reported by 43% of projects, while 57% indicated no such activities.

Activities related to the development of business models or business plans were reported by 19% of projects, whereas the majority (81%) did not report engagement in this area. Similarly, 14% of projects reported taking steps towards standardization, while 86% did not.

Finally, patent applications remain relatively limited across the portfolio, with only 6% of projects reporting patent-related activities and 94% indicating no engagement in this area (Figure 21).

**FIGURE 21. TYPES OF EXPLOITATION ACTIVITIES PERFORMED BY CLEAN HYDROGEN JU PROJECTS**



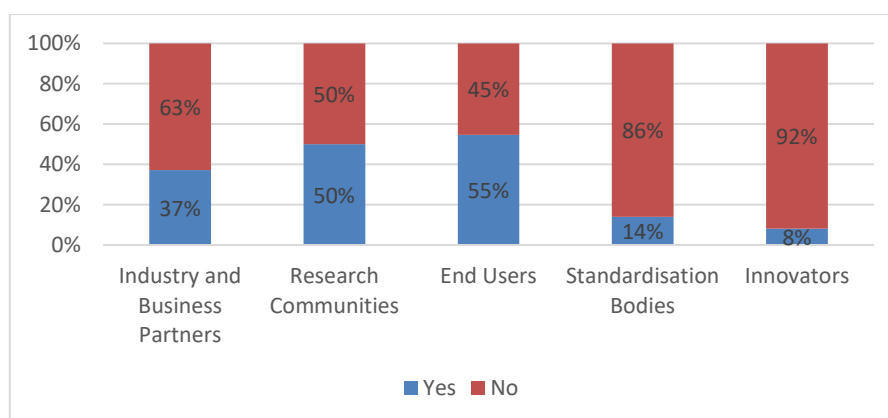
Finally, the analysis of target audiences for exploitation activities indicates that industry and business partners are among the most frequently targeted stakeholders, with 37% of projects reporting engagement with this group.

Research communities are also a key audience, with 50% of projects reporting targeted activities. Engagement with end users was reported by 55% of projects, indicating a relatively strong orientation towards potential users of project results.

In contrast, fewer projects reported targeting standardization bodies (14%) and innovators (8%), suggesting that engagement with these stakeholder groups remains comparatively limited.

Overall, the results indicate that exploitation efforts are primarily directed towards industry stakeholders, research communities and potential end users, while engagement with standardization actors and innovation intermediaries remains more limited (Figure 22).

**FIGURE 22. TARGET AUDIENCES OF THE EXPLOITATION ACTIVITIES PERFORMED BY CLEAN HYDROGEN JU PROJECTS**





## 2. SUPPORT TO OPERATIONS

### 2.1. Communication activities

#### 2.1.1 Events

##### Key Flagship Events and Event participations in 2025

In 2025, the Clean Hydrogen Partnership actively engaged with stakeholders across Europe and beyond through a diverse portfolio of flagship events, workshops, webinars, and international forums. These activities reinforced Europe's leadership in clean hydrogen research, innovation, and market development.

##### Info day for Call 2025, Brussels (22 January 2026)

The Info Day for the Call for Proposals 2025 took place on 22 January at The Hotel Brussels. The event provided key insights into the 2025 Call for Proposals and offered 25 companies and projects the opportunity to pitch their project ideas or services. A total of 250 participants attended the event on site, while an additional 200 people expressed interest in receiving the event recording.

The presentations and the recording of the event are available on the dedicated webpage<sup>42</sup>.

##### Hyvolution Paris 2025 (28–30 January 2025)

Hyvolution Paris 2025 provided a strong platform to showcase and promote the work of the Clean Hydrogen Partnership, including the launch and dissemination of its recently published Call for Proposals.

During the Hyvolution Summit 2025, Valérie Bouillon-Delporte, Executive Director of the Clean Hydrogen Partnership, spoke in the session "*Hydrogen: Consolidating the Sector and Shaping the Market*," addressing key challenges and opportunities for market development.

Mirela Atanasiu, Head of Operations and Communications, delivered a keynote entitled "*Working in Partnership for the Competitiveness of the EU Hydrogen Sector*," highlighting the importance of collaboration in strengthening Europe's hydrogen ecosystem.

Throughout the event in Paris, the Clean Hydrogen Partnership was also present with a dedicated exhibition booth, actively engaging with stakeholders and promoting the 2025 Call for Proposals to a wide international audience.

##### Workshop on Hydrogen Combustion Technology with NEDO – Kobe, Japan (26 March 2025)

The **Clean Hydrogen Partnership**, together with the New Energy and Industrial Technology Development Organization (**NEDO**), hosted a high-level workshop in Kobe, Japan, dedicated to the future of hydrogen and ammonia combustion technologies.

As the third international workshop in this series, the event brought together leading industry experts, researchers, and policymakers to examine innovative technological pathways for clean hydrogen and ammonia combustion. Discussions underscored the critical role of international and cross-sector collaboration in achieving global climate objectives and strengthening long-term energy security.

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<sup>42</sup> [https://www.clean-hydrogen.europa.eu/apply-funding/info-days-0/info-day-2025-presentation-call\\_en](https://www.clean-hydrogen.europa.eu/apply-funding/info-days-0/info-day-2025-presentation-call_en)



The workshop builds on the cooperation agreement signed in Tokyo in June 2024 and serves as a blueprint for advancing future international partnerships in hydrogen technology development.

A key takeaway from the discussions was the shared consensus that sustained research and innovation are essential to enable gas turbines, boilers, and burners to operate with up to 100% clean hydrogen at commercial scale. In parallel, achieving high levels of fuel flexibility was recognised as a crucial step toward full decarbonisation and a strategic priority for all stakeholders involved.

**News item:** [Advancing Hydrogen Combustion Technologies through International Collaboration](#)

### **Webinar on Hydrogen Sustainability and Circularity (8 May 2025)**

The webinar presented the **European Hydrogen Sustainability and Circularity Panel (EHS&CP)**, established by the Clean Hydrogen Partnership. The event focused on clean hydrogen production and its contribution to the decarbonisation of transport, with particular attention to storage solutions, resource efficiency, and circularity.

The programme also included expert insights on hydrogen life cycle analysis (LCA) and eco-design, drawing on results from the SH2E and eGHOST projects. These contributions were complemented by input from the Joint Research Centre (JRC) on broader aspects of hydrogen sustainability.

The webinar attracted strong interest, with more than 700 registrations.

All presentations and the event recording are available on the dedicated webpage<sup>43</sup>.

### **EU Hydrogen Valleys Days 2025 (24 and 25 June 2025)**

The EU Hydrogen Valleys Days, under the theme *“Hydrogen Valleys: Driving Europe’s Competitiveness,”* was jointly organised by the Clean Hydrogen Partnership and the European Commission on 24–25 June 2025.

The two-day programme featured keynote speeches and dedicated sessions highlighting success stories and lessons learned from advanced Hydrogen Valley projects. Participants gained insights into key challenges, including permitting, licensing, and skills development.

Significant initiatives were also presented, including the **H2 Valleys Facility** and the European Commission’s Hydrogen & Derivatives Mechanism transparency platform. The H2 Valleys Facility is designed to accelerate the creation of new hydrogen valleys by providing technical, financial, and legal Project Development Assistance (PDA), guiding projects from the pre-feasibility stage through to final investment decisions.

Discussions further explored lead markets in mobility and industry and addressed the critical topic of financing hydrogen projects. The event concluded with networking opportunities aimed at fostering collaboration and innovation. Over 210 participants attended.

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<sup>43</sup> [https://www.clean-hydrogen.europa.eu/media/news/webinar-hydrogen-sustainability-and-circularity-2025-03-20\\_en](https://www.clean-hydrogen.europa.eu/media/news/webinar-hydrogen-sustainability-and-circularity-2025-03-20_en)



All presentations, the event recording, and a highlights video<sup>44</sup> are available on the dedicated webpage<sup>45</sup>.

### **Info Day regarding the Call for Applications for Project Development Assistance (PDA) for Hydrogen Valleys (18 July 2025)**

The Clean Hydrogen Partnership organised an Info Day in conjunction with the launch of the Call for Applications for the Project Development Assistance (PDA) programme for Hydrogen Valleys.

The digital Info Day, held on 18 July, presented comprehensive information on the programme's benefits, eligibility criteria, and application process. Participants were guided through the key aspects of the call and had the opportunity to better understand how the PDA can support project development.

The PDA programme provides tailored expert support across commercial, technical, regulatory, and governance dimensions. Its objective is to help advance **Hydrogen Valleys** across the European Union and in countries associated with Horizon Europe, supporting projects on their path towards a Final Investment Decision (FID).

The deadline for applications was September 2025.

Event Webpage<sup>46</sup>

### **Coordinators Day 2025 (30 September 2025)**

The Coordinators Day 2025 provided valuable insights to project coordinators on key aspects of project implementation, including grant agreement preparation, reporting requirements, and overall project management.

On 30 September 2025, the Clean Hydrogen Partnership hosted a dedicated Coordinators Day for coordinators of projects selected under the HORIZON-JU-CLEANH2-2025 call for proposals.

The full-day event featured a series of presentations and practical guidance sessions, supporting coordinators in the preparation and signature of grant agreements and helping ensure a smooth start to project implementation.

Dedicated webpage<sup>47</sup>

### **EU Hydrogen Innovation Forum 2025, Brussels (2–3 October 2025)**

As part of **European Hydrogen Week 2025**, the **EU Hydrogen Innovation Forum** was co-organised by the Clean Hydrogen Partnership and the European Commission.

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<sup>44</sup> <https://www.youtube.com/watch?v=bEjnXvXkfe8>

<sup>45</sup> [https://www.clean-hydrogen.europa.eu/media/events/hydrogen-valley-days-2025-2025-06-24\\_en](https://www.clean-hydrogen.europa.eu/media/events/hydrogen-valley-days-2025-2025-06-24_en)

<sup>46</sup> [https://www.clean-hydrogen.europa.eu/media/events/info-day-regarding-call-applications-project-development-assistance-pda-hydrogen-valleys-2025-07-18\\_en](https://www.clean-hydrogen.europa.eu/media/events/info-day-regarding-call-applications-project-development-assistance-pda-hydrogen-valleys-2025-07-18_en)

<sup>47</sup> [https://www.clean-hydrogen.europa.eu/apply-funding/coordinators-day/coordinators-day-2025\\_en](https://www.clean-hydrogen.europa.eu/apply-funding/coordinators-day/coordinators-day-2025_en)



The two-day forum took place on 2 and 3 October 2025 at the Thon Hotel EU in Brussels, under the theme “*Driving Europe’s Competitiveness and Market Uptake with R&I in Clean Hydrogen Technologies.*” A strong focus was placed on hydrogen start-ups and scale-ups as critical drivers of Europe’s green industrial transformation.

The event brought together policymakers, industry leaders, researchers, and investors to accelerate the development and deployment of clean hydrogen technologies, strengthen Europe’s global competitiveness, and boost market uptake of innovative solutions.

Key discussions explored:

- Enhancing Europe’s competitiveness through hydrogen research and innovation
- Empowering innovative SMEs and start-ups
- Addressing future skills, financing, and investment needs
- Creating synergies across EU, national, and regional funding programmes

In total, more than 260 participants registered for the Forum and took part in eight thematic sessions, featuring 36 expert speakers from across the hydrogen value chain.

More information and event recording<sup>48</sup> are available on the dedicated webpage<sup>49</sup>.

## **2.1.2 Clean Hydrogen Partnership and Hydrogen Europe Research Awards - 25 November 2025**

### **EU Hydrogen Research and Innovation Days 2025, Brussels (24–25 November 2025)**

The **EU Hydrogen Research and Innovation Days 2025** were organised by the Clean Hydrogen Partnership on 24 and 25 November 2025 at the Sofitel Europe Hotel in Brussels. The event brought together more than 250 participants, including project coordinators, industry leaders, researchers, regional authorities, and representatives of EU institutions from across the European hydrogen ecosystem.

Over two days, participants reviewed the Clean Hydrogen Partnership’s programme, explored its expanding portfolio of projects and achievements, and discussed strategic priorities shaping hydrogen research and innovation in the coming years.

#### **Programme Review and Strategic Insights**

The event showcased results from funded projects spanning the entire hydrogen value chain, from production, distribution, and storage to a wide range of end-use applications.

A highlight of the first day was the presentation of the **Programme Review Report 2025**, developed in collaboration with the Joint Research Centre (JRC), highlighting Europe’s cutting-edge across the entire value chain.

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<sup>48</sup> <https://www.youtube.com/watch?v=Pi4aNY-gLqw&t=2851s>

<sup>49</sup> [https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2025/eu-hydrogen-innovation-forum\\_en](https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2025/eu-hydrogen-innovation-forum_en)



The event also underlined the critical role of **regional collaboration**, particularly through **Hydrogen Valleys**, demonstrating how innovation at local and regional levels is accelerating Europe's clean hydrogen transition and supporting industrial deployment.

All presentations and the event recording<sup>50</sup> are available on the dedicated webpage<sup>51</sup>.

### **Awards Ceremony**

The first day concluded with the **Clean Hydrogen Partnership Awards** and the **Hydrogen Europe Research Young Scientist Awards**, celebrating exceptional innovation, impactful success stories, outstanding outreach activities, and inspiring individual careers. The awards highlighted how funded projects are advancing state-of-the-art technologies, delivering tangible impact on the ground, and inspiring the next generation of hydrogen talent.

### **Clean Hydrogen Partnership Awards<sup>52</sup> – 2025 Winners**

The **Clean Hydrogen Awards** were presented in five categories:

#### **• Best Innovation Award**

**HyP3D** received the Best Innovation Award for its pioneering use of 3D printing to manufacture advanced solid oxide electrolysis cells (SOCs). These next-generation cells demonstrate enhanced efficiency and durability through features such as corrugated electrolytes and integrated gas channels, enabling lighter and simpler system designs.

#### **• Best Success Story Award**

**HELIOS** and **FLEX4H2** jointly won the Best Success Story Award for their advances in hydrogen combustion technologies:

- **HELIOS** developed a retrofittable hydrogen gas turbine based on the *FlameSheet™* platform, achieving fully hydrogen-powered operation.
- **FLEX4H2** designed a fuel-flexible combustor capable of operating with up to 100% hydrogen blended into natural gas, enabling clean and dispatchable power generation.

#### **• Best Outreach Award**

The **COSMHYC Project Series** (*COSMHYC*, *COSMHYC XL*, *COSMHYC DEMO*) was awarded Best Outreach for its innovative hydrogen compression solution, validated at a public refuelling station. The project's strong dissemination activities significantly increased visibility and supported the commercialisation of thermochemical compressors.

#### **• European Hydrogen Valleys Award**

BalticSeaH2 received the **European Hydrogen Valley of the Year Award** for its ambitious hydrogen ecosystem spanning southern Finland and Estonia. With 40 partners from nine countries, the initiative aims to establish one of Europe's largest interregional hydrogen networks.

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<sup>50</sup> <https://www.youtube.com/watch?v=VL52Assb4l4&t=2s>

<sup>51</sup> [https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2025\\_en](https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2025_en)

<sup>52</sup> [https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2025/clean-hydrogen-partnership-awards-2025\\_en](https://www.clean-hydrogen.europa.eu/european-hydrogen-week/european-hydrogen-week-2025/clean-hydrogen-partnership-awards-2025_en)



In addition, two Hydrogen Valleys were recognised from among 73 initiatives listed on the Mission Innovation Hydrogen Valley Platform:

- **Trieres Valley** (Greece)
- **Hydrogen Valley Emsland** (Germany)
- **Women in Hydrogen Innovation Award**

Following the success of its inaugural edition in 2024 — organised in collaboration with *Women in Green Hydrogen* — the Clean Hydrogen Partnership once again honoured outstanding female leadership in the sector.

**Julie Mougín**, Deputy Director for Hydrogen Technologies at CEA, received the **Women in Hydrogen Innovation Award** in recognition of her 20-year contribution to hydrogen and fuel cell technologies, including major advancements in high-temperature electrolysis.

## 2.1.3 Website and Social Media activities

### Web Analytics 2025

In 2025, the website continued to grow its reach and engagement. A total of 118.205 visitors explored the site, marking a **4.3% increase** compared with 2024. These visitors generated 184.392 sessions, a 3.86% rise year-on-year.

User interaction became notably more dynamic: events per session increased by 39.44%, reaching an average of 6.32 events per session, showing that visitors engaged more with the content.

**Total page views reached 423.998**, and while this represents a decrease of 13.92%, the stronger engagement metrics indicate that users are navigating the site with greater purpose and efficiency. **Returning visitors represented 19.20%** of the audience.

The Clean Hydrogen Partnership newsletters were sent based on the Newsroom platform provided by DG Connect and continued to expand their reach, **surpassing 18.000 subscribers in 2025**. Throughout the year, 21 news updates were shared with the community.

### Social Media Developments 2025

In 2025, the Clean Hydrogen Partnership **further strengthened its social media presence by adding Bluesky** to its communication portfolio. Together with the website and newsletters, social media channels form a key pillar for sharing updates on the activities of the JU, events, funding opportunities, and reports with a broad and diverse audience.

All **communication channels are aligned** to ensure that important information is consistently shared across platforms, always linking back to the website, the central hub for all Clean Hydrogen Partnership content. The Partnership also amplifies the visibility of its projects by reposting, linking, and sharing relevant content from the wider hydrogen community. The project repository remains a key reference point, with social media posts directing users to this resource.

The Partnership is now active on LinkedIn, x and Bluesky, each contributing to a growing and engaged community.



## LinkedIn

LinkedIn experienced strong growth, reaching **47.767 followers** in 2025. Posts generated over 3 million impressions, including the results of the social media campaign on the Success Stories of the Clean Hydrogen Partnership conducted by GOPA in November-December 2025.

- Organic impressions: 684.733
- Sponsored impressions: approx. 2.3 million

The channel reaches a diverse audience, with most followers based in France, Belgium, the Netherlands, and the United Kingdom. In total, **275 posts were published**, receiving 308 comments and 320 reposts.

**TABLE 17. KEY DATA ON LINKEDLN CHANNEL FOR 2025**

	Q1	Q2	Q3	Q4	All
Posts made by the Clean Hydrogen Partnership	70	66	53	86	<b>275</b>
Impressions of the posts of the Clean Hydrogen Partnership	285,295	166,058	127,884	2,530,317	<b>3,109,554</b>
Comments	97	69	52	90	<b>308</b>
Re-Posts of the posts of the Clean Hydrogen Partnership	98	69	58	101	<b>326</b>

## X

The follower count on X stabilised in 2025, with the decline observed in previous years slowing mid-year. By the end of 2025, the account counted 8.885 followers (compared with 9.025 at the end of 2024). A total of 235 posts were published.

## Bluesky

The Partnership launched its **Bluesky account** in November 2025, aligning with the broader move by European institutions to establish a presence on the platform. By year-end, the account had published 34 posts and begun building its initial follower base, laying the groundwork for future growth as the platform continues to expand.

## Targeted Campaigns

Several posts supported key strategic initiatives, including:

- Promotion of seven Success Stories through a corporate paid campaign with GOPA
- Promotion of the 2025 Programme Review Report
- Highlighting the JU's role in gender equality on 8 March
- Women in Hydrogen campaign by Hydrogen Europe Research
- Launch of the Project Development Assistance (PDA)
- Launch of the Hydrogen Valley Facility



- Launch of the European Hydrogen Safety Panel (EHSP)
- Promotion of the European Hydrogen Observatory
- Participation in the European Commission's #Science4EU campaign
- STEP Seals featuring JU projects

### **YouTube Channel Performance**

In 2025, the Clean Hydrogen Partnership published 24 videos and 7 Shorts on its YouTube channel, including:

- Recording of the Clean Hydrogen Info Day – Call 2025
- Recording of the Webinar on Hydrogen Sustainability and Circularity
- 13 videos from the EU Hydrogen Valley Days
- 3 videos from the EU Hydrogen Innovation Forum
- 4 videos from the EU Hydrogen Research and Innovation Days
- Shorts featuring the Success Stories videos

The uploaded content reached 4.288 views and 46.973 impressions. The channel gained 44 new followers, bringing the total to 668 subscribers. The **most-watched video was the Info Day – Call 2025** recording.

## **2.2. Legal and financial framework**

### **Data Protection**

With regard to protection of personal data, the Clean Hydrogen JU, as an EU body applying Regulation (EU) 2018/1725, continued its data protection activities in 2025.

The Clean Hydrogen JU, along with other JUs that share a common IT infrastructure, have coordinated to update their collective DPIA on the use of Microsoft services, in light of the results of the EDPS' investigation on Commission's use of Microsoft products. The update was performed through a specific contract under a framework contract lead by SESAR 3 JU to secure availability of data protection and cyber security consultancy services. The updated impact and security assessments have been finalized in 2025 and will be implemented by the relevant action groups (IT Officers and Data Protection Officers).

### **Legal and financial framework**

No new decision regarding the legal and financial framework has been adopted in 2025.

## **2.3. Budgetary and financial management**

### **2.3.1 Budget**

The JU budget comprises revenue and expenditure.



On the expenditure side, the budget is divided in three titles:

- Title 1 covers staff expenditure, such as salaries, allowances and benefits, contributions, and taxes. In addition, it includes expenses for training, missions and medical services as well as the costs associated with the recruitment procedure and representation costs;
- Title 2 covers the costs associated with the functioning of the Programme Office, such as renting premises, IT needs, expenses related to communications, other service contracts, various office supplies and strategic studies;
- Title 3 covers expenditure related to the operational activities under the H2020 and Horizon Europe programmes.

Compared with 2024, the 2025 appropriations related to Titles 1 and 2 increased by 12% in terms of commitments and decreased by 1% in terms of payments. Appropriations related to Title 3 included commitment and payment appropriations for the fifth call for proposals under Horizon Europe and other operational expenditure such as procurement activities, JRC collaboration and experts' fees.

There were three budget amendments and four budget transfers in 2025. The first amendment introduced the reactivation of unused administrative commitment appropriations to cover refurbishment needs, the inclusion of two contract agent (CA) positions, and the re-creation of a budget line for administrative studies (line 2800); the second amendment reactivated unused operational commitment appropriations from 2023 in order to partially finance the Valleys Facility procurement; the third amendment reactivated Horizon Europe commitment appropriations to support additional procurement activities, as well as unused payment appropriations from 2022, 2023, and 2024 under operational expenditure to cover increased payment needs. An overview of the initial budget and amendments is presented in Table 18.

**TABLE 18. BUDGET FOR YEAR 2025 – STATEMENT OF REVENUE WITH INITIAL VOTED BUDGET AND BUDGET AMENDMENTS.**

Statement of revenue	Voted budget		Amended budget 1		Amended budget 2		Amended budget 3	
	2025		2025		2025		2025	
Heading	Commitment appropriations (in EUR)	Payment appropriations (in EUR)	Commitment appropriations (in EUR)	Payment appropriations (in EUR)	Commitment appropriations (in EUR)	Payment appropriations (in EUR)	Commitment appropriations (in EUR)	Payment appropriations (in EUR)
<b>EU contribution (excl. EFTA and third country contributions)</b>	<b>88,378,873</b>	<b>56,363,917</b>	<b>88,378,873</b>	<b>56,363,917</b>	<b>88,378,873</b>	<b>56,363,917</b>	<b>88,378,873</b>	<b>56,363,917</b>
of which Administrative	3,742,515	3,742,515	3,742,515	3,742,515	3,742,515	3,742,515	3,742,515	3,742,515
of which Operational	84,636,358	52,621,402	84,636,358	52,621,402	84,636,358	52,621,402	84,636,358	52,621,402
<b>EFTA and third countries contribution</b>	<b>102,430,419</b>	<b>48,519,519</b>	<b>102,430,419</b>	<b>48,519,519</b>	<b>102,430,419</b>	<b>48,519,519</b>	<b>102,430,419</b>	<b>48,519,519</b>
of which Administrative	102,919	102,919	102,919	102,919	102,919	102,919	102,919	102,919
of which Operational	2,327,500	1,416,600	2,327,500	1,416,600	2,327,500	1,416,600	2,327,500	1,416,600
of which Operational third countries excluding EFTA	100,000,000	47,000,000	100,000,000	47,000,000	100,000,000	47,000,000	100,000,000	47,000,000

<b>Financial Members other than the Union contribution</b>	<b>3,845,434</b>	<b>3,845,434</b>	<b>3,845,434</b>	<b>3,845,434</b>	<b>3,845,434</b>	<b>3,845,434</b>	<b>3,845,434</b>	<b>3,845,434</b>
of which Administrative	3,845,434	3,845,434	3,845,434	3,845,434	3,845,434	3,845,434	3,845,434	3,845,434
<b>Unused appropriations of previous years</b>	<b>1,819,722</b>	<b>70,621,458</b>	<b>2,418,722</b>	<b>70,621,458</b>	<b>4,841,815</b>	<b>70,621,458</b>	<b>7,924,529</b>	<b>85,543,652</b>
<b>Reactivation of unused appropriations from administrative expenditure</b>	<b>1,283,580</b>	<b>1,283,580</b>	<b>1,882,580</b>	<b>1,283,580</b>	<b>1,882,580</b>	<b>1,283,580</b>	<b>1,882,580</b>	<b>1,283,580</b>
Of which from 2021								
Of which from 2022	1,283,580	1,283,580	1,283,580	1,283,580	1,283,580	1,283,580	1,283,580	1,283,580
Of which from 2023			599,000		599,000		599,000	
<b>Reactivation of unused appropriations from operational expenditure</b>	<b>536,142</b>	<b>69,337,878</b>	<b>536,142</b>	<b>69,337,878</b>	<b>2,959,235</b>	<b>69,337,878</b>	<b>6,041,949</b>	<b>84,260,072</b>
Of which from 2021								
Of which from 2022	127,286	37,089,864	127,286	37,089,864	127,286	37,089,864	127,286	38,660,912

Of which from 2023	408,856	28,060,858	408,856	28,060,858	408,856	28,060,858	731,579	30,923,280
Of which from 2024		4,187,156		4,187,156	2,423,093	4,187,156	5,183,084	14,675,880
<b>TOTAL</b>	<b>196,474,448</b>	<b>179,350,328</b>	<b>197,073,448</b>	<b>179,350,328</b>	<b>199,496,541</b>	<b>179,350,328</b>	<b>202,579,255</b>	<b>194,272,522</b>

## 2.3.2 Budget execution

### 2.3.2.1 Administrative expenditure

The JU's administrative budget execution increased to 91% (compared to 85% in 2024) in terms of commitment appropriations.

In terms of payments appropriations, the execution rate significantly increased to 86% (compared to 66% in 2024).

More specifically, Title 1 commitment and payment rates increased compared to 2024 (commitment rates: 86% in 2025 and 83% in 2024, payment rates: 83% in 2025 and 73% in 2024). Staff in active employment represented 47% of the total administrative budget and showed a commitment rate of 86%. This execution level was mainly affected by delays in the recruitment of eight positions, including the Financial Officer, Knowledge Management Officer, two Project Officers, a Management Assistant, additional Contract Agents<sup>53</sup>, and a Seconded National Expert (SNE). Nevertheless, staffing levels increased steadily compared to the previous year, and towards the end of the year the JU operated at almost full capacity for TAs and CAs, positively contributing to improved budget execution.

Mission budget execution increased to 92% in 2025 (from 79% in 2024).

Title 2, also showed a marked improvement in execution in commitment rates compared to 2024 (committed: 96% in 2025 and 87% in 2024), and a significant increase in terms of payments (paid: 88% in 2025 and 58% in 2024). These results reflect a structured and proactive budget implementation approach applied throughout the year.

As a result, support contracts, strategic studies, and current administrative expenditure were fully implemented (100%). Rental costs reached an implementation rate of 95%, while information technology expenditure was executed at 98%, and communication expenses at 85%, reflecting careful planning, close follow-up of contractual deliverables, and timely processing of related financial transactions.

Overall, the improved execution of Title 2 demonstrates the effectiveness of active budgetary management, underpinned by well-defined internal processes and sustained coordination across units.

### 2.3.2.2 Operational expenditure

The budget execution reached 99% of commitment appropriations in 2025, mostly due to the global commitment related to the 5th call for proposals under Horizon Europe which launched in January 2025. The overall execution in payments increased to 94% (from 85% in 2024).

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<sup>53</sup> Two additional Contract Agent positions were granted to the Clean Hydrogen JU in the beginning of 2025 and added to the Staff Establishment Plan through the first amendment to the annual work programme and budget, which was followed by recruitment procedures concluded in December 2025 for one of the positions, and in January 2026 for the other one.

In parallel, the execution rate of payment appropriations under Horizon 2020 increased significantly, rising from 72% in 2024 to 100% in 2025. This improvement was the result of strengthened monitoring of grant implementation, close follow-up of payment schedules, and proactive coordination with project and financial officers to ensure the timely processing of payment requests.

For Horizon Europe, commitment appropriations were 99% implemented, demonstrating effective programming and budget planning aligned with the annual work programme. In terms of payments, the overall execution rate increased to 93% (from 88% in 2024), with the remaining amounts to be disbursed in 2026, following the signature of grant agreements by the April 2026 deadline. The overall execution in payments reached 85%, maintaining the same level as in 2023.

This progress results from reinforced cash-flow management, enhanced oversight of grant implementation, and sustained cross-functional cooperation.

**TABLE 19. BUDGET 2025 – STATEMENT OF EXPENDITURE**

Statement of revenue	COMMITMENTS				PAYMENTS			
Heading	Amended budget 2025 (AWP)	Amended budget 2025 after transfers	Executed Budget 2025	%	Amended budget 2025 (AWP)	Amended budget 2025 after transfers	Executed Budget 20285	%
<b>Title 1 - Staff expenditure</b>	<b>5,591,720</b>	<b>4,915,134</b>	<b>4,229,826</b>	<b>86.06%</b>	<b>5,591,720</b>	<b>4,988,134</b>	<b>4,155,344</b>	<b>83.30%</b>
Salaries & allowances	5,215,000	4,505,914	3,927,608	87.17%	5,215,000	4,588,414	3,902,022	85.04%
Expenditure relating to Staff recruitment	5,000	9,000	6,645	73.83%	5,000	9,000	8,061	89.57%
Mission expenses	70,000.00	85,500	85,500	100.00%	70,000.00	89,000	81,720	91.82%
Socio-medical infrastructure (incl. training)	45,000	58,000	54,217	93.48%	45,000	45,000	30,433	67.63%
External services	252,720	252,720	152,932	60.51%	252,720	252,720	129,664	51.31%
Receptions, events and representation	4,000	4,000	2,924	73.10%	4,000	4,000	3,444	86.10%
<b>Title 2 - Infrastructure and operating expenditure</b>	<b>3,981,728</b>	<b>4,669,999</b>	<b>4,469,555</b>	<b>95.71%</b>	<b>3,382,728</b>	<b>3,997,999</b>	<b>3,533,686</b>	<b>88.39%</b>

Rental of buildings and associated costs	844,000	846,271	804,632	95.08%	494,000	496,271	416,344	83.89%
Information, communication technology and data processing	515,500	766,500	753,232	98.27%	515,500	848,500	804,138	94.77%
Movable property and associated costs	254,000	254,000	249,827	98.36%	5,000	5,000	827	16.54%
Current administrative expenditure	9,548	22,048	22,048	100.00%	9,548	22,048	17,804	80.75%
Postage / Telecommunications	7,000	13,000	6,807	52.36%	7,000	10,900	8,318	76.31%
Expenditure on formal meetings	54,000	54,000	48,220	89.30%	54,000	54,000	26,952	49.91%
External communication information and publishing	800,500	800,500	678,243	84.73%	800,500	972,500	960,837	98.80%
Service contracts	1,497,180	1,333,680	1,327,307	99.52%	1,497,180	1,492,680	1,206,477	80.83%
Strategic studies		580,000	579,239	99.87%		96,100	91,989	95.72%
<b>Title 3 - Operational expenditure</b>	<b>189,923,093</b>	<b>193,259,490</b>	<b>191,862,083</b>	<b>99.28%</b>	<b>170,375,880</b>	<b>185,551,757</b>	<b>174,094,763</b>	<b>93.83%</b>
Previous years' Calls/other funded actions		253,682	200,662	79.10%	11,478,514	16,214,304	16,193,882	99.87%

Current year's Calls/other funded actions	189,923,093	193,005,808	191,661,421	99.30%	158,897,366	169,337,453	157,900,881	93.25%
<b>TOTAL</b>	<b>199,496,541</b>	<b>202,844,623</b>	<b>200,561,464</b>	<b>98.87%</b>	<b>179,350,328</b>	<b>194,537,890</b>	<b>181,783,793</b>	<b>93.44%</b>

## 2.4. Financial and in-kind contributions from Members other than the Union

**TABLE 20: CONTRIBUTIONS FROM MEMBERS OTHER THAN THE EU IN 2025 (EUR)**

Contributions from JU Members other than the Union in 2025	
Nature	Amount (in €)
Financial contributions (FC) reported	3,845,434.00
In-Kind to Operational Activities (IKOP) reported	53,639,751.01
In-Kind to Additional Activities (IKAA) reported	0.00 <sup>54</sup>
In-Kind to Additional Activities (IKAA) reported and certified	0.00 *
<b>TOTAL all contributions reported</b>	<b>57,485,185.01</b>
<b>TOTAL all contributions reported, including certified IKAA</b>	<b>57,485,185.01</b>

**TABLE 21: EVOLUTION OF CUMULATED IKOP UP TO 2025 (EUR)**

Values of IKOP - Evolution (in EUR) (or graph-Optional)				
Reference of the Project-Call	Total amount of IKOP planned for the project	Amount of IKOP reported before 2025	Amount of IKOP reported in 2025	Total Amount of IKOP certified until 2025
Call 2014	33,080,357.24	33,080,357.24	0.00	33,080,357.24
Call 2015	39,899,049.74	22,920,120.92	16,978,928.82	39,899,049.74
Call 2016	7,780,349.17	7,620,332.19	160,016.98	7,780,349.17
Call 2017	45,490,630.75	24,976,987.59	19,946,104.61	44,661,078.51
Call 2018	26,856,558.56	11,970,721.78	8,087,971.84	6,654,743.49
Call 2019	27,507,910.74	10,155,924.71	1,363,227.03	3,076,265.57
Call 2020	16,752,252.70	15,045,090.27	8,261,793.56	9,081,774.56
Call 2022	79,151,497.54	2,394,715.53	-1,439,300.36	0.00
Call 2023	26,204,689.29	668,553.12	280,953.09	0.00
Call 2024	2,490,830.41	0.00	0.00	0.00
Call 2025	4,985,915.63	0.00	0.00	0.00
<b>TOTAL</b>	<b>310,200,041.77</b>	<b>128,832,803.35</b>	<b>53,639,751.01</b>	<b>144,233,618.28</b>

<sup>54</sup> No IKAA data was collected after June 2025 IKAA data reported in the Annual report 2024, as IKAA figures for 2022-24 exceeded the SBA target, in line with approved minutes of the Governing Board meeting held on 10 June 2025 where GB chair proposed no further IKAA data collection due to targets achieved and exceeded.

**TABLE 22: EVOLUTION OF CERTIFIED IKAA IN 2024 AND 2025, AND TOTAL SINCE 2021 (MILLION EUR)**

<b>Values of certified IKAA – Evolution (in EUR), since 2021 EUR and (million EUR)</b>	
<b>Year</b>	<b>Amount of certified IKAA</b>
YEAR 2022 closed at year-end 2024	256.94
[YEAR N-1] 2023 closed at year-end 2024	482.96
2024 Closed as of 31 May 2025	698.07
<b>TOTAL since 2021</b>	<b>1,437.97</b>

## 2.5. Administrative Procurement and contracts

In 2025, the tendering and contract management strategy has weighed on interinstitutional procurement procedures launched by the European Commission or other EU bodies in order to use the resulting multiannual framework contracts.

In addition, the Clean Hydrogen JU cooperates with other Joint Undertakings on tendering needs in order to minimise the administrative effort for goods and services which are cross-JU, in the context of the Back Office Arrangements for Procurement (BOA Procurement – see also in Section 2.7.2 on efficiency gains and synergies). The BOA Procurement was established in 2023 through a Service Level Agreement, signed between the Clean Aviation JU and seven other Joint Undertakings.

Most of the Clean Hydrogen JU’s administrative contracting was carried out through existing multiannual framework contracts, under the lead of the European Commission, of the BOA Procurement or through the Clean Hydrogen JU’s own direct or framework contracts. For example, under the BOA Procurement, the Clean Hydrogen JU has secured the provision of services to organize first-aid training courses for the staff of 9 Joint Undertakings.

Table 21 provides an overview of the contracts awarded in 2025, including the procedure used in each case and the name(s) of the contractor(s); only those contracts with a value exceeding EUR 15 000 are listed.

In cases of specific contracts implementing a framework contract, the information is aggregated for each contractor under the same framework contract.

**TABLE 23. CONTRACTS AWARDED IN 2025**

<b>Contract subject</b>	<b>Contract type</b>	<b>Contractor info</b>	<b>Tender procedure</b>	<b>Signature date (dd/mm/yyyy)</b>	<b>Amount (EUR)</b>
EU Hydrogen Research and Innovation Days 2025	Specific contract	ICF NEXT S.A.	N/A	07/07/2025	127 777
Specific Contract no. 3 implementing Framework contract No CleanHydrogen/Contract	Specific contract	THINK E	N/A	27/02/2025	1 242 745,6

326 – Project Technical Assistance services					
Booth Transport, setup and dismantle - Hyvolution Paris 2025	Specific contract	CREASET SA	N/A	27/01/2025	22 351,64
Specific Contract no. 19 with Inetum for Managed Infrastructure Services Package 2025 01/01/2025-31/12/2025	Specific contract	RealDolmen	N/A	01/01/2025	29 485,69
CleanHydrogen/Contract 359 - Inter-JU First Aid Training	FWC - Single	Rode Kruis - Vlaanderen	Negotiated procedure	05/06/2025	50 000
Specific contract implementing FWC COMM/2025/OP/0051 - EU Hydrogen Valleys Days 2025	Specific contract	GOPA COM.	N/A	08/05/2025	138 561,98
Specific contract implementing FWC COMM/2025/OP/0051 - Success Stories 2025	Specific contract	GOPA COM.	N/A	21/05/2025	100 351
Specific contract implementing FWC COMM/2025/OP/0051 - Clean Hydrogen Innovation Forum 2025	Specific contract	GOPA COM.	N/A	04/08/2025	110 407,32
Interim services AST to the ED and support to F&A for period 6 november 2025 until 01 may 2026	Specific contract	Randstad Belgium NV	N/A	06/11/2025	36 635,04
Interim support for F&A unit for period 01/04/2025-26/09/2025	Specific contract	Randstad Belgium NV	N/A	31/03/2025	36 353,23
Analysis of synergies activities and development of synergies strategy	Direct contract	White Research BV	Negotiated procedure	02/07/2025	135 500

Lease of a hydrogen powered fuel cell car for the Clean Hydrogen Joint Undertaking	Direct contract	Toyota	Negotiated procedure	08/09/2025	57 373
The role of innovation in enhancing the competitiveness of the European hydrogen sector	Direct contract	Environmental Resources Management France SAS	Negotiated procedure	11/08/2025	139 500
Staff Engagement Survey 2025	Direct contract	Pwc EU Sevices EESV	Negotiated procedure	01/07/2025	24 239,39
Specific Contract no 1 implementing Framework Contract CleanHydrogen/Contract 399 - "European Hydrogen Refuelling Stations Availability System"	Specific contract	SPILETT new technologies GMBH	N/A	17/12/2025	255 750
Specific Contract no 1 implementing Framework Contract Clean Hydrogen/Contract 401 - European Hydrogen Sustainability and Circularity Panel	Specific contract	ECORYS EUROPE EEIG –GEIE	N/A	17/12/2025	532 150
Consultancy services for Space planning and design 2025	Direct contract	BEDIMO SOCIETE ANONYME	Negotiated procedure	10/10/2025	31 680

## 2.6. IT and logistics

Information and communications technology (ICT) provides the ICT infrastructure, tools and services that enable staff members to work and teams to collaborate. Since its creation, the JU has been one of the most active promoters of a single approach for all the JUs to the ICT environment, reducing costs, outsourcing, and increasing performance

The year 2025 was marked by specific actions fulfilled in the following mentioned distinct areas: ICT governance, Information and document management, digital transformation, cybersecurity and logistics and facility management.

## 2.6.1 ICT Governance

The Joint Undertakings took all opportunities to build synergies on areas of joint interest and maintain the strong partnership with other entities such as DIGIT or other partnerships to harmonise processes and good practice. This has particularly materialized in 2025 by the and the governance lead by Clean Hydrogen of the back-office arrangement on ICT. The annual action plan and corresponding budget were fully delivered – see the section 2.7.2 efficiency gains and synergies – BOA ICT.

To further develop the ICT services, the JU joined each interinstitutional framework contracts or inter-agency joint procurement of added-value, and adopted the new delivery model of DIGIT composed of Dynamic Purchasing Systems (DPS). SCIC AVC-3 framework contract was used to upgrade the audio-visual equipment of our common meeting rooms, while FREIA has been investigated to support the cybersecurity services to develop in 2026.

## 2.6.2 Digital infrastructure

Regarding the digital infrastructure, the JU continue to rely on the secure pan-European networks for the Commission, executive agencies and other European institutions. The new TESTA line design shared with more agencies operated under the new DIGIT broker model is shared with the IT community and more agencies are using this innovative solution.

The upgraded common conference centre of the White Atrium building has been delivered with the necessary audio-visual functions to hold hybrid meetings. The installation and final delivery to the Joint Undertakings has been established for February 2026.

The integration of SNS JU and EDCTP3 in the common infrastructure in the White Atrium after their autonomy materialized during the last quarter. This technical project was supported by the IT managed services contract and embedded network services.

## 2.6.3 Digital transformation

In the area of digital transformation, the main objective is to build a performing digital infrastructure and a fit-for-purpose Digital Workplace. Each staff member is receiving modern IT equipment, but also encouraged to develop the digital skills, mobile hardware and software solutions, and collaboration with the cloud approach and keeping cybersecurity mindsets anytime.

### 2.6.3.1 Information management

#### EC Solutions

The JU has implemented ICT tools designed and made available by the EC for the financial and call management. These tools are updated and maintained on regular basis by the Commission services; they require continuous input from the side of the JU, on the one hand, to correct the multiple and repetitive mistakes and, on the other hand, in terms of future developments to meet the expectations of the partnership. COMPASS stands for Corporate Management and Processing Architecture for Shared Services. It is the European Commission's corporate IT architecture and integration framework, designed to standardize and harmonize IT solutions across the institution. The core systems used by the Clean Hydrogen Joint Undertaking from COMPASS are :

- SUMMA (Financial Management System)
- e-Grants (Grant Management)
- e-Procurement (Procurement Processes)
- PMO (Project Management Office)

The roles of Single Point of Contact for EC applications were evident and crucial this year when it came

to the deployment of the new IT accounting system (SUMMA – “The European Commission's next-generation corporate financial system designed to modernise, harmonise, and standardise EU financial business processes, replacing the ABAC system”). To ensure the correct usage and implementation of these applications, the JU also makes use of the training services offered by the EC on these applications (see section 2.7 Human resources). This transition process turned out as the “project of the year”. It required involvement of staff resources in the finance and administration for a full semester, and with imperative deadline for the year-end closure. A strong collaboration developed also amongst the ExaMs - External Authorisations Manager - of the different Joint Undertakings since they were responsible for security and access management in SUMMA for external entities and crucial in this project.

For the execution of the funded actions, the Joint Undertaking is using :

- For calls for tenders : the “e-Procurement” suite was used throughout the entire process: from the publication of the call, the submission and evaluation of the proposals as well as for grant preparation. The “e-submission/e-tendering” is supporting the operational tender procedures.
- For call for proposals : the “e-grants” suite was useful as before to ensure the successful implementation of the call 2025.

The Clean Hydrogen JU is also using (or adopting when possible) flagship digital solutions developed by the European Commission, such as SysPer and Systal for HR services, ARES for document management and the Next-EUROPA platform as web communication platform.

- The additional module MIPS for Mission Processing System has been deployed successfully in January 2025 and further harmonize the processes, workflows and procedures for Human Resources administration.
- The JU’s web presence is supported by a website compliant with the Europa Web Publishing Platform (EWPP) hosted under the Next-EUROPE platform. This ensured stability and continuity of this essential tool for the external communication and visibility of the Clean Hydrogen JU programme.

#### Other Agencies/JUs’ framework contracts

The Clean Hydrogen JU initiated in 2010 with the first Joint Undertakings the joint strategic ICT plan for the JUs located in the White Atrium building. Since then the JU shares its virtual IT infrastructure hosted by a private cloud computing provider and also shares the ICT managed services performed by a private company, in synergy with the other JUs. The connectivity to the EC tools, essential for the business operations, is also ensured via this secured private cloud. The full mobility and independence from the premise in Brussels is then guaranteed at all time and greatly supports the business continuity plan.

The hosting of the different knowledge platforms delivered to the JUs, such as Observatory, Hydrogen Valley, the CRM suite and the recent Knowledge Hub is ensured by different contractors, while the operational and security aspects are covered by our IT managed services provider for all the Joint Undertakings. This provides the technical support of the various applications but also developments by third parties contracted aside. The public access to those communication tools is also supported by the necessary maintenance and support contracts. In 2025, The EU Login services, provided by Commission, has been used for the Knowledge Hub to reinforce audit trail and data protection of our key asset but also direct access to the main source of information’s, our grants. This allowed a simplification of the landscape of applications and the TRUST and CRM platforms have been decommissioned in December.

The Joint Undertaking is also using software-as-a-service solutions since 2022 for the end-users. Key assets are Teams for meetings, document libraries in SharePoint, and Teams groups and OneDrive for collaboration, Exchange online but also Defender for the security and management aspects. This goes along with the implementation of the necessary mitigating required by the adopted EU regulation on the protection of personal data by EU institutions and bodies (Regulation (EU) 2018/1725).

In 2025 the Joint Undertakings organized a common assessment of the current Data Protection Impact Assessment (DPIA) and security risk assessment performed on the Microsoft Office 365 public cloud environment. The goal is to revise the current landscape but also extend our safe usage of other assets such as power platforms, planner or generative AI agents. The analysis closed in September 2025 resulted in a common action plan for 2026 to revise and implement further mitigation measures both on IT and DP side.

### *2.6.3.2 Document Management*

Since December 2023, the IT Officer has taken over the role of Document Management Officer (DMO). This ensures the continuation of the correct implementation and monitoring of the European Commission electronic archiving and document management (e-Domec) policy within the entire JU. This significant role was combined with the contract management aspects and the Joint Undertaking opened a new position for a Document and Contract assistant recruited in December 2025. The transition will be organized from after the mandatory trainings and nominations in 2026.

The main activities in 2025 on document management can be summarised as follows:

“Job users” were created and interfaced with the Knowledge hub tool developed by Clean Hydrogen so that the exploitation of registered filled documents is facilitated for data mining and data collection.

“Job users” were created and interfaced with the SUMMA accounting to register automatically the document sent electronically and via PEPPOL.

New folders were created in NomCom to accommodate the yearly activities, and the annual check on registration rules for document was performed in November to ensure proper conservation and archiving.

The dedicated collaboration platform using Microsoft Teams channels and SharePoint libraries for the benefit of all the Joint Undertakings in a common tenant is still greatly appreciated and resulted in a reduced if not stopped usage of the old CIRCABC platform. This is reinforcing the synergies and interaction of the back offices arrangements (ICT, Accounting, Procurement) but also more new groups of internal and external actors organized in dedicated teams.

The project of implementation of AresBridge integrated in Microsoft 365 SaaS information system to complement the IT tool Hermes-ARES-NomCom is postponed. We are looking forward for some other similar initiative, i.e. in SESAR, to benefit from the experience and development.

### *2.6.3.3 Cybersecurity*

Regarding the JU’s resilience to ever-evolving digital security threats, the Cybersecurity was reinforced by focusing on the business continuity operations:

- a close follow-up of the infrastructure-as-a-service solution and managed IT service contracts available to the Clean Hydrogen JU;
- efficient remote support provided by the IT officer and the service desk;
- making sure that JU is not affected by security incidents arising from external cyberattacks.

The developments of the new information security (Infosec) regulation and the discussions around the cybersecurity regulation 2023/2841 were followed closely in each dedicated meeting and group. The

implementation of those recommendations for improvement are facilitated by the preparation of the cybersecurity service group under the ICT back-office arrangement (BOA) lead by IHI JU.

Regulation 2023/2841 of the European parliament and of the council aims to achieve a high common level of cybersecurity within the EU institutions, bodies, offices, and agencies. The Interinstitutional Cybersecurity Board (IICB) has issued a number of governance guidelines to accommodate this requirement. Joint undertakings falls under this regulation and therefore we need to comply to these guidelines.

The dedicated role of Cyber Security Officer within the Joint Undertaking has been confirmed by the nomination of the IT Officer to support this function. Regular reporting to the Executive Director has been organized in 2025 to support the adoption of the different assessments and plans produced within the year by the common cybersecurity officer.

In 2025 the obligations was to produce 4 key documents with strict deadlines, Risk Assessment, Maturity Assessment, Cybersecurity measures and finally a Cybersecurity Plan to achieve and revise every 2 years. The considerable amount of work was supported as said by the ICT back-office arrangement but also by a dedicated common cybersecurity officer provided by the IT managed services contract.

Awareness-raising activities are held regularly for the benefit of the JU's staff to draw their attention to the importance of protection of assets and information, especially towards phishing campaigns for the staff members and redteaming exercises performed on an annual basis with the support of European Union Agency for Cybersecurity (ENISA) and CERT-EU for the IT experts.

Security recommendations and assessments for Microsoft 365 were performed by CERT-EU and Microsoft. Suggested improvements were immediately taken on board and implemented with the help of the ICT managed services provider to the extent possible.

The JU Local Information Security Officer (LISO) continued participating in the dedicated DIGIT Interinstitutional Committee for Digital Transformation (ICDT) CyberSecurity sub-group and the CERT-EU stakeholders forum. The new roles of LCO has been taken by the IT Officer.

#### **2.6.3.4 Logistics and facility management**

In addition, logistical support continued to be provided in the context of general administration. This encompasses the management of the supply and maintenance of equipment, namely stationery, goods and services for administration, and includes the monitoring of services provided in particular through the Office for Infrastructure (Brussels), the Translation Centre and the Publications Office of the European Union.

Logistical management and facility management were adapted to the new ways of working, in line with the Commission decision on new ways of working and hybrid working.

We continued to use remote working capabilities as an integrated way of working; dynamic approaches to the use of office space and use of modern and wireless technologies as a valid sustainable alternative which represents a significant benefit in terms of environmental footprint, efficiency, and work-life balance. We kept also the failover solution for damaged or missing device with the possibility to work with a virtual desktop solution on a private device. This was extensively used by the extra-muros work without any additional investment.

We challenged also in 2025 the office design and space allocation for staff members when working in White Atrium. This project will materialize in 2026 with the refurbishment of the 4<sup>th</sup> floor in Whoete Atrium.

## 2.7. Human Resources

### 2.7.1 HR Management

#### Staff selection and recruitment

The staff establishment plan (SEP) allows for 27 Temporary agents, 4 contract agents and 3 SNEs. We onboarded 2 Project officer as replacement of 2 staff members who left.

The JU successfully completed the selection process for the Document and Contract Management Assistant and onboarded the new staff member in December.

The position for Stakeholders Relationships officer was completed by the Selection panel in December; final decision and recruitment were scheduled for the following year.

The selection of two trainees was finalized by year end; onboarding was scheduled for January.

The JU reached an occupancy rate of 93,75 % at the end of 2025 and the turnover was 6.25% in 2025.

#### Team Activities organized in 2025

A New Year's lunch was organized on 19 January 2025.

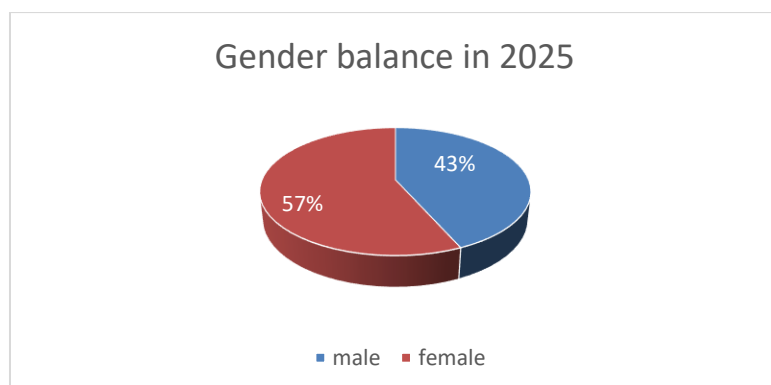
A staff survey was conducted with an external consultant selected through a procurement procedure. The results were communicated to all staff in November.

A teambuilding event for the whole organization took place on 18 November 2025, an analysis of the staff survey was given and a workshop to create an action plan took place in the afternoon.

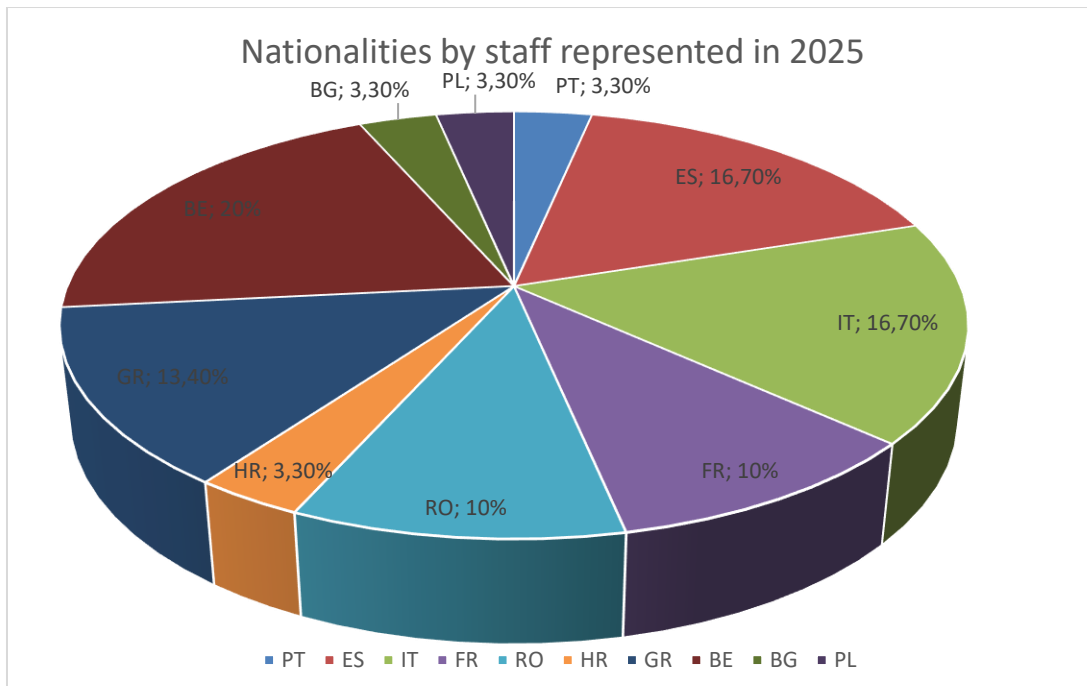
Topics of improvement were identified and volunteers to prepare an action plan were established and started to create solutions. Once completed the JU will use these procedures and PwC will follow-up to see if the action plans have been put in place and are having the expected results of improving the difficulties identified during the workshop. The JUs, as interinstitutional partners, have also attended meetings held by the European Commission on the HR transformation programme that intends to set up a new IT platform to replace SYSPER. The JUs will further strengthen this collaboration in 2026.

**FIGURE 23. STAFF STATISTICS: (A) GENDER BALANCE AND (B) NATIONALITIES**

#### Gender Balance



## Geographical Balance



## Learning and professional development

Most trainings followed by Clean Hydrogen JU staff members in 2025, were on Lump sum, SUMMA and ECS.

In order to create more synergies between the JUs especially in the HR area, several trainings have been organized by one JU and were available to staff of all the JUs as mentioned in the Table 24.

**TABLE 24. TRAINING OVERVIEW**

Name of training	Organized by	Given by
Anti-fraud awareness session	Sesar JU	Sesar JU
Cyber security awareness training	IHI JU	European Commission
Prevention of Harassment for JU managers	IHI JU	E&Y
Respect and dignity at the workplace (for managers)	IHI JU	E&Y
First Aid trainings (2-full days)	Clean Hydrogen JU	Rode Kruis Vlaanderen

**TABLE 25. STAFF IMPLEMENTING RULES (SIR) ADOPTED IN 2025**

SIR implemented in 2025	
Title of the SIR	Reference and date of the GB decision (if relevant)
<p><b>Adopted by analogy:</b>            Commission Decision C(2022) 1715 of 24 March 2022 on home leave for officials, temporary staff and contract staff serving in a third country</p> <p>Commission Decision C(2023)8630 of 12 December 2023 on the prevention of and fight against psychological and sexual harassment – we have adopted this decision but we still apply our internal procedure with the JUs is still valid <a href="#">Ares(2023)1366936</a></p> <p>Commission Decision C(2024) 1038 of 21 February 2024 amending Decision C(2011)1278 final on the GIPs for Articles 11 and 12 of Annex VIII SR on the transfer of pension rights.(it concerns a change in the conversion coefficient on the transfer of pension rights)</p>	
<p><b>Adopted by Written procedure:</b>            Commission Decision C(2025) 2495 final Mission Guide - adopted retroactively as of 13 May 2025.</p> <p>Commission Decision C(2022) 497 final on the conduct of administrative inquiries and disciplinary proceedings</p>	<p>CleanHydrogen-GB-2025-08            ARES(2025)8250295</p> <p>CleanHydrogen-GB-2025-05            ARES(2025)9124213</p>

## 2.7.2 Efficiency gains and synergies

### [BOA ICT](#)

The Clean Hydrogen JU and the IHI JU are co-leads of the BOA ICT.

After signature of the SLA and Descriptions of Services by the EDs of 10 Joint Undertakings at the end of 2024, in full accordance with Article 13 of the SBA and continuing the shared practices of the past 14, the Back Office Arrangement for ICT formally started its activity on 1st January 2025. ICT activities were carried out in accordance with the priorities set forth in the BOA ICT AWP and common services, namely:

- Service area #1 Inter-JU IT Governance,
- Service area #2 Management of shared ICT infrastructure and Service area #4 Workplace services provision,
- Service area #5 Security and compliance management;

In 2025, in continuation of the practice over the previous years, the JUs held 4 ICT Steering Committee meetings, during which:

- The implementation of the common ICT annual work plan and budget for 2025 (AWP 2025) was monitored.
- The common ICT annual work plan and budget for 2026 (AWP 2026) was defined, with an early adoption during the meeting of September 2025.

The AWP 2025 contains the following 7 actions and related budget:

- Action 1. BOA ICT implementation
- Action 2. Next FWC for ICT Managed services
- Action 3. Upgrade Common Meeting
- Action 4. Internet line provider
- Action 5 Security regulation(s)
- Action 6. SaaS O365
- Action 7. Windows 11 migration
- Action 8. reconversion White Atrium building

The actions of the AWP 2025 were implemented in accordance with the plan. Particular effort was devoted to the cybersecurity action plan, implemented in full accordance with the timeline defined in Regulation 2023/2841 of the European Parliament and of the Council laying down measures for a high common level of cybersecurity at the institutions, bodies, offices and agencies of the Union. The activities implementing this part of the AWP 2025 were led by IHI JU and CBE JU, and then broken down per JU. This resulted in the delivery of the 4 mandatory document according to the cybersecurity regulation :

- cybersecurity review
- risk assessment
- maturity assessment
- cybersecurity plan

The AWP 2026 includes the following actions:

- Action 1. BOA ICT implementation
- Action 2. Next FWC for ICT Managed services
- Action 3. SaaS O365 – update of risks and mitigations measures
- Action 4. Upgrade Common Meeting
- Action 5 Security regulation(s)
- Action 6. AI tools for Joint undertakings
- Action 7. Improvement to White Atrium building infrastructure

[BOA for Accounting Services](#)

The JUs took over the Accounting services that until 30 November 2022 were provided by DG BUDG and succeeded in implementing the BOA for Accounting Services in 2022, and immediately for the accounting closure 2022.

EU-Rail is the lead JU of this BOA and concluded the SLA with the other JUs on 16 December 2022. Accounting services will be provided by 3 Accounting Officers coming from the following JUs: CA JU, SESAR JU and EU-Rail JU.

#### Organisation:

- The Executive Director of the Lead JU is responsible for the organization, oversight and coordination of the accounting services to the other JUs on the basis of an annexe of the BOA SLA.
- The Head of Corporate Services or another officer with the necessary grade, skills and competencies of the Lead JU shall act as Accounting Coordinator of the BOA Accounting Officers.
- The Accounting Officer(s) of the JU Accounting Providers delivers the service to one or more JU Accounting Beneficiary and is responsible for the accounts she/he signs off, while counting on the support and coordination with the lead JU.

In order to ensure the provision of these services, it was agreed between the EC and the JUs to make use of the support of 3 additional Contractual Agents and of an external Accounting Services provider. The BOA for Accounting services are fully operational and are delivering the intended services, including the preparation of the Provisional and Final Annual Accounts for 10 Joint Undertakings and liaising with the audit teams on accounting matters, the follow-up on the collection of Accounts Receivable past the due date, the VAT reporting towards the Belgian authorities, the annual validation of the accounting system, the inscription of the budget etc.

During 2025, the BOA Accounting continued to ensure the business continuity of its services and prepared the provisional accounts for the 10 JUs in a timely manner while receiving already a clean opinion for 9 out of 10 JUs by the European Court of Auditors. The BOA accounting has also provided on request ad-hoc support for the implementation and update of financial systems and financial processes. As of January 2025, the BOA team is composed of 3 Accounting Officers supported by 3 Accounting Assistants.

#### BoA Procurement

In 2025, the BOA Procurement continued to create tangible benefits and added value for all participating Joint Undertakings. The larger budgetary volume and economies of scale increased the interest of economic operators in the open tender procedure for communication services launched by CAJU on behalf of 9 JUs. This may explain the exceptionally high number of tenders received in response to this open call.

At the same time, the ad hoc deployment of legal/procurement resources made available by other JUs to CAJU demonstrated the effectiveness of the solidarity and synergy concept.

The 2025 activities of BOA Procurement were not limited to the execution of the tender procedures. They also included a feasibility analysis of how the corporate E-Procurement tools provided by DIGIT could support JUs current operational and implementation model in relation to joint specific contracts.

## BOA HR

In 2025, under the leadership of BOA HR, the Joint Undertakings have continued to maximise synergies and implemented several initiatives across three key HR areas: selection and recruitment, HR legal framework and HR digitisation. In particular, through bi-monthly meetings, the JUs further promoted best practices, ensured consistent HR support services, and achieved greater efficiency and economies of scale.

In line with the HR BOA HR action plan 2025, the JUs have:

- finalised the alignment and harmonisation of selection and recruitment practices across all JUs;
- conducted a state-of-play analysis of the inter-JU Competency Framework, which will be further developed in 2026;
- launched a pilot initiative establishing common Service Level Agreements (SLAs) between DG HR and the JUs for the provision of badges;
- strengthened cooperation by organising an HR Officers' Away Day to share best practices and enhance collaboration;
- shared reserve lists to reduce time-to-recruit. In particular, IHI JU shared two reserve lists with other JUs and Executive Agencies, enabling the recruitment of two staff members in different organisations. It also provided expertise and resources by contributing panel members to several selection procedures across JUs;
- supported newly established Joint Undertakings during their start-up phase by providing guidance, advice, and templates;
- centralised the organisation of training courses of common interest for all JUs (e.g. ethics and integrity, respect and dignity in the workplace). In this context, IHI JU organised six half-day sessions on Ethics and Integrity and four half-day First Aid training sessions for JU staff members;
- joined the Standing Working Party as part of a dedicated JU cluster to facilitate effective participation and contribution of the JUs, and contributed to the development of a common JU HR legal framework by sharing Executive Director and Governing Board decisions on various HR regulatory matters.

## **3. GOVERNANCE**

### **Major developments**

### **3.1. Phasing-out plan monitoring**

The objective of the 1<sup>st</sup> initial plan adopted in 2023 was to provide a pragmatic approach to the scenario on the discontinuation of all JU's operational and administrative activities, relevant procedural aspects and timeline by 31.12.2031.

The Joint Undertaking has prepared, as agreed previously with its members, a 2<sup>nd</sup> version which is addressing the remaining aspects and completes the document (following a template shared by Commission services); it is still to be considered as a "living" document and thus subject to amendments in line with any other developments of the JU in the future. The updated Phasing Out Plan was adopted by the Governing board via its decision number CleanHydrogen-GB-2025-02, on 0/04/2025.

### **3.2. Governing Board**

The Governing Board of the JU comprises three representatives from the European Commission representing the EU, six from Hydrogen Europe and one from Hydrogen Europe Research.

The GB chair was Ms Danica Maljković, representative of the Industry Grouping (Hydrogen Europe).

The Vice-Chair was Ms Rosalinde van der Vlies, Director of Clean Planet at DG Research and Innovation and representative of the Commission. Her mandate lasted until 31 March 2025, when she was replaced by Ms Joanna Drake, RTD DG, acting Director of the Clean Planet Directorate in DG RTD.

During the year, the Governing Board held three meetings, on 27 February, 26 June and 22 October.

All the meetings focused on strategic issues and discussions on the progress of the programme and included updates from the members on policy developments and Horizon Europe.

The first meeting, in February, was mainly dedicated to discussions regarding the strategic priorities for 2026 AWP, updates on Hydrogen Week, synergies, 2025 budget and Staff Establishment Plan, phasing-out plan, an overview of JU governance models and the status of MFF preparation.

In June, the main topics included the election of the new Vice-Chair of the Governing Board. The discussions focused on the AWP 2026 status (including budget), an update on the Hydrogen Week and other flagship events, an update on synergies, a presentation on next MFF and SET Plan together with private members' expectations for the next MFF.

The third meeting, in October, tackled an update synergies, a presentation on the use of leftover budget, an update on AWP 2026 (including budget), and update on the SET Plan and on next MFF including FP10.

The GB also adopted major decisions by written procedure, which are:

- CleanHydrogen-GB-2025-01: Decision of 26 March 2025 adopting the first amendment to the Clean Hydrogen JU 2025 Annual Work Programme

- CleanHydrogen-GB-2025-02: Decision of 9 April 2025 adopting the revised Phasing-out plan of the Clean Hydrogen JU
- CleanHydrogen-GB-2025-03: Decision of 25 April 2025 adopting the second amendment to the Clean Hydrogen JU 2025 Annual Work Programme
- CleanHydrogen-GB-2025-04: Adoption of 29 July 2025 of the minutes of the GB meeting of 27 February 2025
- CleanHydrogen-GB-2025-05: Decision of 24 October 2025 laying down general implementing provisions on the conduct of administrative inquiries and disciplinary proceedings
- CleanHydrogen-GB-2025-06: Decision of the 27 June 2025 on the Consolidated Annual Activity Report for 2024 including the corresponding expenditure and on its assessment
- CleanHydrogen-GB-2025-07: Opinion of the 27 June 2025 on the Annual Accounts 2024
- CleanHydrogen-GB-2025-08: Decision of 25 September 2025 on the adoption of the updated Mission guide
- CleanHydrogen-GB-2025-09: Decision of 6 August 2025 approving the list of actions selected for funding, the reserve lists, and the list of rejected proposals under the Clean Hydrogen Joint Undertaking call for proposals with reference HORIZON-JU-CLEANH2-2025
- CleanHydrogen-GB-2025-10: Adoption of 14 October 2025 of the minutes of the GB meeting of 26 June 2025
- CleanHydrogen-GB-2025-11: Decision of 21 October 2025 adopting the third amendment to the Clean Hydrogen JU 2025 Annual Work Programme
- CleanHydrogen-GB-2025-12: Adoption of 7 November 2025 of additional lists of actions selected for funding resulting from the evaluation of the call for proposals HORIZON-JTI-CLEANH2-2024-1 for optimal implementation of call budgets
- CleanHydrogen-GB-2025-13: Adoption of 17 December 2025 of the Clean Hydrogen JU's annual work programme and budget for 2026

More information on the role and composition of the Clean Hydrogen JU Governing Board is available on the JU's website ([https://www.clean-hydrogen.europa.eu/about-us/organisation/governing-board\\_en](https://www.clean-hydrogen.europa.eu/about-us/organisation/governing-board_en)).

### **3.3. Executive Director**

Article 19 of the SBA defines the role of the Executive Director as the legal representative and the chief executive responsible for the day-to-day management of the JU, in accordance with the decisions of the Governing Board. Ms. Valérie Bouillon-Delporte has been the Executive Director appointed by the JU GB since the 1 June 2024.

Internal delegation arrangements have been in place over the year to ensure full business continuity in case of planned or unexpected absence of the Executive Director in her role of Authorising Officer and Appointing Authority.

### **3.4. States Representatives Group**

Established in 2022, the States Representatives Group (SRG) has 75 members, of which 64 representatives (main and alternate) are from the 27 Member States and 11 representatives are from 5 Associated Countries (4 Associated Countries have not nominated a representative).

In 2025, the SRG met on three times: on 14 February, on 3 June and on 10 October. Its activities focused on following up the JU's work and results and advising the Governing Board accordingly, including the following:

- During the February meeting, the SRG members were updated on the possible priorities for the call for proposals to be held in 2026 and were requested to provide initial feedback;
- During the June meeting, the SRG members were updated on the status of the call for proposals in 2025 and on the progress of the discussion on topics of the call for proposals in 2026. The Chair presented the opinions on the AAR 2024 and the Commission presented the overall process for the preparation of the next MFF;
- At the October meeting, the Programme Office presented the status of the call for proposals in 2025, sharing the call results and the outcome of the procedure for optimal use of the operational budget, endorsed by the GB, and updated the SRG members on the AWP for 2026 and on the Hydrogen Week. The SRG was also presented the situation of newly Associated Countries and how their association may impact the operational budget of the JU. The Chair presented the template and process of the "Report describing the national or regional policies and identifying specific ways of cooperation" (SBA Article 20(9) and (10)).

The formal consultation of the SRG took place in May 2025 regarding the Annual Activity Report for 2024 and in November regarding the Annual Work Programme for 2026. Both consultations concluded with positive opinions provided to the Governing Board, with some comments taken into account by the Programme Office.

The report on national and regional policies on Hydrogen (2025 version) was under construction development and consolidation at the end of 2025, prior to its submission to the Governing Board in the beginning of 2026.

### **3.5. Scientific Committee**

N/A

### **3.6. Stakeholders Group**

The Stakeholders Group is an official advisory body, as foreseen in the Council Regulation establishing the Joint Undertakings, specifically in Recital 34 and Articles 22, 79 and 84. The Stakeholders Group is to be consulted on various horizontal issues or specific questions in areas relevant to the work of the Clean Hydrogen JU.

On 17 December 2021, a Call for Expression of Interest was launched, open to all candidate groups or sector representatives to join the JU's Stakeholders Group. On 2 February 2022, after concluding the selection process in accordance with the criteria established by the Governing Board of the Clean Hydrogen JU, the members of the Stakeholders Group were appointed for a four-year term.

Considering the need to ensure full sector coverage, as well as geographical and gender balance, the Governing Board decided that the composition of the Stakeholders Group would be reassessed in 2023. Thus, the Clean Hydrogen JU launched a new Call for Expression of Interest for new Members

open to all candidate groups or sector representatives and on 7 May 2024, the new five members of the Stakeholders Group were appointed by the Governing Board for the remainder of the initial four-year period.

In 2025, the Stakeholders Group met in June (10/6/2025) and September (25/9/2026), as in previous years, but a third meeting was held in February (13/2/2026). The addition of this meeting helped engage stakeholders earlier in the process to develop the Annual Work Programme (AWP), including the 2026 priorities and potential synergies. The meetings included an update from the Programme Office on the Call 2025, the development of the AWP 2026, key events, valleys, working with Member States and Regions, and synergies. It also included an update on the SET-Plan by EERA and presentations from various members about their activities and their synergic potential.

Consultation with the members via email included an informal consultation on the draft topics proposed for the Call 2026 (May) and a formal consultation on the list of Call 2026 topics, particularly asking for suggestions to enable concrete synergies (October). The members were also formally asked to provide feedback on the draft Synergies Strategy (December). Other formal communication includes the emails preparing for and following up on the meetings (sending the agenda, presentations, minutes, actions, etc.).

Other communication via email to the members during 2025 included an encouragement to the members to participate in the public consultation on the next MFF (March), an outreach requested by the Delegation of the European Union to Japan to promote the Smart Energy Week in Tokyo (June), information on the opening of the Call for Applications for Project Development Assistance, in the context of the Hydrogen Valley Facility (July), outreach information on the Hydrogen Week 2025 and the Innovation Forum (September).

Given that the mandate of the members of the Stakeholders Group would end on February 6 2026, and considering that the Governing Board had foreseen the possibility of extending the mandate of appointed members by an additional 3 years<sup>55</sup>, appointed members were invited via email (November) to manifest their interest in continuing on the Stakeholders Group. As the Governing Board highlighted the importance of a continuous effort to create a representative SG, two associations with whom the JU established a cooperative relationship, ERRIN and ENNOH, were also invited (December) to manifest their interest in becoming members of the Stakeholders Group.

Bilateral meetings with members of the Stakeholders Group are discussed as part of our synergies activities.

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<sup>55</sup> Article 1 of the “Decision of the Governing Board of the Clean Hydrogen Joint Undertaking reference number CleanHydrogen-GB-2022-04, on the Selection of the Members of the Stakeholders Group of the Clean Hydrogen Partnership”.

## 4. FINANCIAL MANAGEMENT AND INTERNAL CONTROL

### 4.1. Control results

This section focuses on the results generated by the whole internal control system and presents other related information that supports management assurance of the achievement of the financial management and internal control objectives.

The Governing Board adopted the revised internal control framework on 16 August 2018. The Clean Hydrogen JU applies *mutatis mutandis* the components, principles and characteristics laid down in the internationally acknowledged Committee of Sponsoring Organizations of the Treadway Commission model of internal control, in line with the European Commission's internal control framework. Internal control systems and procedures are applicable at all levels of management and are designed to provide reasonable assurance of achieving the following objectives:

- effectiveness, efficiency and economy of operations;
- reliability of reporting;
- safeguarding of assets and information;
- prevention, detection, correction and follow-up of fraud and irregularities.

#### 4.1.1 Effectiveness of controls

Control results regarding the legality and regularity of operations, fraud prevention and other control objectives - in particular the safeguarding of assets - are detailed in the subsequent sections.

##### *4.1.1.1 Legality and regularity of the financial transactions*

The control objective is to ensure that the Clean Hydrogen JU has reasonable assurance that the **total amount of any financial operation** authorised during the reporting year, which would **not be in conformity** with the applicable contractual or regulatory provisions, **does not exceed 2 % of the authorised payments** or revenue concerned. To reach this conclusion, the Clean Hydrogen JU reviewed the results of the key controls in place. For each item, materiality is assessed in accordance with Annex 5.12.

Despite the large number and magnitude of transactions, the Clean Hydrogen JU's residual error rate has not only stayed below the target threshold of 2% but has decreased from 0.51% in 2024 to 0.29% in 2025. This is the first time, the Clean Hydrogen JU has obtained such a low error rate, which was detected by *ex post* audits covering operational expenditure (grants) and showed the effectiveness and efficiency of the Clean Hydrogen JU's *ex ante* controls at the programme level.

In order to get a low error rate, the JU must achieve the main objective of *ex ante* controls: to ascertain that the principles of sound financial management have been applied.

Table 26 outlines and compares the main principles of *ex ante* and *ex post* controls.

**TABLE 26. EX ANTE AND EX POST CONTROLS**

	<b>EX ANTE CONTROLS</b>	<b>EX POST CONTROLS</b>
When?	<b>Before</b> the transaction is authorised	<b>After</b> the transaction is authorised
Frequency?	Mandatory on <b>all</b> transactions	Made on a <b>sample</b> basis
How?	Mainly <b>desk review</b> of supporting documents, requests for clarification (e.g. beneficiaries' proposals and reports) and available results of controls already carried out relating to the operational and financial aspects of the operation.	Mainly <b>on-the-spot</b> checks at the beneficiary's premises
Impact?	Errors detected should be corrected <b>before</b> the transaction is approved	Errors detected (e.g. ineligible expenditure) should be corrected through <b>recovery orders</b> or offsetting with future payments
Level of assurance?	<b>Primary</b> means of ensuring sound financial management and legality and regularity of transactions, but based on desk review of available evidence.	<b>Secondary</b> means of ensuring sound financial management and legality and regularity of transactions, but more robust as normally carried out 'on the spot'

The Clean Hydrogen JU has developed and continues to apply procedures defining the controls to be performed by project and finance officers for every financial claim, invoice, commitment, payment and recovery order, taking into account risk-based and cost-effectiveness considerations.

For operational expenditure, the processing and recording of transactions in ABAC are performed using the corporate IT tools (System for Grant Management (SyGMa) and COMPASS) for H2020 and Horizon Europe grants and experts, which ensures a high degree of automation, and the controls are embedded in each workflow.

**SUMMA** is the new corporate financial system based on SAP S/4HANA. From 1 January 2026, it will replace ABAC, which had supported the Clean Hydrogen JU and Commission's accounting, budgetary and treasury functions since 2005. SUMMA modernises, harmonises and standardises the EU's financial business processes.

The Clean Hydrogen JU's financial team has been preparing for the SUMMA onboarding since February 2025. This preparation has included:

- the configuration of the SUMMA system,
- the access rights configuration for go-live,
- the new budget structure,

- User Acceptance Testing (UAT), during which financial staff tested the system to ensure it meets the legal, financial and business requirements before go-live,
- the preparation and migration of transactions from ABAC to SUMMA and
- internal testing sessions with the Clean Hydrogen JU’s transactions in the Summa testing environment, allowing each financial staff member to familiarise themselves with the SUMMA tool.

#### 4.1.1.2 Ex-ante control activities in 2025

The implementation of ex-ante controls appropriate to the characteristics of each transaction remains the **primary means** of ensuring sound financial management and legality and regularity of transactions. Ex-ante control is obligatory on all transactions, and errors detected during such controls should be corrected before the transactions are approved. When well-constructed and supervised, ex-ante checks can identify and prevent irregularities, allowing for immediate correction and avoiding time-consuming recovery action. Analysing the results of ex-ante controls can identify systemic errors which need to be addressed through revisions to the internal control system or other action (such as information or training for staff).

The *Ex ante* control activities in 2025 included:

- assessment, request for clarifications and signature of the 13 GAPS of the call 2024 and 19 GAPS of the call 2025 using the lump sum scheme;
- assessment, request for clarifications and payment of 28 periodic reports of the H2020 programme and 55 periodic reports of the Horizon Europe programme based on the “*Guidance H2020 ex-ante controls on interim & final payments*” and “*Guidance on Horizon Europe - ex-ante controls*” issued by the Commission;
- reinforced monitoring and targeted checks during *ex ante* controls for interim and final payments, in accordance with the H2020 and HE *ex ante* control strategy;
- interactions and clarifications between coordinators/beneficiaries and Project Officers and Financial Officers;
- reinforced internal review through internal meetings between Project and Financial Officers;
- double funding and plagiarism checks.

**TABLE 27. GUIDANCE AND MANUALS USED TO ASSESS THE GAPS AND PAYMENTS**

Manuals		
	GAPs	Interim and final payments
H2020 programme (2014-2020)	Finished programme, no more GAPs to be signed	Guidance on H2020 ex-ante controls on interim & final payments
Horizon Europe programme (2021–2027)	<ul style="list-style-type: none"> <li>• Internal guidance</li> <li>• Guidance: Horizon Europe - ex-ante controls</li> </ul>	Guidance on Horizon Europe - ex-ante controls

Regarding the GAPs, the internal guidance for grant agreement preparation has been updated based on the Horizon Europe rules, allowing the first grants signed under Horizon Europe to be compliant with these new rules.

Regarding the interim and final payments, a key element of the ex-ante controls applicable to the H2020 and Horizon Europe grants of the JU is the two related guidance documents issued by the European Commission to streamline and standardise ex-ante control procedures throughout the Research ‘family’.

The Horizon Europe *ex ante* controls guidance (version 01 September 2023) is the first guidance published for the Horizon Europe programme, helps staff with ex ante control checks. It describes the common ex-ante control procedures to be implemented for Horizon Europe (HE) grants (at the grant agreement preparation (GAP), amendments (AMD) and payments (REPA) stages) and provides guidance on streamlining and standardising practices throughout Horizon Europe implementing services.

The Clean Hydrogen JU published the call for proposals 2025 using only lump sum grants. Beneficiaries to lump sum grants do not have to report actual costs and there are no financial declarations to be made nor reviewed. Lump sums remove the obligation of financial reporting, checks, reviews or audits related to actual costs and resources used. By doing so, it will reduce the financial error rate.

As there won't be any financial audits and no JU's representative error rate on the Horizon Europe grants using lump sum (e.g. call 2024), the Horizon Europe Control Strategy for the Research family is characterised by a risk-based approach and details how the HE control system will maintain a balance between economy, effectiveness and efficiency in the achievement of the HE programme goals. In that respect, the error rate from the *ex post* audits of HE projects will be a single aggregated risk-based error rate based on all JUs' error rates and not an error rate at each JU level. The first HE projects signed in early 2023 with a 12-month reporting period were selected for audits in 2025 as part of this new risk-based audit strategy. In addition, a risk-based *ex ante* control methodology will be applied in all grant management cycles in order to prevent the error from (re-)appearing. The more significant the risk (detected), the higher the intensity of risk-based *ex ante* controls.

#### 4.1.1.3 Value and share of the operational transactions

The overview of the administrative and operational expenditures in terms of amounts and percentage provides an idea of the size of the transactions. Table 26 provides the total payment execution.

**TABLE 28. TOTAL PAYMENT EXECUTION IN 2025**

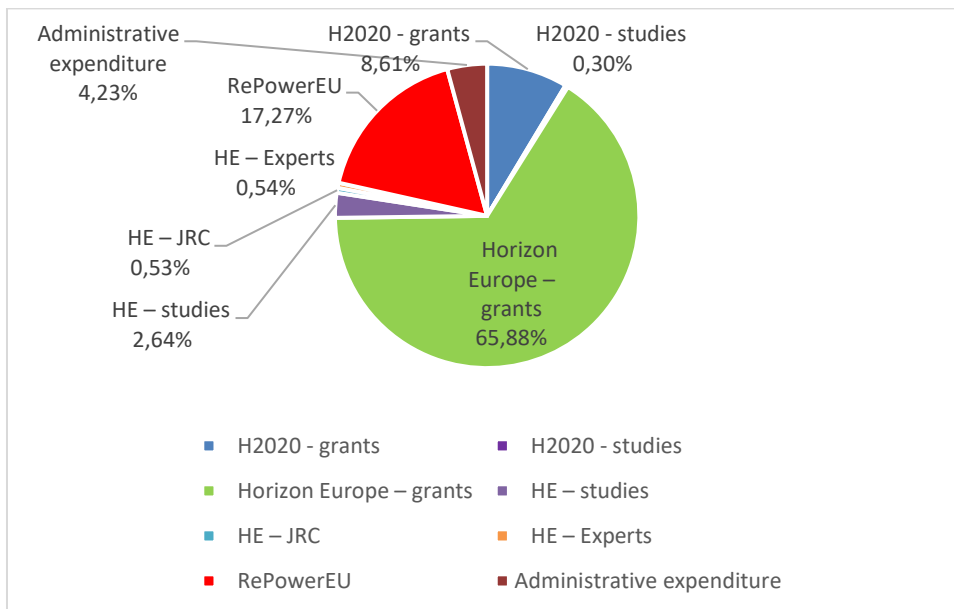
Total payments execution in 2025		
<b>Operational budget</b>	325 payments	174 094 762
<b>Administrative expenditure</b>	477 payments	7 689 032
<b>Total</b>	802 payments	181 783 794

Table 29 and Figure 24 present the amounts and shares of operational and administrative expenditure.

**TABLE 29. AMOUNTS AND SHARES OF OPERATIONAL AND ADMINISTRATIVE EXPENDITURE**

Payments made	Amounts (EUR)	%
<b>Operational expenditure</b>		
H2020 – grants	15 645 881.51	8.61%
H2020 – studies	548 000.00	0.30%
Horizon Europe – grants	119 766 994.51	65.88%
HE – studies	4 794 387.31	2.64%
HE – JRC	954 602.30	0.53%
HE – Experts	984 103.08	0.54%
RePowerEU	31 400 793.79	17.27%
<b>Administrative expenditure</b>	7 689 031.60	4.23%
<b>Total</b>	<b>181 783 794.10</b>	<b>100%</b>

**FIGURE 24. SHARES OF OPERATIONAL AND ADMINISTRATIVE EXPENDITURES**



As for the share of expenditures, **grant management** represents more than **90 %** of the total ‘payments made’ while procurement accounts for 2.94 % and expenditure payments for 4.23 %.

Since a large part of the budget is implemented via H2020 and Horizon Europe grants with actual costs, the main control activities focused on *ex ante* and *ex post* controls in this area.

#### 4.1.1.4 Ex post control of operational expenditure and error rates identified

Ex-post controls are defined as controls executed to verify the financial and operational aspects of finalised budgetary transactions in accordance with Article 23 of the JU Financial Rules (81).

Ex-post audits have three main objectives:

- to assess the legality and regularity of expenditure on a multi-annual basis;
- to indicate the effectiveness of ex-ante controls;

- to provide the basis for corrective and recovery mechanisms.

The R&I family operates a common audit strategy intended to contribute to the legality and regularity of expenditure on a multiannual basis, including the detection and correction of non-systemic and systemic errors.

For Horizon 2020 and Horizon Europe, the Common Audit Service (CAS) of the Common Implementation Centre of DG RTD carries out all the financial ex post audits, including those concerning grants managed by Clean Hydrogen JUs. This is a major step towards ensuring efficiency gains, a harmonised approach, legal certainty, equality of treatment of beneficiaries and the lightest audit burden on beneficiaries. The implementation of audit results remains the responsibility of the individual granting authorities.

The main indicators of legality and regularity for the programme delegated to Clean Hydrogen JU are as follows:

- *The cumulative representative error rate (RepER)* which is based on errors detected by ex post audits. It provides a reasonable estimate of the level of error in the population relating to the accepted Clean Hydrogen JU contributions on the completion of the audits but does not take into account the corrections and follow-up measures undertaken.
- *The cumulative residual error rate (ResER)* is the level of error remaining in the population after deducting corrections and recoveries made by the Clean Hydrogen JU. It includes the extension of audit results to non-audited financial statements of the audited beneficiaries to correct systemic errors.

The formulas for the calculation of the cumulative representative error rate and residual error rate are presented in Annex 5.12 – Materiality Criteria.

The targets as set out in the materiality criteria are respectively:

- For H2020, to ensure that the cumulative residual error rate remains within a range of 2-5%, aiming for as close as possible to 2%;
- For Horizon Europe, (actual costs) to ensure that the cumulative detected and residual error rates do not exceed 2%.

Progress against these targets is assessed annually based on the results of the implementation of the ex post audit strategy and taking into account the frequency and importance of the errors detected along with the cost-benefit considerations regarding the effort and resources needed to detect and correct the errors. It should be noted, however, that due to its multi-annual nature, the effectiveness of the ex-post control strategies of the R&I Family can only be measured and assessed fully in the final stages of the EU Framework Programme, once the ex-post audit strategies have been fully implemented and errors, included those of a systemic nature, have been detected and corrected.

## **Horizon 2020 (H2020) Programme**

### ***H2020 Audit objective***

An initial target of 295 participations to be audited was established in collaboration with the CAS at the beginning of H2020 programme. In light of consistently positive audit results and the significant level of ex post audit coverage achieved, this target was revised downward to 250 participations in 2022.

In 2025, no additional participations for audit was selected, leading to a total of 201 number of audited participations for the full H2020 programme. These 201 participations were covered through 142 ex post audits.

By the end of 2025, 138 audits had been finalised, while the remaining four experienced delays and are expected to be completed in early 2026.

Consequently, 2026 will be the last year of reporting on ex post results of Horizon 2020.

### **H2020 Audit Coverage (Cumulative)**

The Clean Hydrogen Joint Undertaking (JU) aimed to reach at least 25%<sup>56</sup> audit coverage in terms of EU Contributions of H2020 expenditure by the end of the programme, thereby supporting the annual declaration of assurance.

As of 31 December 2025, this audit coverage target had been exceeded with 174 million EUR selected out of the 585,51 million EUR accepted, providing a sufficient and timely basis for assurance.

Table 30 presents the coverage of selected and completed audits (representative and risk-based) in relation to the accepted Clean Hydrogen JU contribution per year.

**TABLE 30. EX POST AUDITS, DIRECT AUDIT COVERAGE UP TO 31 DECEMBER 2025 (H2020 EC CONTRIBUTION)**

YEAR	EC contribution in mil. EUR						
	Accepted	Selected for audits			Cumulative coverage	Audits closed	Cumulative coverage
		Corrective	Representative	Total			
<b>2017</b>	37,09	4,98	3,16	8,14	21,95%	1,47	3,96%
<b>2018</b>	58,65	2,59	8,22	10,81	19,79%	4,71	6,45%
<b>2019</b>	98,53	14,66	12,61	27,27	23,79%	11,39	9,04%
<b>2020</b>	70,03	19,86	28,63	48,49	35,83%	23,84	15,67%
<b>2021</b>	88,62	10,29	7,1	17,39	31,76%	13,89	15,67%
<b>2022</b>	59,12	5,42	10,27	15,69	31,01%	26,02	19,74%
<b>2023</b>	93,07	11,73	8,13	19,86	29,23%	44,22	24,85%
<b>2024</b>	44,13	10,62	15,85	26,47	31,70%	12,64	25,16%
<b>2025</b>	36,27				29,74%	23,25	27,57%
<b>Total</b>	<b>585,51</b>	<b>80,15</b>	<b>93,97</b>	<b>174,12</b>	<b>29,74%</b>	<b>161,43</b>	<b>27,57%</b>

### **H2020 Results of ex post audits (Representative and residual error rate)**

Audit results were used to calculate an indicative cumulative representative error rate and the residual error rate for H2020 expenditure specific to the Clean Hydrogen JU, as of 31 December 2025.

The error rates for Horizon 2020<sup>57</sup> for Clean Hydrogen JU on 31 December 2025 are:

- Cumulative representative (detected) error rate is –2.84%
- Cumulative residual error rate is –0.29%

<sup>56</sup> In line with DG BUDG guideline

<sup>57</sup> Note that the error rates based on the audit work (930 representative results out of the 948 expected in the six Common Representative Samples) for Horizon 2020 Framework Programme for Research and Innovation on 31 December 2025 are:

- **Cumulative representative detected error rate** for the Framework Programme: **3.83%**
- **Cumulative residual error rate** for the Framework Programme: **1.78%**

**TABLE 31. EVOLUTION OF THE H2020 JU CUMULATIVE REPRESENTATIVE DETECTED AND RESIDUAL ERROR RATE**

YEAR	representative (detected)	residual
2018	-0,50%	-0,46%
2019	0,84%	-0,70%
2020	-2,16%	-1,34%
2021	-3,84%	-1,73%
2022	-2,97%	-0,88%
2023	-2,77%	-0,59%
2024	-2,81%	-0,51%
2025	-2,84%	-0,29%

This significantly low error rate for the programme, well below the materiality threshold, reflects a positive trend of continuous improvement driven by several factors:

- Top beneficiaries have been participating continuously in the partnership since the Seventh Framework Programme.
- As a result of multiple ex-ante and ex-post controls, they have gained experience and strengthened their internal systems accordingly.
- The Clean Hydrogen Programme Office services (finance, ex post audit, grant management, and legal) dedicate significant efforts to explaining programme provisions and clarifying eligibility criteria and other complex issues.

### ***H2020 Implementation of audit results***

The Clean Hydrogen JU has implemented the necessary controls and monitoring mechanisms to ensure that all errors detected in favour of the Clean Hydrogen JU are corrected in due course (either through a recovery order or by offsetting a future payment). It includes extension of audits findings (whereby systematic errors detected in audited costs claimed are extrapolated to all the other non-audited JU costs claimed from the same audited beneficiary) and it includes the ex post audits performed by the Court of Auditor.

Table 32 presents the cumulative number of audit results processed since the beginning of Horizon 2020. Table 33 presents the time to implement the results of the closed audits of Horizon 2020 in 2025.

**TABLE 32. H2020 IMPLEMENTATION OF AUDIT RESULTS – CUMULATIVE FROM THE START OF THE MFF TILL 31 DECEMBER 2025**

	Audit Results Processed	% Audit results processed	Audit Results Pending	% Audit results pending	TOTAL
<b>Audit</b>	185	95,36%	9	4,64%	194
<b>Extensions</b>	67	100,00%	0	0,00%	67
<b>TOTAL</b>	<b>252</b>	<b>96,55%</b>	<b>9</b>	<b>3,45%</b>	<b>261</b>

**TABLE 33. H2020 TIME TO IMPLEMENT THE RESULTS OF CLOSED AUDITS IN 2025**

	0-6 months	% 0-6 months	above 6 months	% > 6 months	TOTAL
Closed projects: Negative adjustments with recovery	0	0,00%	1	100,00%	1
Closed projects: Positive or zero adjustment	8	88,89%	1	11,11%	9
On-going projects: Negative adjustments	6	100,00%	0	0,00%	6
On-going projects: Positive or zero adjustment	7	100,00%	0	0,00%	7
<b>TOTAL</b>	<b>21</b>	<b>91,30%</b>	<b>2</b>	<b>8,70%</b>	<b>23</b>

## Horizon Europe (HE) Programme

### *HE Audit objective*

The year 2025 represented the fourth year for the Joint Undertaking of implementation of the Horizon Europe Framework Programme (2021–2027).

In June 2025, the Common Audit Service (CAS) launched the second audit campaign with the objective to launch the second risk-based audit sample (strata 1 Actual costs: layer 2) and the first common representative sample selection (strata 1 Actual costs: layer 1)<sup>58</sup>.

### *HE Audit coverage (cumulative)*

In 2024, the CAS selected one Clean Hydrogen Joint Undertaking beneficiary under Horizon Europe as part of the common representative audit sample (CRS) 2025 at programme level. Due to delays in the audit process, the results of this audit are expected in early 2026.

In 2025, five risk-based beneficiaries were selected. The audits are planned to be launched in 2026.

**TABLE 34. EX POST AUDITS, DIRECT AUDIT COVERAGE UP TO 31 DECEMBER 2025 (HE EC CONTRIBUTION)**

YEAR	EC contribution in mil. EUR				
	Accepted	Selected for audits	Cumulative coverage	Audits closed	Cumulative coverage audit closed
<b>2024</b>	35,54	0,02	0,06%	0	0,00%

<sup>58</sup> Common Audit Service Annual Audit Plan 2025 (version 26 June 2025)

<b>2025</b>	66,22	1,91	1,90%	0	0,00%
<b>Total</b>	<b>101,76</b>	<b>1,93</b>	<b>1,90%</b>	<b>0</b>	<b>0,00%</b>

### **HE Results of ex post audits**

In the absence of final audit results on 31 December 2025 for Horizon Europe, the Clean Hydrogen Programme Office decided to estimate an indicative JU representative detected and residual error rate for its Horizon Europe funded population in order to assess the potential financial exposure and support the assurance process.

The methodology used by Clean Hydrogen JU applied the following criteria:

- *Beneficiaries already audited in the past:* For beneficiaries previously audited under Horizon 2020, the last available individual error rate recorded in the CAS audit database (Audex) per beneficiary was used. In line with the representative error rate methodology used in Horizon 2020, positive error rates were neutralised, and therefore only negative error rates (where applicable) were applied in the calculation.
- *Low-risk beneficiaries & medium risk beneficiaries:* For beneficiaries that had not been audited previously and were not classified as newcomers or SMEs, the final cumulated representative error rate calculated for Horizon 2020 on 31 December 2025, of -2.84% as indicated above, was applied as a proxy error rate.
- *High-risk beneficiaries:* For beneficiaries that had not been audited previously and were not classified as newcomers and SMEs, which represent the highest risk category, the final cumulated representative error rate calculated for Horizon 2020 on 31 December 2025, of -2.84% as indicated above, was applied as a proxy error rate.

Based on this methodology, the estimated error rates for Horizon Europe<sup>59</sup> for Clean Hydrogen JU on 31 December 2025 are:

- Cumulative representative detected error rate is -1.66%
- Cumulative residual error rate is -1.55%

<sup>59</sup> Note that the error rates based on the results of ex-post controls (89 representative audits and 29 representative technical reviews out of the 177 expected audits and 30 technical reviews in the first Common Representative Sample) for the Horizon Europe Framework Programme for Research and Innovation on 31 December 2025 are:

- **Cumulative representative detected error rate** for the Framework Programme: **4.38%**
- **Cumulative residual error rate** for the Framework Programme: **4.05%**

Due to the still relatively small number of completed audits and technical reviews, the error rate calculation is highly sensitive to extreme result. The Horizon Europe error rates, in particular the residual one, should be considered within a time perspective. The implementation of the audit results and extension of audit findings over time will tend to lower the cumulative residual error rate, thereby increasing its difference with the representative detected error rate. A reservation is issued in the Annual Activity Report of DG Research & Innovation as the cumulative residual error rate is, at the end of 2025, above the 2% materiality threshold.

At the time of preparation of this report, no final Horizon Europe ex-post audit results for Clean Hydrogen JU beneficiaries were available. Nevertheless, based on the estimation methodology described above, Clean Hydrogen JU considers these estimations to provide a reliable indication of the level of error.

On this basis, the detected and residual error rates for Horizon Europe operational expenditure are estimated to remain below the materiality threshold of 2%.

Consequently, no reservation concerning Horizon Europe operational expenditure is considered necessary in the Assurance Declaration of the Executive Director for the Annual Activity Report.

*4.1.1.5 Fraud prevention, detection, and correction*

The Clean Hydrogen JU implements the common research anti-fraud strategy. In March 2019, the Common Implementation Centre (CIC) adopted the revised strategy and the associated action plan. The implementation of the action plan is monitored through regular meetings of the Fraud and Irregularity Committee, in which the Clean Hydrogen JU participates.

Furthermore, for areas of expenditure other than grants, the Clean Hydrogen JU applies mutatis mutandis, by analogy, the anti-fraud strategy of DG Research and Innovation. For Horizon Europe, the new document “Guidance – Horizon Europe – Ex-ante Checks to Detect Potential Fraud (version 07/22)” helps alert staff members to additional checks.

This is particularly relevant for areas such as expert management, procurement and internal fraud risks. The risk analysis concluded that the residual risks, after the implementation of mitigating measures, remain low.

In June 2025, OLAF received information about alleged irregularities of a beneficiary in the implementation of a project, with an impact on several projects. OLAF has since opened an investigation which is ongoing at the time of the reporting. In November 2025, Sesar JU organised three identical anti-fraud training sessions for all the Joint Undertakings. The Clean Hydrogen JU has provided information to OLAF upon request. In 2025, no internal fraud was reported in 2025.

These activities are indicators on fraud related activities. Table 35 provides an overview of the state of play.

**TABLE 35. ANTI-FRAUD RELATED ACTIVITIES IN 2025**

Stage of the anti-fraud cycle	Indicator	State of play
<b>Prevention and detection</b>	1. Number of information sessions, meetings and trainings on anti-fraud	3
	2. Number of files (suspicious) formally sent to the European Anti-Fraud Office (OLAF) for investigation	1

<b>Investigation</b>	3. Reply to OLAF within OLAF deadlines	Yes
	4. Reasonable time to communicate internal fraud to OLAF	n/a
<b>Correction</b>	5. Time elapsed between receipt of an OLAF report and internal decision on recovery or disciplinary sanctions by the JU	n/a
	6. Average time to send inform the beneficiary, following OLAF report	n/a
	7. Amount recovered relative to the amount recommended to recover by OLAF (%)	n/a

Based on the above information, the JU considers that reasonable assurance can be provided that the anti-fraud measures and controls in place are effective and efficient.

#### *4.1.1.6 Assets and information and reliability of reporting*

The safeguarding of assets provides reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the company's assets that could have a material effect on the financial statements.

In that respect and to protect EU public funds from potential irregular or illegal application, Clean Hydrogen thoroughly applies within the grant and procurement management all the requirements regarding controls and checks following from the applicable legal framework as well as from the common methodological guidance provided by the Commission.

In addition to the safeguards aimed at financial aspects, Clean Hydrogen pays attention also to non-financial elements of its assets and information. Due care is taken with regard to personal data protection (see Section 2.2). For example, a comprehensive Data Protection Impact Assessment was carried out in connection with the Microsoft Office Online services implementation, results of which were properly documented. Measures are applied for the deployed IT tools and IT infrastructure so that information processed electronically is adequately protected from theft or loss.

Similarly, measures for physical protection of assets, documents and data contained therein are in place at the Clean Hydrogen premises. This has been ensured since 2011 by following the inventory procedure, which covers not only assets over EUR 420 but also any items below this level kept in the inventory. We keep the control effective by using our own inventory tags and perform annual physical inventory counts in relation to the assets report, which is provided to the accountant for the preparation of the annual accounts. Phaseout and impairment are also kept in a timely way in the database to support the disposal exercises performed on an ad hoc basis.

In the event of a disaster, the JU ensures the complete restoration of the system. In the common IT Security procedure for the JUs, we use cloud storage for the information management system, the JU is relying on the security measures and backup provided by the Microsoft 365 solution. Nevertheless, a cloud backup solution has been deployed as a safeguard of the retention policy of documents, together with antivirus software, firewalls and change management processes ensured by our ICT managed service providers.

Regarding cybersecurity vigilance, we use the active solution of Microsoft Defender to safeguard our storage and communication, together with the passive support and monitoring of CERT-EU for intrusion detection and weaknesses.

A comprehensive Document Management Policy is applied at the JU which is formalised by means of the respective ED Decision. Attention is paid to maintaining audit trail, mostly by means of registering files in Ares, either automatically using the Commission IT tools and systems or manually.

As for reliability of reporting, Clean Hydrogen continuously uses precise and up-to-date information for reporting purposes, most notably for the production of its consolidated annual activity reports. In this respect, especially in the field of EC grant management deployed by Clean Hydrogen (Compass, SyGMA, Corda), used as the primary source for collecting various sets of data but not only. These are further complemented by internal tools, databases and repositories such as the Observatory, TRUST platform and Knowledge hub.

*4.1.1.7 Efficiency of controls (“Time to”) TIME-TO-PAY (60)*

**Operational payments**

**H2020**

In 2025, 28 (14 interim and 14 final) H2020 reports were assessed (41 in 2024). The overall time to pay (TTP) remained stable and in line with that of prior years (73 days in 2025, same average as in 2024).

The gross TTP (including any suspensions due to requests for clarifications and amendments) reached 165 days (110 in 2024).

**Horizon Europe**

In total, 31 prefinancing payments were processed by 31 December 2025. 55 HE reports (54 interim and 1 final) were assessed in 2025 (25 in 2024).

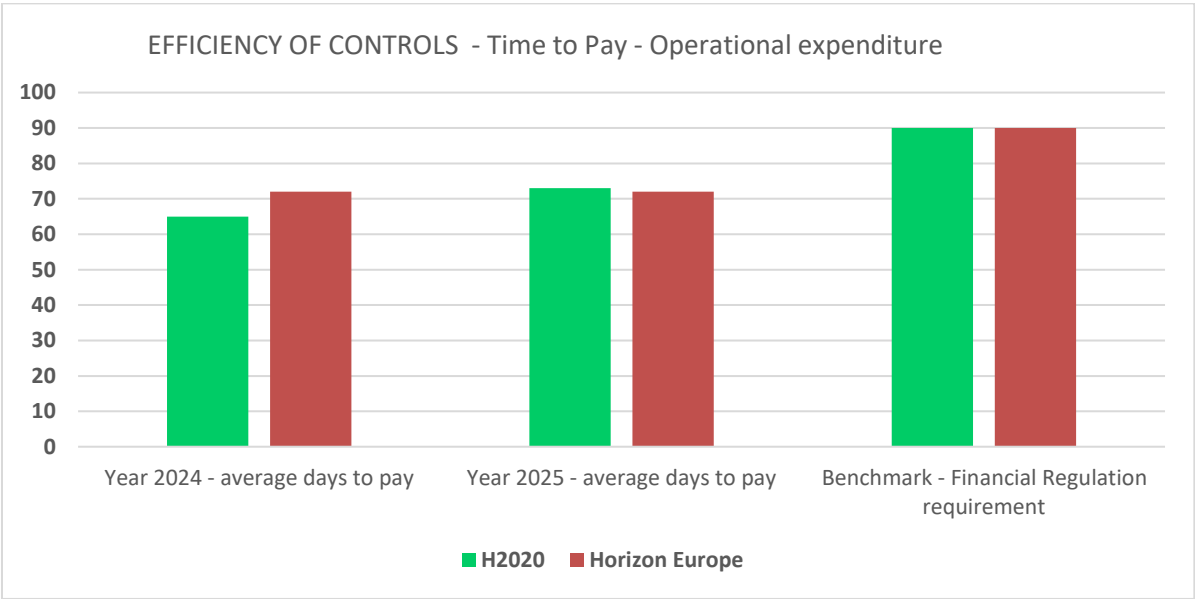
Time-To-Pay: Overall efficiency

**TABLE 36. EFFICIENCY OF CONTROLS – TTP: OPERATIONAL EXPENDITURE**

<b>Framework programme - interim and final payments</b>	<b>Year 2024 - average days to pay</b>	<b>Year 2025 - average days to pay</b>	<b>Benchmark - Financial Regulation requirement</b>
<b>H2020</b>	73	<b>73</b>	90
<b>Horizon Europe</b>	72	<b>72</b>	90

<sup>(60)</sup> Art 116.1 FR: 90 calendar days for contribution agreements, contracts and grant agreements involving technical services or actions which are particularly complex to evaluate and for which payment depends on the approval of a report or a certificate.

**FIGURE 25. EFFICIENCY OF CONTROLS – TTP: OPERATIONAL EXPENDITURE**

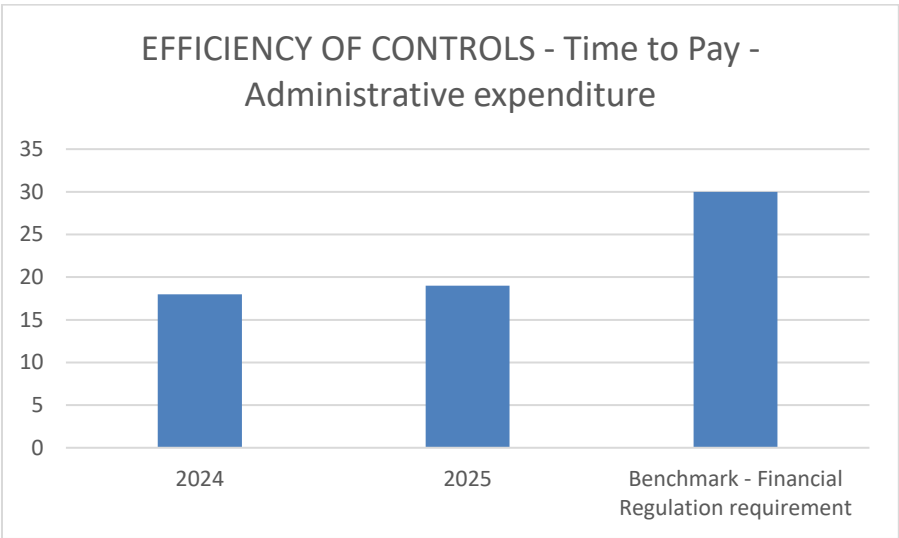


**TABLE 37. EFFICIENCY OF CONTROLS – TTP: ADMINISTRATIVE EXPENDITURE**

Administrative payments	2024	2025	Benchmark - Financial Regulation requirement
Average number of days	18	19	30

The number of days to assess and pay the administrative expenditure decreased from 18 days in 2024 to 19 days in 2025 (Table 37 and Figure 26).

**FIGURE 26. EFFICIENCY OF CONTROLS – TTP: ADMINISTRATIVE EXPENDITURE**



As shown by comparative analysis of an average TTP indicator over the past 2 years against required benchmarks, the Clean Hydrogen JU performed well below the limits of each of the required indicators.

This was achieved through effective monitoring and prioritising system that assesses various aspects, such as the timeliness of responses, priorities and the complexity of transactions. For complex transactions, such as final payments (based on a risk assessment), the Clean Hydrogen JU put preventive measures in place to anticipate and address any potential delays (e.g. missing certificates on financial statements)

Thanks to all these preventive and monitoring measures, the average TTP for both operational and administrative expenditure in 2024 and 2025 demonstrated high levels of efficiency.

**4.1.2 Economy of controls**

The **principle of economy** “requires that the resources used by the institution in the pursuit of its activities are made available in due time, in appropriate quantity and quality and at the best price.”

The analysis of the economy of controls can be estimated based on their costs. Therefore, the cost of the controls put in place in the Clean Hydrogen JU is reported. Based on the calculation and assessment of the amount and percentage of the budget managed, the economy aspect of our controls is assessed in Table 38.

**TABLE 38. COST OF CONTROLS UP TO 31 DECEMBER 2025**

<b>Efficiency and effectiveness of controls until 31 December 2025</b>	<b>Operational expenditure/ running grants (H2020 &amp; Horizon Europe) and newly signed grants (Horizon Europe)</b>	<b>Resources used on ex ante and ex post controls – estimated</b>	<b>Average proportion</b>
Operational expenditure for 2025	787,603,846.83	34,346,025.00	4.36%
Number of running grants	128.00	9.00	9.04

As regards grant management, the Clean Hydrogen JU’s total cost of controls, measured by the ratio of costs/to payments, is 4.36% (0.22% in 2024). This means **that the cost of controls represented 4.36% of the Clean Hydrogen JU’s operational expenditure** in 2025 and can be quantified as **EUR 12,777.05** per running grant agreement.

As an additional measure of effectiveness, we consider that the residual error rate shows a stable trend over the years, well below 2 %. In 2025, in particular, we demonstrated a significant reduction in the error rate, mainly thanks to targeted risk-based *ex ante* webinars, first introduced in 2020.

Table 38 demonstrates the measurable benefits of the efficient and effective use of resources in the Clean Hydrogen JU to reduce error rates and ensure that principles of sound financial management

are well understood and followed by the Clean Hydrogen JU beneficiaries throughout the lifetime of the projects, as well as the monitoring of their scientific progress. From a long-term perspective, we believe that other benefits of a preventive nature that are not directly measurable will be materialised in the future.





**4.1.3 Conclusion on the cost-effectiveness of controls**

Based on the most relevant key indicators and control results, the Clean Hydrogen JU has assessed the effectiveness, efficiency and economy of its control system and reached a positive conclusion on the cost-effectiveness of the controls for which it is responsible.

Nevertheless, with the introduction of the new Horizon Europe programme, accompanied by significant increases in the budget and the number of grants to be assessed, the pressure on the JU team has increased dramatically compared with 2022 and is expected to increase further in the upcoming years.

In order to ensure an adequate level of *ex ante* controls, especially for interim and final payments, the staffing issue shall also be addressed adequately<sup>61</sup>.

**4.2. Audit observations and recommendations**

2023	Implementation of .....	3		
		2		





This section sets out briefly the state of play for all audit observations and recommendations reported by auditors related either to performance aspects or to internal control and financial management.


**4.2.1 Internal Audit**

At the end of 2024, the IAS completed its first audit on “operational synergies.” Throughout 2025, the Programme Office began implementing the associated action plan, with the objective of completing it by June 2026. The audit resulted in no critical recommendations, but it did include one very important recommendation and one important recommendation, each with sub-recommendations, as outlined below (see Table 39). Completion of the actions are due by June 2026 and have no impact on the assurance of 2025.

<sup>61</sup> We refer to the top staff issue risk identified in the Risk Assessment, Section 1 of the AAR

TABLE 39. INTERNAL AUDIT SERVICE (IAS) OPEN RECOMMENDATIONS AT 31 DECEMBER 2025

Reported	Audit Title	Accepted Recommendation(s)	State of play in 2025	Impact on the assurance for 2025
2024	Operational Synergies [...]	<b>1. Synergies Strategy, Roles and Guidelines (very important recommendation)</b> - Develop a comprehensive synergies strategy to guide coordination across programmes and initiatives. - Clarify the roles and responsibilities of JU bodies in the identification, promotion, and implementation of synergies. - Design and implement internal JU processes and guidance to support the systematic identification, promotion, and execution of synergies.		
		<b>2. Monitoring and reporting on synergies (important)</b> - Design a structured and consistent approach to monitor its synergies performance. - Improve the quality and consistency of reporting on both common JU KPIs and the Clean Hydrogen specific KPI for reporting on synergies.		

 Action plan in process but no impact on the assurance for 2025





In parallel, the IAS initiated an audit on the “back-office arrangements (BOA)”. At the time of drafting this report, the audit is still ongoing, with completion expected by the end of 2026. No critical recommendation has been shared so far. A detailed list is available in the Annex 5.14<sup>62</sup>.

#### 4.2.2 European Court of Auditors

In 2025, the Clean Hydrogen JU was audited on its annual accounts 2024 by the European Court of Auditors. In November 2025, the ECA published its ‘Annual report on the EU Joint Undertakings for the financial year 2024. As in previous years, the ECA issued a “clean opinion” regarding the reliability of the JU’s annual accounts and the legality and regularity of the underlying transactions.

<sup>62</sup> Reporting on the internal and external audits and assessing the effectiveness of internal control systems

The list of new and old recommendations and observations that do not call into questions the audit opinion is the following one:

Reported	Audit Title	Accepted Recommendation(s)	State of play in 2025	Impact on the assurance for 2025
31-10-2025	Annual report on EU joint undertakings for the 2024 financial year	<p><b>New Recommendation (all):</b> When planning their administrative payments budget for 2027, the SESAR 3, CleanH2 and Global Health EDCTP3 JUs should proactively take account of the volume of unused administrative appropriations they had already accumulated by the end of 2024. Deadline for implementation: end 2026 (submission of budgets for the 2027 financial year).</p>		
		<p><b>Old recommendations (all JUs):</b></p> <p>6/2021. All JUs (except F4E) should implement a time-recording system to obtain objective data on staff time spent on each activity. In 2024, under the JUs' back-office arrangement, human resources departments continued to harmonise and optimise the IT tools made available to all JUs (Sysper and Systal).</p> <p>7/2022. All JUs (except F4E, EU-Rail, CA, IHI, the Chips), should implement a risk-based approach to grant management that covers the main grant management phases from preparation to payment. In this context, JUs should in particular ensure that: (a) potentially risky beneficiaries and projects are subject to intensified ex ante controls or ex post audits; and (b) important ex post audit results are</p>		

		<p>duly considered in the risk assessment for future ex ante controls.</p> <p><b>Old recommendations (Clean Hydrogen JU only):</b></p> <p>2023 Low implementation rates for the administrative commitments and infrastructure payments budgets (Title 2). List of Clean Hydrogen JU observations that do not call into questions the auditors opinion for 2024 financial year:</p> <ul style="list-style-type: none"> <li>- observations on budget management</li> <li>- observations on legality and regularity of the transactions with ineligible costs identified</li> <li>- observations on other issues related to the IAS audit on synergies.</li> </ul>		
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Action has been implemented throughout 2025 and there is no impact on the assurance for 2025.

*Follow-up of observations from the discharge authorities*

In April 2025, the European Parliament granted discharge to Clean Hydrogen JU in respect to the implementation of the budget for the 2023 financial year and approved the closure of the 2023 accounts.

In its resolution, the Parliament made several observations regarding budgetary and financial management (Horizon 2020 and Horizon Europe calls and partnerships), management and control systems (ex post audits, ex ante controls for Horizon 2020 grants, reinforced monitoring), procurement and staff (staff establishment plan, allocation of staff, vacancy rate, gender and geographical balance) and a follow-up of previous years' observations.

In Q4 2025, the Clean Hydrogen JU formally acknowledged these observations, outlining the measures it intends to adopt to address them. The full discharge report and Clean Hydrogen JU reply are published on the website of the European Parliament. The discharge decision in respect to the implementation of the budget for the 2024 financial year is expected in Q2 2026.

### 4.2.3 Overall Conclusions

Internal and external audit work significantly contributes to the Clean Hydrogen JU's continuous improvements.

In 2025, the Clean Hydrogen JU received an unqualified opinion from the ECA. These results, jointly with the other key performance indicators, confirmed the continuous improvement and maturity of the internal control environment and the efficiency and effectiveness of the processes and controls put in place by the JU, in line with the corporate guidelines.

The current residual risk from the audit observations and recommendations (e.g. IAS, ECA, directly from an audit on the JU or indirectly) that remain open by end of December 2025 do not impair the declaration of assurance.

### 4.3. Assessment of the effectiveness of internal control (IC) systems

The Commission has adopted an Internal Control Framework based on the highest international standards – i.e. The Committee of Sponsoring Organizations of the Treadway Commission Internal Control Integrated Framework, the golden standard for internal control systems.

The Clean Hydrogen JU has adapted the Internal Control Framework to reflect its specific characteristics and organisational structure. On 16 August 2018, the JU Governing Board adopted the updated, tailored Internal Control Framework (ICF). The internal control systems are suited to achieving its policy and internal control objectives in accordance with the internal control principles, having due regard to the risks associated with the environment in which it operates.

#### 4.3.1 Continuous monitoring

In line with the Commission's Internal Control F (ICF)<sup>63</sup> and in line with the objectives and priorities described in the 2025 AWP, the Clean Hydrogen JU assesses annually the 17 internal control principles and the related indicators to ensure that all internal control principles are present and functioning. During this exercise, internal control strengths and deficiencies are identified using all available information sources such as self-assessment, weaknesses spontaneously reported by staff, exceptions and non-compliance events, ongoing monitoring of the implementation of control and anti-fraud strategies, and audit conclusions, findings and recommendations.

Based on this assessment, the internal control system is considered effective overall, with all components and underlying principles present and functioning as intended. The controls in place provide reasonable assurance regarding the achievement of the organisation's objectives.

However, the assessment identified a limited number of minor deficiencies where further improvements are warranted. These relate in particular to:

- **Awareness and communication of the internal control framework:** The framework should be more systematically shared and presented to staff, notably to newcomers, to ensure a consistent understanding of internal control principles and the JU's control

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<sup>63</sup> adopted by the GB on the 16 August 2018

environment. The JU plans to introduce a training in the induction programme for new comers.

- **Update the JU guidelines:** All the existing guidance should be revised to reflect current practices and ensure continued relevance and clarity, and simplified if necessary.
- **Organisational and workplace improvements:** Building on the results of the staff survey, actions should be implemented and monitored across key themes, including meetings, job descriptions, organisational planning, coaching and training, internal workplace practices, workflow efficiency, induction programmes, as well as collaboration, diversity, equity, transparency, inclusion, and management practices.
- **Ethics framework:** Follow-up on the programme developed in cooperation with the relevant advisory body (BOA HR – lead by CBE JU) remains ongoing.
- **Anti-fraud strategy:** The revised strategy has been updated; it must be endorsed by the ED and communicated to the staff prior to June 2026.

Appropriate corrective actions have been identified and are being implemented or planned. Their follow-up will be ensured to address the identified weaknesses in a timely manner.

None of the actions identified represent a level of criticality that would negatively affect the organisation or undermine the declaration of assurance.

### 4.3.2 Risk assessment and management

Risk management aims to enable an organisation to fulfil its mission and objectives in the most efficient and effective way by ensuring the timely and adequate identification, assessment (analysis and evaluation), management (treatment and escalation, as required), monitoring and controlling of the risks and opportunities.

Risk assessment is one of the five key ICF components and consists of four principles: ICF components and principles – risk assessment

- Principle 6. The organisation specifies objectives with sufficient clarity to enable the identification and assessment of risks relating to objectives.
- Principle 7. The organisation identifies risks to the achievement of objectives across the entity and analyses the risks as a basis for determining how the risks should be managed.
- Principle 8. The organisation considers the potential for fraud in assessing risks to the achievement of objectives.
- Principle 9. The organisation identifies and assesses changes that could significantly impact the system of internal control.

In Octobre 2025, the JU undertook a comprehensive risk assessment and conducted a risk workshop with the presents of all the JU staff. The risk assessment exercise carried out in 2024 identified potential risks that could be detrimental to achieving the JU's objectives. These risks were included in

the risk register, and the most significant one was included in the AWP 2026 and shared with the parent DG during the annual most important risk peer review 2025.

No critical risk has been identified that could have a significant impact on assurance, and actions are being implemented to mitigate the high and medium risk(s) identified. (For details, please refer to above section 1 on key objectives and associated risks).

### **4.3.3 Prevention of Conflict of Interest**

The Programme Office has developed a comprehensive set of rules and procedures that are effectively implemented across its entire governance structure, as follows:

- when joining the Programme Office team, each staff member agrees to the application of the staff regulation and signs a declaration of honour on the management of conflicts of interest;
- with the Executive Director's decision of 27 September 2019, the JU applies by analogy, *mutatis mutandis*, the 'Code of good administrative behaviour for staff of the European Commission in their relations with the public';
- conflict of interest procedures was in place for the members of both the FCH 2 JU GB and the advisory bodies, and were renewed in December 2021 in the scope of newly adopted rules of procedures of the GB for the Clean Hydrogen JU;
- specific measures have been implemented for the prevention and management of conflicts of interest of experts in charge of the evaluation of grant applications and of the review of projects and tenders;
- for each recruitment procedure to select the best candidate, both Selection Committee members and candidates are required to declare any possible conflicts of interest by signing a declaration so that conflict of interests can be considered and potential adjustments made accordingly.
- the JU implements the common research anti-fraud strategy. In March 2019, the CIC adopted the revised strategy and the associated action plan. The implementation of the action plan is monitored through regular meetings of the Fraud and Irregularity Committee, in which the JU participates.

The conflicts of interest and lack of objectivity have been identified as risks with a low probability. This is due to the ethical awareness and the stance of the Clean Hydrogen JU staff.

Clean Hydrogen JU has reasonable assurance that the measures in place to prevent conflicts of interest are effective.

Clean Hydrogen JU has assessed its internal control system during the reporting year and has concluded, taking into account the results of the evaluation presented above in section **4.1.**, **4.2.**, and

4.3. that: It is effective and the components and principles are present and functioning well overall, but some improvements are needed as minor deficiencies were identified related to :

- Organisational and workplace improvement (from the staff survey conducted in 2025);
- Awareness and communication of internal control framework;
- Revision and update of JU internal guidelines (e.g. Anti-fraud strategy: The revised strategy to be adopted by the ED and communicated to staff by end of June 2026).

Appropriate corrective actions have been identified and are planned to be implemented in 2026. Their follow-up will be ensured to address the identified weaknesses in a timely manner.

### 4.4. Conclusion on the assurance

Recapitulative Table

Reservation Title	Financial Impact (in m EUR)		Residual error rate [Year 1]*	Evolution
	Year N-1	Year 1		
XXXX	0	0	See Annex 5.15	Maintained
Management and control system weakness ...	-	-	N/A	Lifted (solved)
YYYY	0	0	%	New
ZZZZ	0	0		Lifted
.....	.....	.....		.....

\* where applicable.

In conclusion, based on the elements reported above, the Clean Hydrogen JU’s management has reasonable assurance that, overall, suitable controls are in place and working as intended; risks are being appropriately monitored and mitigated; and necessary improvements and reinforcements are being implemented.

Therefore, the Executive Director, in her capacity as Authorising Officer has signed the Declaration of Assurance presented in the following section.

## **4.5. Statement of Assurance**

### **4.5.1 Assessment of the Annual Activity Report by the Governing Board**

The declaration of the Executive Director and the Clean Hydrogen JU's AAR for 2025 give a fair assessment of the operational and financial management needed for achieving the objectives.

Based on the information provided, the Clean Hydrogen JU key objectives set up for 2025 were all achieved in compliance with the principles of legality and regularity of operations.

The Governing Board notes that the management of the Clean Hydrogen JU has reasonable assurance that, overall, suitable controls are in place and working as intended and that risks are being properly monitored and mitigated.

Therefore, the Executive Director, in her capacity as Authorising Officer, has signed the Declaration of assurance without any reservation.

The Governing Board thanks Ms Valérie Bouillon-Delporte, Executive Director, for her continuous efforts to deliver the Clean Hydrogen JU's work programme in 2025.

### **4.5.2 Declaration of assurance**

I, the undersigned,

Executive Director of the Clean Hydrogen JU

In my capacity as authorising officer by delegation

Declare that the information contained in this report gives a true and fair view.

State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and

that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on my own judgement and on the information at my disposal, such as the results of the self-assessment, ex-post controls, the work of the internal audit capability, the observations of the Internal Audit Service and the lessons learnt from the reports of the Court of Auditors for years prior to the year of this declaration.

Confirm that I am not aware of anything not reported here which could harm the interests of the Joint Undertaking.

Valérie Bouillon-Delporte  
Executive Director

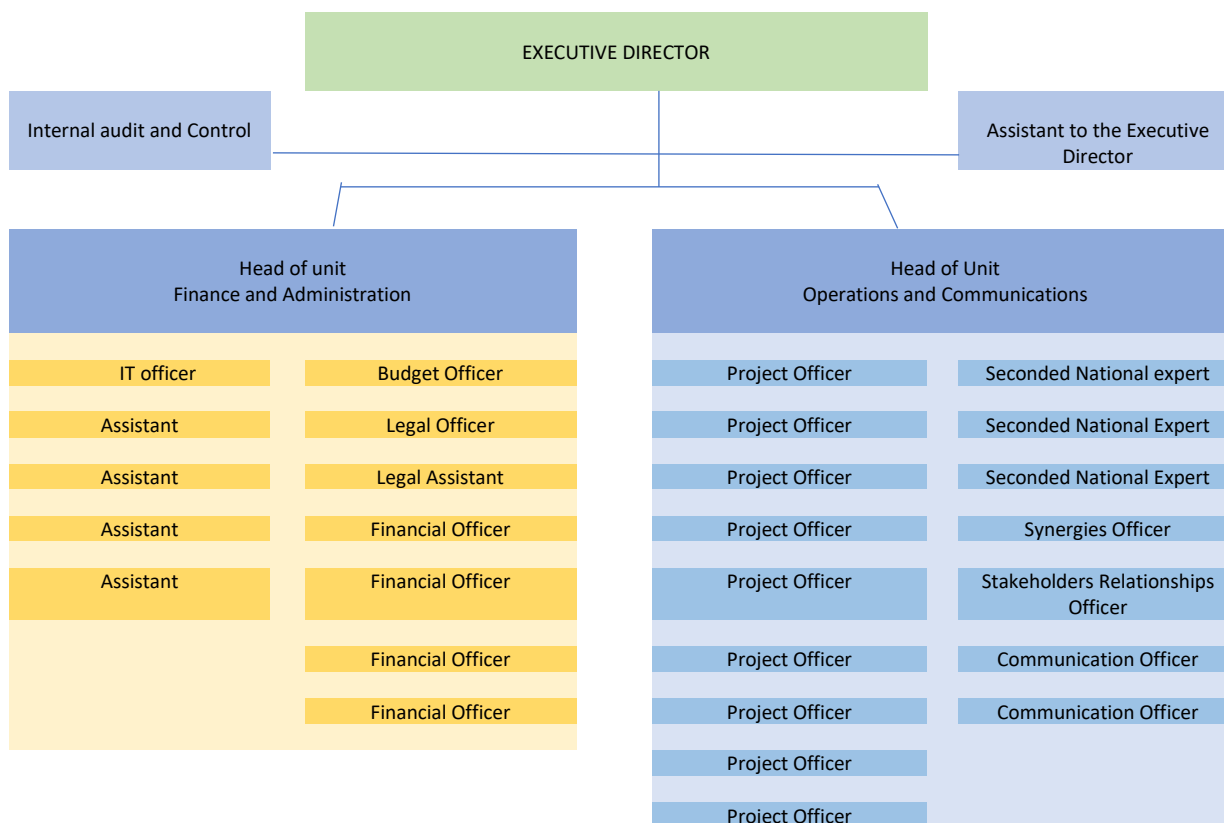




## 5 ANNEXES

### 5.1. Organisational chart

FIGURE 27. ORGANISATIONAL CHART



### 5.2. Establishment plan and additional information on HR management

TABLE 40. HUMAN RESOURCES BY FUNCTION GROUP/GRADE AND TYPE OF POST, 2024 AND 2025

Function group and grade	YEAR 2024				YEAR 2025			
	Authorised		Actually filled as of 31/12		Authorised		Actually filled as of 31/12	
	Perm. posts	Temp. posts	Perm. posts	Temp. posts	Perm. posts	Temp. posts	Perm. posts	Temp. posts
AD 16								
AD 15								
AD 14	1		1		1		1	
AD 13					1		1	
AD 12	2		2		1		1	
AD 11								

AD 10	2		2		2		2	
AD 9	3		3		3		3	
AD 8	2		1		3		3	
AD 7	5		5		4		4	
AD 6	2		2		2		2	
AD 5								
<b>TOTAL AD</b>		17		16		17		17
AST 11								
AST10	1		1		1		1	
AST 9	1		1		1		1	
AST 8	1		1		1		1	
AST 7	1		1		1		1	
AST 6	1		1		2		2	
AST 5	4		3		3		3	
AST 4					1		1	
AST 3	1		1					
AST 2								
AST 1								
<b>TOTAL AST</b>		10		9		10		10
AST/SC 6								
AST/SC 5								
AST/SC 4								
AST/SC 3								
AST/SC 2								
AST/SC 1								
<b>TOTAL AST/SC</b>								
<b>TOTAL AD+AST+ AST/SC</b>	27			25			27	
<b>GRAND TOTAL</b>		27		25		27		27

**TABLE 41. CONTRACT STAFF BY FUNCTION GROUP**

<b>Contract Agents<sup>64</sup></b>	<b>Authorized</b>	<b>Actually filled as of 31/12/2025</b>
Function Group IV	2	1
Function Group III	2	2
Function Group II		
Function Group I		
<b>TOTAL</b>		

<sup>64</sup> Three contract agents are financed by third-country contributions

**TABLE 42. SNEs**

Seconded National Experts	Authorized	Actually filled as of 31/12/2025
	3	2
<b>TOTAL</b>	3	2

### 5.3. Publications from projects

Publications in 2025 related to H2020 and Horizon Europe projects, based on the information extracted from multiple sources:

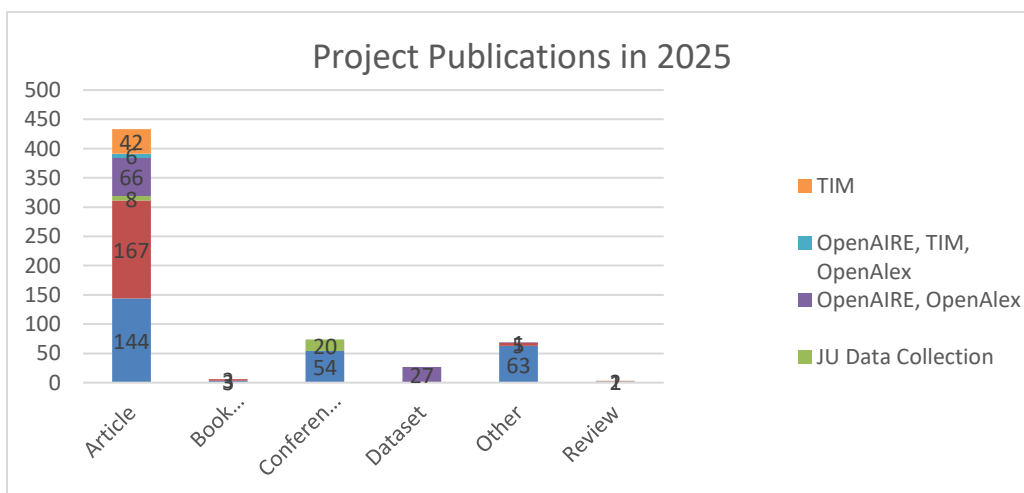
- CORDA
- JRC’s TIM tool
- Clean Hydrogen JU Data Collection 2025
- OpenAIRE
- OpenAlex

The list also includes publications from 2022 that were not reported in due time by the projects for the Annual Activity Report of 2024. As regards publications of (H2020) projects of previous years, please refer to our past Annual Activity Report publications.

For the years 2022, 2023, 2024 and 2025, 635 publications were identified, 249 in 2022, 170 in 2023, 121 in 2024 and 96 in 2025. About two third of them was extracted from CORDA (450 in total), 28 additional ones came from the Clean Hydrogen JU Data Collection and 157 more were identified using CORDIS, TIM, OpenAIRE and OpenAlex.

Focusing in 2025 publications, in the figure below you can find their split per type and source collected:

**FIGURE 28. PROJECT PUBLICATIONS BY TYPE AND SOURCE IN 2025**



### 5.3.1 Additional Publications of 2022 (complementing AARs 2022-2024)

TABLE 43. ADDITIONAL PUBLICATIONS OF 2022

Source	Project Acronym	Publication Type	Title	Authors	Publication Title	Year
<b>CORDA</b>	PRHYDE	Article	A Review of Fuel Cell Powertrains for Long-Haul Heavy-Duty Vehicles: Technology, Hydrogen, Energy and Thermal Management Solutions	Shantanu Pardhi; Omar Hegazy; S. Wilkins; Mohamed El Baghdadi; Dai-Duong Tran; Sajib Chakraborty	Energies	2022
<b>OpenAIRE, OpenAlex</b>	HYTEC	Article	A Review on Industrial Perspectives and Challenges on Material, Manufacturing, Design and Development of Compressed Hydrogen Storage Tanks for the Transportation Sector	Mariana Pimenta Alves; Sung Kyu Ha; Carlos Alberto Cimini; Waseem Gul	Energies	2022
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	AD ASTRA project - WP4 Characterization of Interconnects extracted from operated SUN stacks	Paolo Piccardo	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	ID-FAST	Article	An Analytical Approximation for the Ionomer Film Model in PEMFC	Thomas Jahnke; Andrea Baricci	Journal of the Electrochemical Society	2022
<b>OpenAIRE, OpenAlex</b>	HyCARE	Dataset	An Effective Activation Method for Industrially Produced TiFeMn Powder for Hydrogen Storage [Dataset related to publication]	David Michael Dreistadt; Julian Jepsen; Paul Jerabek; Archa Santhosh; José M. Bellosta von Colbe; Nico Scharnagl; Thomas Klassen; Claudio Pistidda; Henry Ovri;	Zenodo (CERN European Organization for Nuclear Research)	2022

				Chiara Milanese; Giovanni Capurso; Thi Thu Le		
<b>OpenAIRE, TIM, OpenAlex</b>	MAMA-MEA	Article	An experimental approach to evaluate drying kinetics and foam formation in inks for inkjet printing of fuel-cell layers	Paolo E. Santangelo; Marco Puglia; Marcello Romagnoli	Experimental thermal and fluid science	2022
<b>OpenAIRE, OpenAlex</b>	ID-FAST	Article	Analysis of MEA's durability under Accelerated Stress Tests that mimic realistic automotive operations	Elena Colombo; Andrea Casalegno; Andrea Baricci	E3S web of conferences	2022
<b>OpenAIRE, OpenAlex</b>	REFHYNE	Article	Analysis of the Status of Research and Innovation Actions on Electrofuels under Horizon 2020	Emanuela Marzi; Agostino Gambarotta; Mirko Morini	Energies	2022
<b>OpenAIRE, OpenAlex</b>	IDEALHY	Article	Assessment of power-to-power renewable energy storage based on the smart integration of hydrogen and micro gas turbine technologies	Antonio Escamilla; Lourdes García-Rodríguez; David Sánchez	International journal of hydrogen energy	2022
<b>OpenAIRE, OpenAlex</b>	HYPSTER	Article	Blowout Prediction on a Salt Cavern Selected for a Hydrogen Storage Pilot	Hippolyte Djizanne; Grégoire Hévin; Carlos Murillo Rueda; Benoît Brouard; P. Bérest	Energies	2022
<b>OpenAIRE, OpenAlex</b>	ADEL	Article	Business Model Development for a High-Temperature (Co-)Electrolyser System	Christian Michael Riester; Marc Torrell; Nerea Alayo; Albert Tarancón; Gotzon García; Diogo M.F. Santos	Fuels	2022
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	Chromium evaporation and weight gain measurements	Roberto Spotorno	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	INN-BALANCE	Article	Control-oriented estimation of the exchange current density in	José Agustín Aguilar; Attila Husar; Juan Andrade-Cetto	International journal of energy research	2022

			PEM fuel cells via stochastic filtering			
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	Data collected from interconnect operated 40'000 hours in SOFC mode	Paolo Piccardo	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	Data of durability test	Jérôme Laurencin	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	CRESCENDO	Dataset	Dataset for the paper "High Loading of Single Atomic Iron Sites in Pyrolysed Fe-NC Oxygen Reduction Catalysts for Proton Exchange Membrane Fuel Cells", DOI:10.1038/s41929-022-00772-9	Asad Mehmood; Anthony Kucernak; Goran Dražić; Peter Strasser; Mengjun Gong; Alex Martinez Bonastre; Moulay Tahar Sougrati; Aaron Roy; Frédéric Jaouen; Mathias Primbs; Dash Fongalland; Anastassiya Khan; Andrea Zitolo	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	ID-FAST	Dataset	Dataset of "PEMFC performance decay during real-world automotive operation: evincing degradation mechanisms and heterogeneity of ageing"	Elena Colombo; Andrea Casalegno; Andrea Baricci; Andrea Bisello; Guetaz Laure	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE</b>	INSIDE	Article	Deciphering the Exceptional Performance of NiFe Hydroxide for the Oxygen Evolution Reaction in an Anion Exchange Membrane Electrolyzer	Li Wang; Viktoriia A. Saveleva; Mohammad J. Eslamibidgoli; Denis Antipin; Corinne Bouillet; Indro Biswas; Aldo S. Gago; Seyed S. Hosseiny; Pawel Gazdzicki; Michael H. Eikerling; Elena R.	ACS Applied Energy Materials	2022

				Savinova; K. Andreas Friedrich		
<b>OpenAIRE, OpenAlex</b>	COMETHY	Article	Demonstration and analysis of a steam reforming process driven with solar heat using molten salts as heat transfer fluid	Alberto Giaconia; Luca Turchetti; Giampaolo Caputo; Primo Di Ascenzi; Giulia Monteleone	E3S web of conferences	2022
<b>OpenAIRE</b>	HEALTH-CODE	Article	Detoxil Avis France - detoxil 600 mg en pharmacie santediscount commande   pharmacie veau Diaetoxil Avis shop pharmacie Forum	Diaetoxil Amazon	0	2022
<b>OpenAIRE, OpenAlex</b>	Fit-4-AManda	Article	Development of a Graphite Coating and Its Transfer from Batch to Coil Process for Application in PEMFC for Hydrogen-Powered Vehicles	Maurizio Giorgio; Christoph Leyens; Slavcho Topalski; Teja Roch; Maximilian Steinhorst	Advances in materials physics and chemistry	2022
<b>OpenAIRE, OpenAlex</b>	HYDRAITE	Article	Dynamic Load Cycle Effects on PEMFC Stack CO Tolerance under Fuel Recirculation and Periodic Purge	Pauli Koski; Jari Ihonen; J. Viitakangas	Journal of the Electrochemical Society	2022
<b>OpenAIRE, OpenAlex</b>	PECSYS	Article	Dynamic Operation of a Heat Exchanger in a Thermally Integrated Photovoltaic Electrolyzer	Erno Kempainen; Sonya Calnan; Bernd Stannowski; Iris Dorbandt; Rory Bagacki; S. Janke; Quiterie Emery; Christian Schary; Rutger Schlatmann; Fuxi Bao	Energy technology	2022
<b>OpenAIRE, OpenAlex</b>	REMOTE	Article	Economic appraisal of Power-to-Liquid Fischer-Tropsch plants exploiting renewable electricity, green hydrogen, and CO2 from biogas in Europe	Marco Marchese; Massimo Santarelli; Paolo Marocco; Andrea Lanzini	E3S web of conferences	2022

<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	Electrical measurement of coated steels	Roberto Spotorno	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	HyStorIES	Article	Energy Storage Solutions for Offshore Applications	Yessica Arellano; Francesco Finotti; Elvia Chavez-Panduro; Pierluigi Salvo Rossi	Energies	2022
<b>OpenAIRE, OpenAlex</b>	REMOTE	Article	Energy-Economic Assessment of Islanded Microgrid with Wind Turbine, Photovoltaic Field, Wood Gasifier, Battery, and Hydrogen Energy Storage	Maciej Żołądek; K.D. Panopoulos; Alexandros Kafetzis; Rafał Figaj	Sustainability	2022
<b>OpenAIRE</b>	SECOND ACT	Article	Enhanced DRT estimation using prior knowledge	T Malkow	0	2022
<b>OpenAIRE, OpenAlex</b>	MOBYPOST	Article	Evaluation of the Performance Degradation of a Metal Hydride Tank in a Real Fuel Cell Electric Vehicle	Santiago Hernán Suárez; Abdesslem Djerdir; Youcef Amirat; Djafar Chabane; Omar Elkedim; Abdoul N'Diaye	Energies	2022
<b>OpenAIRE</b>	HyTunnel-CS	Other	Experimental data - Hydrogen Safety-mechanical ventilation	Lach, Agnieszka; Gaathaug, Andre Vagner	0	2022
<b>OpenAIRE, OpenAlex</b>	HYDRAITE	Article	First Hydrogen Fuel Sampling from a Fuel Cell Hydrogen Electrical Vehicle–Validation of Hydrogen Fuel Sampling System to Investigate FCEV Performance	Thomas Bacquart; Arul Murugan; Abigail Morris; Ward Storms; Vincent Mattelaer; James Olden; Niamh Moore	Processes	2022
<b>OpenAIRE, OpenAlex</b>	3EMOTION	Article	Four years of operational data for five hydrogen refueling stations	Roberta Caponi; Kristina Fløche Juelsgaard; Andrea Monforti Ferrario; Enrico Bocci	E3S web of conferences	2022

<b>OpenAIRE, OpenAlex</b>	HYUNDER	Article	Green Hydrogen Storage in an Underground Cavern: A Case Study in Salt Diapir of Spain	Laura M. Valle-Falcones; Ramón Rodríguez-Pons; Sonsoles Eguilior; Luis Felipe Mazadiego-Martínez; Antonio Hurtado; Carlos Grima-Olmedo	Applied sciences	2022
<b>OpenAIRE</b>	HyTunnel-CS	Other	Hydrogen Safety: Pressure Peaking Phenomena-ignited releases	Lach, Agnieszka; Gaathaug, Andre Vagner	0	2022
<b>OpenAIRE, OpenAlex</b>	qSOFC	Article	Impedance-based Solid Oxide Fuel Cell testing as scalable and reliable Quality Control tool for cell and batch manufacturing: first findings	Davide Pumiglia; Sergii Pylypko; Della Pietra Massimiliano; Stephen J. McPhail; Andrea Monforti Ferrario	E3S web of conferences	2022
<b>OpenAIRE, OpenAlex</b>	INSPIRE	Article	Importance of Chemical Activation and the Effect of Low Operation Voltage on the Performance of Pt-Alloy Fuel Cell Electrocatalysts	Matija Gatalo; Miran Gaberšček; Francisco Ruiz-Zepeda; Marjan Bele; Harriet Burdett; Adam Hodgkinson; Edwin Hughes; Martin Šala; Léonard Moriau; Nejc Hodnik; Luka Pavko; Alejandro M. Bonastre; Jonathan Sharman	ACS applied energy materials	2022
<b>OpenAIRE, OpenAlex</b>	HyCARE	Dataset	In-situ neutron diffraction during reversible deuterium loading in Ti-rich and Mn-substituted Ti(Fe,Mn) <sub>0.90</sub> alloys - Dataset related to publication	Erika Michela Dematteis; Marcello Baricco; M. Latroche; Stefano Deledda; Giovanni Capurso; Magnus H. Sørby; Fermín Cuevas; Jussara Barale	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	UNIFHY	Article	Investigation of an Intensified Thermo-Chemical Experimental	D. Barisano; Pier Ugo Foscolo; A. Villone; Steffen	Energies	2022

			Set-Up for Hydrogen Production from Biomass: Gasification Process Integrated to a Portable Purification System—Part II	Heidenreich; Cesare Freda; Giacinto Cornacchia; Andrea Lotierzo; Tom Oudenhoven; Enrico Bocci; Emanuele Fanelli; Vera Marcantonio; G. Canneto; F. Nanna; Massimiliano Grieco; Claire Courson; Giacobbe Braccio; M. Rep		
<b>OpenAIRE, OpenAlex</b>	INN-BALANCE	Article	Investigation of gas purging and cold storage impact on PEM fuel cell system performance for aeronautical applications	Gema Montaner Ríos; Syed Asif Ansar; Florian Becker; Christoph Gentner; Anna Vorndran	E3S web of conferences	2022
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	Investigation on anodes from anode supported cells manufactured by Solidpower and aged by IEES-BAS with electrochemical characterization.	Paolo Piccardo	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	HIGH V.LO-CITY	Article	Life cycle assessment of hydrogen-powered city buses in the High V.LO-City project: integrating vehicle operation and refuelling infrastructure	Davide W. Pederzoli; Luca Moreschi; Michela Gallo; C. Carnevali; Adriana Del Borghi; M. Mazzucchelli; R. Genova	SN applied sciences/SN Applied Sciences	2022
<b>OpenAIRE</b>	HyUsPRE	Other	Mapping hydrogen storage capacities of UK offshore hydrocarbon fields and investigating potential synergies with offshore wind	Peacock, Anna; Edlmann, Katriona; Mouli-Castillo, Julien; Martinez-Felipe, Alfonso; McKenna, Russell	0	2022
<b>OpenAIRE, OpenAlex</b>	HYTEC	Article	Multichannel Digital Marketing Optimizations through Big Data	Δαμιανός Π. Σακάς; Costas Vassilakis; Marina C. Terzi; Dimitrios P. Reklitis	Journal of theoretical and applied electronic commerce research	2022

			Analytics in the Tourism and Hospitality Industry			
<b>OpenAIRE, OpenAlex</b>	MATISSE	Article	Multiscale modelling in nuclear ferritic steels: from nano-sized defects to embrittlement	N. Castin; L. Malerba; G. Monnet; C. Courilleau; M. I. Pascuet; F. Bergner; Marta Serrano; C. Domain; B. Gómez-Ferrer; A. Bakaev; M.J. Konstantinović; J. M. Hyde; B. Radiguet; L. Messina; G. Bonny	arXiv (Cornell University)	2022
<b>OpenAIRE</b>	IMPACT	Article	Nanomechanische und nanoelektrische rasterkraftmikroskopische Analyse von Polymerelektrolytbrennstoffzellen	Morawietz, Tobias		0 2022
<b>OpenAIRE, OpenAlex</b>	HyUsPRE	Dataset	Natural hydrogen seeps as analogues to inform monitoring of engineered geological hydrogen storage	Christopher McMahon; C. McMahon; Zoe K. Shipton; Jennifer J. Roberts; Stephanie Flude; Gareth Johnson; Katriona Edlmann	Figshare	2022
<b>OpenAIRE, OpenAlex</b>	MultiPLHY	Article	Performance evaluation of a 4-stack solid oxide module in electrolysis mode	J. Aicart; Julie Mougín; Cédric Beetschen; D. Reynaud; Bastien Gervasoni; Zacharie Wullemin; Yannik Antonetti; F. Waeber; Andrea Nesci	International journal of hydrogen energy	2022
<b>OpenAIRE, OpenAlex</b>	NEWELY	Article	Performance evaluation of the Anion exchange membrane based Water electrolysis	Ronit Kumar Panda; Pascal Schott; Frédéric Fouda-Onana; Yann Bultel; Guillaume Serre	2022 10th International Conference on Systems and Control (ICSC)	2022
<b>OpenAIRE, OpenAlex</b>	THyGA	Article	Progress in Power-to-Gas Energy Systems	Johannes Schaffert	Energies	2022

<b>OpenAIRE, OpenAlex</b>	FCH2RAIL	Dataset	Railway services operated with diesel multiple units in Spain and Portugal	Sebastian Herwartz-Polster; Florian Kühlkamp	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	HyCARE	Article	Research and development of hydrogen carrier based solutions for hydrogen compression and storage	Martin Dornheim; Emmanuel Zoulias; Steven T. Christensen; Thomas Gennett; V.A. Yartys; Lars Baetcke; David M. Grant; C. J. Webb; Mykhaylo Lototskyy; José M. Bellosta von Colbe; Emmanuel Stamatakis; Tae Wook Heo; J.R. Ares; J.F. Fernandez; Véronique Charbonnier; Brandon M. Wood; Paola Rizzi; Etsuo Akiba; Alastair Stuart; Katherine E. Hurst; Sabrina Sartori; Tom Autrey; Jussara Barale; Kriston Brooks; Erika Michela Dematteis; Gavin S. Walker; A. K. Stubos; Oliver Metz; Kouji Sakaki; Mattia Costamagna; Michael Hirscher; Nikolaos Chalkiadakis; Marcello Baricco	Progress in energy	2022
<b>OpenAIRE</b>	Fit-4-AMandA	Article	Roll-to-Roll Coating and Forming of Stainless Steel for Metallic Bipolar Plates	Roch, Teja; Giorgio, Maurizio; Topalski, Slavcho; Porstmann, Sebastian; Polster, Stefan	0	2022

<b>OpenAIRE, OpenAlex</b>	HYUNDER	Article	Scenarios to Decarbonize Austria's Energy Consumption and the Role of Underground Hydrogen Storage	Marcel Clemens; Torsten Clemens	Energies	2022
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Dataset	SOC Fuel, Steam, and Air starvation monitoring using advanced tools	Hamza Moussaoui; Vanja Subotić; Gerald Hammerschmid; Jan Van herle	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	EDEN	Article	SOCIO-ECONOMIC DEVELOPMENT IN THE CONTEXT OF USING REASONABLE SPECIALIZATION IN THE ECONOMY OF UKRAINE	Уляна Андрусів; Nataliia Yurchenko; Halyna Zelinska; Mariia Bahorka; Olga Galtsova; Olena Seleznova	Finansovo-kreditna diâl'nist': problemi teorii ta praktiki	2022
<b>OpenAIRE, OpenAlex</b>	PRESLHY	Article	Spontaneous Ignition of Cryo-Compressed Hydrogen in a T-Shaped Channel System	Donatella Cirrone; Vladimir Molkov; Dmitriy Makarov	Hydrogen	2022
<b>OpenAIRE</b>	StasHH	Article	StasHH - Standard-Sized Heavy-duty Hydrogen	Zenith, Federico	0	2022
<b>OpenAIRE, OpenAlex</b>	HYDROSOL-PLANT	Article	Systematic Quantification of Waste Compositions: A Case Study for Waste of Electric and Electronic Equipment Plastics in the European Union	Alexander Boudewijn; Joost R. Duflou; Wim Dewulf; Dirk Cattrysse; Jef Peeters; Luca Campadello; Alessia Accili	Sustainability	2022
<b>OpenAIRE, OpenAlex</b>	IDEALHY	Article	Techno-Economic Analysis of Solar Thermal Hydrogen Production in the United Arab Emirates	Abdulrahman Joubi; Keiichi Okajima; Yutaro Akimoto	Hydrogen	2022
<b>OpenAIRE, OpenAlex</b>	MCFC-CONTEX	Article	Technologies for Deep Biogas Purification and Use in Zero-Emission Fuel Cells Systems	Roberto Paglini; Andrea Lanzini; Marta Gandiglio	Energies	2022

<b>OpenAIRE, OpenAlex</b>	NEXPEL	Article	The Distortion of Distributed Metric Social Choice	Elliot Anshelevich; Alexandros A. Voudouris; Aris Filos-Ratsikas	Lecture notes in computer science	2022
<b>OpenAIRE, OpenAlex</b>	HEAVENN	Article	Towards Low-carbon Power Networks: Optimal Integration of Renewable Energy Sources and Hydrogen Storage	Sezen Ece Kayacık; Iris F.A. Vis; Albert H. Schrottenboer; Evrim Ursavas	arXiv (Cornell University)	2022
<b>OpenAIRE, OpenAlex</b>	FCH2RAIL	Dataset	Trajectories and driving profiles for hybrid h2 multiple units.	Sebastian Herwartz-Polster; Florian Kühlkamp	Zenodo (CERN European Organization for Nuclear Research)	2022
<b>OpenAIRE, OpenAlex</b>	VOLUMETRIQ	Article	Two Generations of Hydrogen Powertrain—An Analysis of the Operational Indicators in Real Driving Conditions (RDC)	Ireneusz Pielecha; Grzegorz Tchorek; Andrzej Szafek	Energies	2022
<b>OpenAIRE</b>	HyUsPre	Other	Utilizing publicly available datasets for identifying offshore salt strata and developing salt caverns for hydrogen storage	Edlmann, Katriona; Allsop, Craig; Yfantis, Georgios; Passaris, Evan	0	2022
<b>OpenAIRE</b>	FCH2RAIL	Article	Vorstudie Wasserstoffrangierlokomotive Duisport	Konrad, Marcel; Pagenkopf, Johannes; Jäger, Victoria Carolin; Dittus, Holger; Dura, Georg; Garbar, Alexander; Maaß, Jan-Christoph	0	2022

### 5.3.2 Additional Publications of 2023 (complementing AARs 2023-2024)

TABLE 44. ADDITIONAL PUBLICATIONS OF 2023

Source	Project Acronym	Publication Type	Title	Authors	Publication Title	Year
OpenAIRE, OpenAlex	HyBalance	Article	A Comprehensive Overview of the European and Baltic Landscape for Hydrogen Applications and Innovations	Laila Zemīte; Andris Broks; I. Bode; L. Jansons; Aivars Starikovs; A. Backurs; Aigars Laizāns; L. Vempere	Latvian Journal of Physics and Technical Sciences/Latvian journal of physics and technical sciences	2023
OpenAIRE, OpenAlex	FURTHER-FC	Article	A Multiscale Modeling Approach to Identify and Quantify the Transport Limitations in Proton Exchange Membrane Fuel Cells	Thomas Jahnke; Arnaud Morin; Konrad Gülicher	Meeting abstracts/Meeting abstracts (Electrochemical Society. CD-ROM)	2023
OpenAIRE, OpenAlex	PREMIUM ACT	Article	A Novel Accelerated Stress Test for a Representative Enhancement of Cathode Degradation in Direct Methanol Fuel Cells	Claudio Rabissi; Andrea Casalegno; F. Bresciani; Pawel Gazdzicki; Matteo Zago	Energies	2023

<b>OpenAIRE, OpenAlex</b>	GrInHy2.0	Dataset	AC efficiency of GrInHy2.0 electrolysis plant (incl. compressor)	Konstantin Schwarze	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	GrInHy2.0	Dataset	AC efficiency of GrInHy2.0 HTE electrolyzer	Konstantin Schwarze	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	GrInHy2.0	Dataset	Degradation rates of GrInHy2.0 HTE modules	Konstantin Schwarze	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	HyTunnel-CS	Dataset	Effects of hydrogen jet fires on the erosion of tunnel road materials and lining materials	B Sarah; Pursell Mark; F Kellam James	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	CRESCEND O	Article	Electrochemical carbonyl reduction on single-site M–N–C catalysts	Wen Ju; Peter Strasser; Frédéric Jaouen; Jan Rossmeisl; Alexander Bagger; Nastaran Ranjbar Saharie; Sebastian Möhle; Jingyi Wang	Communications chemistry	2023
<b>OpenAIRE, OpenAlex</b>	HYFIVE	Article	Establishment of Austria's First Regional Green Hydrogen Economy: WIVA P&G HyWest	Nikolaus Fleischhacker; Ernst Fleischhacker; Emmanuel Stamatakis; A. Bürger; Ewald Perwög; Niusha Shakibi Nia;	Energies	2023

				Helmut Schreiner; Markus Coll		
<b>OpenAIRE, OpenAlex</b>	HIGGS	Dataset	HIGGS_Inventory of the European transmission gas grid	Michael H. Walter; M. Dolores Storch de Gracia; Alberto Cerezo; Armin Bollien; Hiltrud Schülken; V. Gil; Javier Sánchez-Laínez	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	HIGGS	Dataset	HIGGS_M_WP5_423_OST_T echno-economic-model_190620171000_2309 22	Salvatore	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	HIGGS	Dataset	HIGGS_M_WP5_423_OST_T echno-economic-model_Techno-economic-model_111120171800_2309 22	Salvatore	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	HIGGS	Dataset	HIGGS_Testing Platform_P&ID diagram	Javier Sánchez-Laínez; Teresa Villuendas Gracia; V. Gil	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>CORDA</b>	NewSOC	Article	Hole polarons in LaFeO <sub>3</sub> and La <sub>1-x</sub> Sr <sub>x</sub> FeO <sub>3-δ</sub> : Stability, trapping, mobility, effect of	Cintia Hartmann; Grégory Geneste; Jérôme Laurencin	Physical review. B./Physical review. B	2023

			Sr concentration, and oxygen vacancies			
<b>OpenAIRE, OpenAlex</b>	ShipFC	Article	Hybrid PEM Fuel Cell Power Plants Fuelled by Hydrogen for Improving Sustainability in Shipping: State of the Art and Review on Active Projects	Chiara Dall'Armi; Rodolfo Taccani; Davide Pivetta	Energies	2023
<b>OpenAIRE, OpenAlex</b>	HyCARE	Other	HyCARE - Techno Economical Analysis	Testi Matteo; Ragaglia Davide; Luca Praticò	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	FC-EUROGRID	Article	Longitudinal Analysis of Change in Mammographic Density in Each Breast and Its Association With Breast Cancer Risk	Shu Jiang; Graham A. Colditz; Debbie L. Bennett; Bernard Rosner	JAMA oncology	2023
<b>OpenAIRE, OpenAlex</b>	PEGASUS	Article	Low loading ORR selectivity evaluation of Pt-free catalysts with scanning electrochemical microscopy	Ndrina Limani; Renaud Cornut; Emmanuel Scorsone; Vincent Derycke; Alice Boudet; Bruno Jusselme	Electrochemistry communications	2023
<b>OpenAIRE, OpenAlex</b>	PUMA MIND	Article	Modeling and control of PEM fuel cells	María Laura Sarmiento Carnevali	0	2023

<b>CORDA</b>	GREEN HYSLAND	Article	Multi-Criteria Optimization of Hydrogen Energy Supply Chains Considering Economic and Environmental Impacts: Theoretical Case Study in the Context of Balearic Islands	Florent Montignac; Alain Ruby; Diego Larrahondo Chavez; Diego Larrahondo Chavez; Maria-Candelaria Arpajou	34th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2021)	2023
<b>OpenAIRE, OpenAlex</b>	AD ASTRA	Article	Multiscale modelling potentialities for solid oxide fuel cell performance and degradation analysis	Bárbara Bosio; Fiammetta Rita Bianchi	Sustainable energy & fuels	2023
<b>OpenAIRE, OpenAlex</b>	NewSOC	Dataset	NewSOC, supplementary information to WT2.3 "Development of doped lanthanum chromite based fuel electrodes", WT2.5 "Electrochemical characterization of single cells"	Kalliopi Maria Papazis; Argyro Konstantinidou; Maria-Eleftheria Farmaki	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	NewSOC	Dataset	NewSOC, supplementary information to WT2.5.4 "Cells with honeycomb structured oxygen electrodes": electrochemical and post-mortem data sets.	E.N. Naumovich; Anna Niemczyk	Zenodo (CERN European Organization for Nuclear Research)	2023

<b>OpenAIRE, OpenAlex</b>	NEWELY	Article	Novel Pyrrolidinium-Functionalized Styrene-b-ethylene-b-butylene-b-styrene Copolymer Based Anion Exchange Membrane with Flexible Spacers for Water Electrolysis	Ziqi Xu; K. Andreas Friedrich; Sofia Delgado; Tobias Morawietz; Aldo Saul Gago; Vladimir Atanasov	Membranes	2023
<b>OpenAIRE, OpenAlex</b>	BIONICO	Article	Perspectives of Biogas Plants as BECCS Facilities: A Comparative Analysis of Biomethane vs. Biohydrogen Production with Carbon Capture and Storage or Use (CCS/CCU)	Johannes Full; Alexander Sauer; Tobias Schließ; Hans-Peter Schmid; Robert Miehe; Sonja Ziehn; Silja Hohmann; Edgar Gamero	Energies	2023
<b>OpenAIRE</b>	NEWELY	Article	Polymer synthesis status 09.09.2021	Zitka	0	2023
<b>OpenAIRE</b>	BEST4Hy	Article	Regulatory and Standardisation Assessment	Daniel Grisenti; Pasquale Pinto; Sabina Fiorot; Ilaria Schiavi; Marianna Franchino	0	2023
<b>OpenAIRE, OpenAlex</b>	HPEM2GAS	Dataset	Research Report	-	Zenodo (CERN European Organization for Nuclear Research)	2023

<b>CORDA</b>	DelHyVEH R	Article	Rethinking “BLEVE explosion” after liquid hydrogen storage tank rupture in a fire	Donatella Cirrone; Vladimir Molkov; Dmitriy Makarov; Dmitriy Makarov	International journal of hydrogen energy	2023
<b>OpenAIRE, OpenAlex</b>	CRESCEND O	Article	Review on the Degradation Mechanisms of Metal-N-C Catalysts for the Oxygen Reduction Reaction in Acid Electrolyte: Current Understanding and Mitigation Approaches	Kavita Kumar; Frédéric Maillard; Frédéric Jaouen; Laëtitia Dubau	Chemical reviews	2023
<b>OpenAIRE, OpenAlex</b>	HyLAW	Article	Socio-technical barriers to domestic hydrogen futures: Repurposing pipelines, policies, and public perceptions	Joel A. Gordon; Seyed Ali Nabavi; Nazmiye Balta-Ozkan	Applied energy	2023
<b>OpenAIRE, OpenAlex</b>	UNIFHY	Article	Synergic Effects of Bed Materials and Catalytic Filter Candle for the Conversion of Tar during Biomass Steam Gasification	Alessandro Antonio Papa; Sergio Rapagnà; Andrea Di Carlo; Alessandra Tacconi; Elisa Savuto	Energies	2023
<b>OpenAIRE, OpenAlex</b>	HYRESPON SE	Article	Technical and Economic Evaluation of Electricity Generation and Storage	Saif Serag; Adil Echchelh	Iraqi journal of science	2023

			Using Renewable Energy Sources on Socotra Island, Yemen			
<b>OpenAIRE, OpenAlex</b>	PROMETEO	Article	Thermo-economic evaluation and optimization of solar-driven power-to-chemical systems with thermal, electricity, and chemical storage	Shengwei Huang; Xing Zhou; Yongming Zhao; Yumeng Zhang; Qian Meng; Xinyu Guo; Liang Li	Frontiers in energy research	2023
<b>OpenAIRE, OpenAlex</b>	GrInHy2.0	Dataset	Time availability of GrInHy2.0 HTE electrolyzer	Konstantin Schwarze	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	STACKTEST	Article	Time to market reduction for hydrogen fuel cell stacks using Generative Adversarial Networks	Nicolas Morizet; Daniel Hissel; Perceval Desforges; Christophe Geissler; Elodie Pahon; Samir Jemeï	Journal of power sources	2023
<b>OpenAIRE, OpenAlex</b>	GrInHy2.0	Dataset	Transient recording of hydrogen flow within GrInHy2.0 electrolyser plant	Konstantin Schwarze	Zenodo (CERN European Organization for Nuclear Research)	2023
<b>OpenAIRE, OpenAlex</b>	HyStorIES	Article	Underground Hydrogen Storage: The techno-economic perspective	Eleni Gianni; Nikolaos Koukouzas; Pavlos Tyrologou; Nazaré Couto;	Open Research Europe	2023

				Júlio Carneiro; Eva Scholtzová		
<b>CORDA</b>	AMON	Other	From direct use of ammonia in solid oxide fuel cells to the next generation of ammonia fuel cell systems	Pratticò, Luca; Chiara, Curzel; Testi, Matteo; Montinaro, Dario	0	2023

### 5.3.3 Additional Publications of 2024 (complementing AAR 2024)

TABLE 45. ADDITIONAL PUBLICATIONS OF 2024

Source	Project Acronym	Publication Type	Title	Authors	Publication Title	Year
CORDA	PH2OTOGEN	Article	A polymer bilayer hole transporting layer architecture for high-efficiency and stable organic solar cells	Xu, Junyi; Heumüller, Thomas; Le Corre, Vincent Marc; Barabash, Anastasiia; Félix, Roberto; Frisch, Johannes; Bär, Marcus; Brabec, Christoph	Joule	2024
CORDA	EXSOThyC	Article	Advanced characterization of alkaline water electrolysis through electrochemical impedance spectroscopy and polarization curves	Matheus T. de Groot; P Vermeulen	Journal of electroanalytical chemistry	2024
CORDA	CRAVE-H2	Article	An overview of hydrogen valleys: Current status, challenges and their role in increased renewable energy penetration	Michael Bampaou; K.D. Panopoulos	Renewable & sustainable energy reviews	2024
CORDA	REACTT	Article	Another Step Towards the Renaissance of Automatic Reset Based Control	Mikuláš Huba; Damir Vrančić; Pavol Bisták	IFAC-PapersOnLine	2024

<b>CORDA</b>	GREEN HYSLAND	Article	Assessment of hydrogen supply chains based on dynamic bi-objective optimization of costs and greenhouse gases emissions: Case study in the context of Balearic Islands	Florent Montignac; Alain Ruby; Diego Larrahondo Chavez; Maria-Candelaria Arpajou	Energy	2024
<b>CORDA</b>	NICOLHy	Conference paper	ASTM E659 Standardized Test Analysis and Results for Synthetic Paraffinic Kerosene	Charline Fouchier, Joseph Shepherd	Proceedings of the 15th International Symposium on Hazards, Prevention and Mitigation of Industrial Explosions	2024
<b>CORDA</b>	EXSOTHyC	Article	Catalyst coated diaphragms for enhanced alkaline water electrolysis	Maximilian Demnitz; Matheus T. de Groot; Daan Wim van Kessel; Kristiaan Chpilevski; J. van der Schaaf	International journal of hydrogen energy	2024
<b>CORDA</b>	REACTT	Article	Constrained Series PI, PID and PIDA Controller Design Inspired by Ziegler–Nichols	Mikuláš Huba; Damir Vrančić; Pavol Bisták; Ján Briežnik	Power Electronics and Drives	2024
<b>CORDA</b>	GREEN HYSLAND	Book chapter	Determining competition between LCA environmental impact categories through MILP single objective optimization - A case study on green hydrogen	Diego Larrahondo Chavez; Diego Larrahondo Chavez; Alain Ruby; Catherine Azzaro-Pantel; Florent Montignac	Computer-aided chemical engineering/Computer aided chemical engineering	2024

<b>CORDA</b>	Hy-SPIRE	Article	Development of glass sealants for proton conducting ceramic cells: materials, concepts and challenges	Xanthi Georgolamprou; Ragnar Kiebach; Stéven Pirou; Ilaria Ritucci	Journal of Materials Science Materials in Engineering	2024
<b>CORDA</b>	AMPS	Article	Economic viability and CO2 emissions of hydrogen production for ammonia synthesis: A comparative analysis across Europe	Alessandro Magnino; Marta Gandiglio; Paolo Marocco; Massimo Santarelli	Advances in applied energy	2024
<b>CORDA</b>	HySelect	Conference paper	Energy demand analysis of a practical solar hybrid sulfur cycle: the HySelect project	Y. Kadohiro, E. Prats-Salvado, J.H.S. Martins, D. Dimitrakis, D. Thomey, N. Monnerie, C. Sattler, J. Michels, I. Pfeifer, M. Kürten	RHODES 2024 Conference Proceedings – 11th International Conference on Sustainable Solid Waste Management	2024
<b>CORDA</b>	NOAH2	Article	Engineering nanostructured electrodes for solid oxide cells (SOCs) via microstructural and electrochemical modelling	Davide Cademartori; Jérôme Laurencin; Élise Bonnet; Jean-Marc Bassat; Maxime Hubert	International journal of hydrogen energy	2024
<b>CORDA</b>	JUST-GREEN AFRH2ICA	Article	Evaluation of water/energy intensity of green hydrogen production plants in Africa scenario	Massimo Rivarolo; Aristide F. Massardo; Aurora Portesine; Stefano Barberis	Journal of physics. Conference series	2024
<b>OpenAIRE, OpenAlex</b>	PRESLHY	Article	Fire modelling: The success, the challenges,	Jennifer X. Wen	Fire safety journal	2024

			and the dilemma from a modeller's perspective			
<b>CORDA</b>	NAHV	Article	Fuel Cell Electric Buses: A Systematic Literature Review	Romeo Danielis; Arsalan Muhammad Khan Niazi; Manuela Masutti; Mariangela Scorrano; Muhammad Asees Awan	Energies	2024
<b>CORDA</b>	JUST-GREEN AFRH2ICA	Article	Green hydrogen landscape in North African countries: Strengths, challenges, and future prospects	Oussama Bayssi; Stefano Barberis; Nouredine Boutammachte; Noughaila Nabil; Samir Rachidi; Meryeme Azaroual; Loubna Bouselamti	International journal of hydrogen energy	2024
<b>CORDA</b>	HySelect	Other	HySelect Deliverable 3.1: SO3 Splitting Catalysts Shortlisting	Karagiannakis George	Zenodo (CERN European Organization for Nuclear Research)	2024
<b>CORDA</b>	ROAD TRHYP	Article	Identification of fracture properties at the interface between CMC and EBC at room and high temperatures using full field measurements	Pierre Bertrand; François Hild; Thibaut Archer; Thomas Vandellos; Cédric Huchette	European Conference on Composite Materials	2024
<b>OpenAIRE, OpenAlex</b>	NEXPEL	Article	Improved Metric Distortion via Threshold Approvals	Elliot Anshelevich; Alexandros A. Voudouris; Aris Filos-Ratsikas; Christopher Jerrett	Proceedings of the ... AAAI Conference on Artificial Intelligence	2024
<b>CORDA</b>	REACTT	Article	Improved MOMI tuning method for integrating processes	Damir Vrančić; Paulo Moura Oliveira; Mikuláš Huba; Pavol Bisták	IFAC-PapersOnLine	2024

<b>CORDA</b>	CANDHy	Other	Inventory of non-steel metallic materials of the natural gas distribution grid	Rodriguez, Cristina; Cerezo, Alberto; Soileux, Emilie; Di Vito, Luigi; Martínez Izquierdo, Lidia; Gil, Vanesa; Parro, Marcos; Martínez, Juan Carlos	0	2024
<b>CORDA</b>	NICOLHy	Article	LH2 Tanks in Fire Incidents - the Cryogenic High Temperature Thermal Vacuum Chamber Enables In-Depth Insights	Robert Eberwein; Frank Otremba; Giordano Emrys Scarponi; Valerio Cozzani	Volume 11: Safety Engineering, Risk and Reliability Analysis; Research Posters	2024
<b>CORDA</b>	FCH2RAIL	Article	Limitations in the Hydrogen Refueling Process of Railway Vehicles	Simon Wieser; María Luisa Quintero Soto; F. Heckert; L. Brønner; M. Böhmer; Sebastián Rubio García	Civil-comp conferences	2024
<b>CORDA</b>	DelHyVEHR	Article	Liquid hydrogen refuelling at HRS: Description of sLH2 concept, modelling approach and results of numerical simulations	Vladimir Molkov; Dmitriy Makarov; Hazhir Ebne-Abbasi	International journal of hydrogen energy	2024
<b>CORDA</b>	HyLICAL	Article	Magnetocaloric effect in the Laves phases RCo <sub>2</sub> (R = Er, Ho, Dy, and Tb) in high magnetic fields	Eduard Bykov; Tino Gottschall; A. Yu. Karpenkov; J. Wosnitza; M. Straßheim; Konstantin Skokov; C. Salazar Mejía; Franziska Scheibel; Timo Niehoff; Oliver Gutfleisch; Wei Liu	Journal of alloys and compounds	2024

<b>CORDA</b>	NAHV	Article	Mapping leadership and communities in EU-funded research through network analysis	Fabio Morea; Domenico De Stefano; Alberto Soraci	arXiv (Cornell University)	2024
<b>OpenAIRE</b>	HIGGS	Other	Metadata of HIGGS deliverable D6.1	Sanchez-Lainez, Javier	0	2024
<b>CORDA</b>	REACTT	Article	MOMI tuning method based on frequency-response data	Damir Vrančić; Pavol Bisták; Mikuláš Huba; Paulo Moura Oliveira	IFAC-PapersOnLine	2024
<b>CORDA</b>	NOAH2	Article	Monolithic Stacks: The Next Evolution for Solid Oxide Electrolysis/Fuel Cell Technology	Federico Capotondo; Anke Hagen; Chrisitan Goltermann; Bhaskar Reddy Sudireddy; Stéven Pirou; Henrik Henriksen; Matthew Thomas Bishop; Ebtisam Abdellahi	Meeting abstracts/Meeting abstracts (Electrochemical Society. CD-ROM)	2024
<b>OpenAIRE, OpenAlex</b>	REMOTE	Article	Multi-state optimal power dispatch model for power-to-power systems in off-grid hybrid energy systems: A case study in Spain	Ander Martinez Alonso; Thierry Coosemans; G. Matute; José M. Yusta	International journal of hydrogen energy	2024
<b>CORDA</b>	PENTASTIC	Other	NEOPARD-X: Multidimensional highly efficient and scalable modular framework for modelling of electrolyzers and fuel cells	Andrey Koksharov; Arnulf Latz; Thomas Jahnke	Electrochimica Acta	2024

<b>CORDA</b>	FCH2RAIL	Article	Optimization algorithm for minimizing railway energy consumption in hybrid powertrain architectures: A direct method approach using a novel two-dimensional efficiency map approximation	Rahul Radhakrishnan; Moritz Schenker	Proceedings of the Institution of Mechanical Engineers. Part F, Journal of rail and rapid transit	2024
<b>CORDA</b>	HEAVENN	Article	Partially adaptive multistage stochastic programming	Sezen Ece Kayacik; Evrim Ursavas; Beste Basciftci; Albert H. Schrottenboer	European journal of operational research	2024
<b>CORDA</b>	SWITCH	Article	Performance assessment of a 25 kW solid oxide cell module for hydrogen production and power generation	Diana-María Amaya-Dueñas; Syed Asif Ansar; Marc P. Heddrich; Marc Riedel; Santiago Salas Ventura; Matthias Metten; Dirk Ullmer; Marius Tomberg	International journal of hydrogen energy	2024
<b>CORDA</b>	REACTT	Article	Practice-Oriented Controller Design for an Inverse-Response Process: Heuristic Optimization versus Model-Based Approach	Pavol Bisták; Damir Vrančić; Mikuláš Huba	Applied sciences	2024
<b>CORDA</b>	REACTT	Article	Predicting the Remaining Useful Life of Solid Oxide Fuel Cell Systems Using Adaptive Trend Models of Health Indicators	Luka Žnidarič; Đani Juričić; Žiga Gradišar	Energies	2024

<b>OpenAIRE, OpenAlex</b>	NEWELY	Article	Separators and Membranes for Advanced Alkaline Water Electrolysis	Dirk Henkensmeier; Jens Oluf Jensen; Qingfeng Li; Patric Jannasch; Jelena Stojadinović; Won Chul Cho; David Aili	Chemical reviews	2024
<b>OpenAIRE, OpenAlex</b>	INN-BALANCE	Article	State machine-based architecture to control system processes in a hybrid fuel cell electric vehicle	Ali Molavi; Maria Serra; Juan Sánchez-Monreal; Niclas Nilsson; Attila Husar; Markus Kogler; Yousif Eldigair; Hampus Hjortberg	International journal of hydrogen energy	2024
<b>CORDA</b>	HEAVENN	Article	Stochastic Cyclic Inventory Routing with Supply Uncertainty: A Case in Green-Hydrogen Logistics	Umur Hastürk; Kees Jan Roodbergen; Albert H. Schrotenboer; Evrim Ursavas	Transportation science	2024
<b>CORDA</b>	StasHH	Conference paper	The StasHH Fuel-Cell Module Standard: Standard-sized Heavy-duty Hydrogen	Zenith, Federico; Bouwman, Ruud; Lundkvist, Henrik	Proceedings of the World Hydrogen Energy Conference	2024
<b>CORDA</b>	HEAVENN	Article	Towards low-carbon power networks: Optimal location and sizing of renewable energy sources and hydrogen storage	Sezen Ece Kayacık; Iris F.A. Vis; Albert H. Schrotenboer; Evrim Ursavas	Sustainable energy, grids and networks	2024
<b>CORDA</b>	e-SHyIPS	Article	Towards the design of a hydrogen-powered ferry for cleaner passenger transport	Giovanni Di Ilio; K. Mahos; Francesco Salvatore; Viviana Cigolotti; Arianna Bionda; Raffaele Ponzini; Chara Georgopoulou; Mariagiovanna Minutillo	International journal of hydrogen energy	2024

<b>CORDA</b>	HIGHLANDER	Article	Unveiling the origins of the activity gap between rotating disk electrodes and membrane electrode assemblies: Pt seed-mediated iridium-doped octahedral platinum nickel catalysts for proton exchange membrane fuel cells	Lujin Pan; Peter Strasser; Elisabeth Hornberger; Jiasheng Lu; Jonathon Sharman; Malte Klingenhof; An Guo; Xingli Wang; Michal Ronovský; Olivia Dunseath; Fabio Dionigi; Harriet Burdett; Alejandro Martinez-Bonastre	EES catalysis	2024
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### 5.3.4 Additional Publications of 2025 (complementing AAR 2025)

TABLE 46. ADDITIONAL PUBLICATIONS OF 2025

Source	Project Acronym	Publication Type	Title	Authors	Publication Title	Year
CORDA	CLEANER	Article	13C-Labeled Mesoporous N-Doped Carbon Nanospheres and N-Doped Hydrothermal Carbon Aerogels as Model Materials for Carbon Corrosion Determination in Electrode Structures	Niklas Ortlieb; Anna Fischer; Lars Guggolz; Julian Martin; Jari Ihonen	Advanced energy materials	2025
CORDA	ELECTROLIFE	Article	2D multiphysics model for proton conductor ceramic technology investigating the effects of temperature, composition of reactants and electrolyte material	Andrea Moranti; Massimo Santarelli; Francesco Da Prato; Federico Smeacetto; Simone Anelli; Domenico Ferrero	Journal of power sources	2025
CORDA	ELVHYS	Article	A comprehensive review on liquid hydrogen transfer operations and safety considerations for mobile applications	Alice Schiaroli; Federico Ustolin; Donatella Cirrone; B. Linseisen; Lucas M. Claussner; Alessandro Campari; K. Andreas Friedrich; Ekaterina Ritter; M. Кузнецов	International journal of hydrogen energy	2025
CORDA	REACTT	Article	A New Closed-Loop Control Paradigm Based on Process Moments	Damir Vrančić; Paulo Moura Oliveira; Mikuláš Huba; Pavol Bisták	Mathematics	2025
CORDA	HyPrAEM	Review	A review on transport properties and performance of commercial and novel membranes for anion exchange membrane water electrolyser	V. Naik; Jan Van herle; Poornesh Kumar Koorata; Suhas Nuggehalli Sampathkumar	International journal of hydrogen energy	2025

<b>CORDA</b>	HyPrAEM	Article	Above and beyond the Lab Scale—Creating a kW-Sized AEM Electrolyzer Validated by In-Situ Distribution of Relaxation Times	Suhas Nuggehalli Sampathkumar; Jan Van herle; T.B. Ferriday; Philippe Aubin; Khaled Lawand; Zoé Mury	Energy & fuels	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	Addressing Mass Transport Limitation and Gas Crossover Behavior in Zero-Gap Porous Separator Configurations for Alkaline Water Electrolysis	Adrian Hartert; Anna T.S. Freiberg; Manuel Hegelheimer; Simon Thiele; Benedikt Böhm	ACS applied energy materials	2025
<b>CORDA</b>	ELVHYS	Other	Advanced Boundary Conditions for the Simulation of Fire Engulfment Tests of Cryogenic Storage Tanks	Alice Schiaroli, Giordano E. Scarponi, Christian Mata, Federico Ustolin, Valerio Cozzani	Chemical Engineering Transactions	2025
<b>CORDA</b>	NAHV	Article	Advanced State-of-X diagnostics of proton exchange membrane fuel cells enabled by the multi-scale modeling framework	Tomaž Katrašnik; Andraž Kravos	International journal of hydrogen energy	2025
<b>CORDA</b>	AMON	Article	Advancing non-carbon energy: Optimized and safely operated solid oxide fuel cell design for industrial feasibility	Xinmiao Wei; Jan Van herle; François Maréchal; Shivom Sharma; Ligang Wang; Stefan Diethelm; Arthur Waeber	Journal of Energy Chemistry/Journal of energy chemistry	2025
<b>CORDA</b>	EXSOTHyC	Article	Alkaline Water Electrolysis Beyond 3 A/cm <sup>2</sup> Using Catalyst Coated Diaphragms	Maximilian Demnitz; Thijs de Groot; J. van der Schaaf	Journal of the Electrochemical Society	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	An In Situ Study of the Topochemical Transformation of Hybrid Layered Hydroxides Into Metallic Nanocomposites	Camilo Jaramillo-Hernández; Gonzalo Abellán; Martín Mizrahi; Cristián Huck-Iriart; Christian Dölle; Víctor Oestreicher	Advanced functional materials	2025
<b>CORDA</b>	HYPOP	Other	Analysis of public engagement with H <sub>2</sub> via social media across the EU27	Daniela Martin		0 2025

<b>CORDA</b>	ELVHYS	Article	Analysis of system resilience in escalation scenarios involving LH2 bunkering operations	Federica Tamburini; Valerio Cozzani; Matteo Iaiani	Reliability engineering & systems safety	2025
<b>CORDA</b>	PEMTASTIC	Other	Application relevant load cycles for PEMFC component development and hybrid system optimization	Juan Sanchez-Monreal, Jens Mitzel, Christophe Vacquier, Pawel Gazdzicki	Energy Conversion and Management	2025
<b>CORDA</b>	H2tALENT	Article	Assessing the competitiveness and trade-offs of national hydrogen strategies in the Maghreb: TIMES scenario-based analysis	Yasmine Ayed; Rafat Al Afif; Patrícia Fortes	International journal of hydrogen energy	2025
<b>CORDA</b>	JUST-GREEN AFRH2ICA	Article	Assessing the feasibility of a green hydrogen economy in selected African regions with composite indicators	Amin Lahnaoui; Wilhelm Kuckshinrichs; Stefano Barberis; Gianmarco Aniello; Solomon Agbo	International journal of hydrogen energy	2025
<b>CORDA</b>	HyPrAEM	Article	Combinatorial Use of Reference Electrodes and DRT for Disentangling AEM Electrolyzer Losses	Suhas Nuggehalli Sampathkumar; Jan Van herle; T.B. Ferriday; Mounir Mensi; Pascal Schouwink; Peter Strasser; Vanja Subotić; Hamza Moussaoui; Khaled Lawand; Albert Taureg; Arthur Paul Lucien Thévenot; Fabio Dionigi; Philippe Aubin; Samaneh Daviran	Energy & fuels	2025
<b>CORDA</b>	HYPOP	Other	Communication and Dissemination Activities Report (D5.3)	Valeria Mingardi		0 2025
<b>CORDA</b>	CONVEY	Article	Cross-sectoral energy system model for hydrogen valley concept	Kari Mäki; Heidi Tuiskula; Ashish Saini; Tomi Thomasson	IET conference proceedings.	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	Crystallographic Phase-Dependent Electrochemical Properties of Layered Hydroxides for Energy Applications	Camilo Jaramillo-Hernández; Gonzalo Abellán; Alvaro Seijas Da Silva	European journal of inorganic chemistry	2025

<b>CORDA</b>	MultiPLHY	Article	Design, laboratory characterization, factory acceptance tests and installation of a 2.6 MW High temperature steam electrolyser in a refinery	Julie Mougin; Philippe Olivier; Agnieszka Gajewski; Harold L. Bergman; Anoop Agrawal; J. Aicart	International journal of hydrogen energy	2025
<b>CORDA</b>	FLEX4H2	Article	Development and validation of a framework to predict the linear stability of transverse thermoacoustic modes of a reheat combustor	Simon Manuel Heinzmann; Mirko R. Bothien; Francesco Gant; Harish S. Gopalakrishnan	Combustion and flame	2025
<b>CORDA</b>	FCH2RAIL	Article	Development, application and optimization of hydrogen refueling processes for railway vehicles	Steffen Wieser; E. Rodríguez; María Luisa Quintero Soto; Mathias Boehm; Linus Brünner	International journal of hydrogen energy	2025
<b>CORDA</b>	HYPOP	Other	Different methods of stakeholders' engagement (D4.2)	Ilaria Schiavi	0	2025
<b>CORDA</b>	ELVHYS	Article	Digital image processing for the advanced characterization and simulation of experimental fire tests	Alice Schiaroli; Valerio Cozzani; Martin Kluge; Federico Ustolin; Giordano Emrys Scarponi; Christian Mata; Abdel Karim Habib	Process safety and environmental protection/Transactions of the Institution of Chemical Engineers. Part B, Process safety and environmental protection/Chemical engineering research and design/Chemical engineering research & design	2025
<b>CORDA</b>	HIGHLANDER	Article	Dissolution Trends of Platinum-Based Intermetallic Nanocatalysts toward the Acidic Oxygen Reduction Reaction	Carlos A. Campos-Roldàn; Deborah J. Jones; Sara Cavalière; Jacques Rozière; Vincent Collière; Mickaël Bigot	ACS catalysis	2025

<b>CORDA</b>	ELECTROLIFE	Article	Dual pathways for refinery off-gas processing: Comparative analysis of steam reforming and co-electrolysis	M. Orlić; Vanja Subotić; Christoph Hochenauer; Dario Montinaro; Daniel Radowski; Daniel Reiner	Energy conversion and management	2025
<b>CORDA</b>	REDHY	Article	Durability of nanostructured non-precious MoS <sub>2</sub> -based electrocatalysts for H <sub>2</sub> evolution in PEM water electrolysis	Fausta Giacobello; A.S. Aricò; Maria Aurora Mancuso; Veronica Cicciò; Alessandra Muscolino; S. Siracusano	Journal of power sources	2025
<b>CORDA</b>	UnLOHcked	Article	Effect of titania phase on the performance of Pt/TiO <sub>2</sub> catalysts in the dehydrogenation of perhydrobenzyltoluene	N. B. Marchenko; Valérie Meille; Ludovic Pinard; F. Morfin; M. Kharma; Nuno Batalha; L. Piccolo; Laurence Massin	International journal of hydrogen energy	2025
<b>CORDA</b>	NICOLHy	Article	Effective elastic moduli and failure mechanisms of a random assembly of thin walled glass microbubbles	A.E. Giannakopoulos; Robert Eberwein; Efsthathios Platypodis; Th. Zisis; Christos D. Dimopoulos; A. D. Zervaki	International journal of solids and structures	2025
<b>CORDA</b>	AMON	Article	Efficient and durable system design for ammonia-fueled solid oxide fuel cells using multiscale multiphysics modeling approach	Arash Nemati; Henrik Lund Frandsen; Rafael Nogueira Nakashima; Javid Beyrami; Hossein Nami	Fuel	2025
<b>CORDA</b>	UnLOHcked	Article	Environmental and economic assessment of large-scale hydrogen supply chains across Europe: LOHC vs other hydrogen technologies	Irene Rey; Ion Agirre; V.L. Barrio	Applied energy	2025
<b>CORDA</b>	FLEX4H2	Article	Experimental and numerical investigation of hydrogen injection, spontaneous ignition and flame stabilization in a lab-scale sequential combustor at high pressure	Peter Griebel; Andrea Ciani; Oliver Lammel; Michael Düsing; Joshua A. Gray; Ole Meyer; Holger Ax; Klaus Peter Geigle; Birute Wood; Andrea Gruber	E3S web of conferences	2025

<b>CORDA</b>	UnLOHcked	Article	Exploring Perhydro-Benzyltoluene Dehydrogenation Using Sulfur-Doped PtMo/Al <sub>2</sub> O <sub>3</sub> Catalysts	K. Alconada; V.L. Barrio; Ion Agirre; Fátima Mariño	Catalysts	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	Exploring pseudohalide substitution in $\alpha$ -cobalt-based layered hydroxides	Youssra Diouane; Gonzalo Abellán; Álvaro Seijas-Da Silva; Víctor Oestreicher	Dalton transactions	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	Fe Incorporation in Ni-Based Layered Hydroxides: Implications for Oxygen Evolution Electrocatalysis	Camilo Jaramillo-Hernández; Gonzalo Abellán; Antonio Leyva-Pérez; Álvaro Seijas-Da Silva; Vicente B. Vert; Martín Mizrahi	Inorganic chemistry	2025
<b>CORDA</b>	HELIOS	Article	FGM modeling of thermo-diffusive unstable lean premixed hydrogen–air flames	Stijn N.J. Schepers; J.A. van Oijen	Combustion and flame	2025
<b>CORDA</b>	HYPOP	Other	First Strategic Communication, Dissemination and Exploitation Plan	Valeria Mingardi		0 2025
<b>CORDA</b>	SUSTAINCELL	Article	Fluorine-Lean Phosphonated Polymers of Intrinsic Microporosity with High Oxygen Permeability as a PEMFC Catalyst Layer Ionomer	Theresa Stigler; Jochen Kerres; Tamás Németh; Patrick Fortin; Simon Thiele	ACS applied energy materials	2025
<b>CORDA</b>	HIGHLANDER	Article	From Seeds to Cell: Improving PEMFC Performance and Durability by Seed-Mediation Synthesis for PtNiIr ORR Nanocatalysts	Lujin Pan; Peter Strasser; Carlos A. Campos-Roldán; Jiasheng Lu; Marc Heggen; Sebastian Möhle; Deborah J. Jones; Johannes Schmidt; Sören Selve; Xingli Wang; An Guo; Thomas Merzdorf; Malte Klingenhof	Advanced science	2025
<b>CORDA</b>	HYPOP	Other	Guidelines and good practices for certification bodies (D4.5)	Ilaria Schiavi		0 2025

<b>CORDA</b>	HYPOP	Other	Guidelines and good practices for obtaining permitting (D4.3)	Maria José Sánchez; Maria Panadero	0	2025
<b>CORDA</b>	HYPOP	Other	Guidelines for public engagement on H2 technologies' implementation (D3.4)	Daniela Martin; Dr Fanie van Rooyen	0	2025
<b>CORDA</b>	LuxHyVal	Article	How to Leverage Digital Twin for System Design?	Jean-Sébastien Sottet; Faima Abbasi; Pierre Brimont; Cédric Pruski	Proceedings of the 13th International Conference on Model-Based Software and Systems Engineering	2025
<b>CORDA</b>	HySelect	Other	HySelect Deliverable 2.1: Subsystems Requirements for Solar Platform Testing	Turchetti Luca; D'Auria Marco; Stendardo Stefano; Grena, Roberto; Rovense Francesco	Zenodo (CERN European Organization for Nuclear Research)	2025
<b>CORDA</b>	HySelect	Other	HySelect Deliverable 3.7: TESTED SHORT SDE STACK	Gasik Michael; Agrafiotis Christos	Zenodo (CERN European Organization for Nuclear Research)	2025
<b>CORDA</b>	HySelect	Other	HySelect Deliverable 4.1: Solar-Driven H2 Production Concept	Schmitz Stefan	Zenodo (CERN European Organization for Nuclear Research)	2025
<b>CORDA</b>	HYPOP	Other	Identification of the main individual-level determinants of public understanding and acceptance of FCH technologies (D1.3)	Dr Aaron Jensen; Dr Eric Jensen; Dr Sarah Spooner; Lali van Zuydam; Daniela Martin	0	2025
<b>CORDA</b>	H2AL	Article	Il progetto H2AL, opportunità e limiti della produzione di alluminio con idrogeno verde	Lorenzo Di Fresco; S. Barberis	QualEnergia Science	2025
<b>CORDA</b>	e-SHyIPS	Article	Influence of contaminants on PEMFC performance – a multisinglecell approach	Farhan Ali; Markus Rautanen; Lius Daniel; Niko Heikkinen; Jari Ihonen	Next research.	2025
<b>CORDA</b>	NAHV	Article	Innovation in rare earths recycling: A quantitative and qualitative analysis of patent data	Riccardo Priore; Marinella Favot; Marco Compagnoni	Resources policy	2025

<b>CORDA</b>	HySelect	Article	International Journal of Hydrogen Energy	M. Lanchi, R. Liberatore, M. Battaglia, M. D'Auria, D. Dimitrakis, D. Thomey, J. Michels, M. Gasik, N.I. Tsongidis, N. Shakibi Nia, L. Turchetti	International Journal of Hydrogen Energy	2025
<b>CORDA</b>	FLEX4H2	Article	Linear Stability Analysis of Transversal Thermoacoustic Modes in Reheat Combustors	Simon Manuel Heinzmann; Mirko R. Bothien; Harish S. Gopalakrishnan; Birute Wood	Journal of engineering for gas turbines and power	2025
<b>CORDA</b>	ELVHYS	Other	Liquid Hydrogen Condensed Phase Experimentation & Interpretation	Janni Vizma, Janet Welch, Wayne Rattigan, Graham Atkinson, Jonathan Hall, Kieran Lyons, Simon Coldrick	Chemical Engineering Transactions	2025
<b>CORDA</b>	HIGHLANDER	Article	Mitigating the Pt Dissolution of Pt–Cr Intermetallics during the Oxygen Reduction Reaction in Acid Medium	Carlos A. Campos-Roldàn; Sara Cavalière; Pierre-Yves Blanchard; Jean-Sébastien Filhol; Hazar Guesmi; Deborah J. Jones; Rachelle Alalam; Raphaël Chattot; Jacques Rozière	ACS catalysis	2025
<b>CORDA</b>	ELVHYS	Other	Modelling of Liquid Hydrogen Transfer Operations through Steady-State Simulations	Lucas M. Claussner, Pramoth Thumattin Sathiamoorthy, Federico Ustolin	Chemical Engineering Transactions	2025
<b>CORDA</b>	ELVHYS	Article	Modelling the behaviour of cryogenic liquid hydrogen tanks engulfed in fire	Alice Schiaroli; Valerio Cozzani; Federico Ustolin; Robert Eberwein; Davide Camplese; Giordano Emrys Scarponi	Process safety and environmental protection/Transactions of the Institution of Chemical Engineers. Part B, Process safety and environmental protection/Chemical	2025

					engineering research and design/Chemical engineering research & design	
<b>CORDA</b>	H2REF-DEMO	Article	Multi-Physical Modeling and Design of a Hydraulic Compression System for Hydrogen Refueling of Heavy-Duty Vehicles	Andrea Fornaciari; Emmanuel Sauger; Peter Kloft; Pavel Kučera; Barbara Zardin; Louis Butstraen; Marco Rizzoli; Massimo Borghi; Éric Noppe; Remi Marthelot; Frédéric Barth; Matteo Bertoli; Francis Eynard	Energies	2025
<b>CORDA</b>	REACTT	Article	New Generation of Higher-Order Controllers: Leveraging PID Control for Improved System Response	Mikuláš Huba; Pavol Bisták; Damir Vrančić; Jarmila Škrinárová	IEEE access	2025
<b>CORDA</b>	ROAD TRHYP	Other	Numerical experiments on flame geometry and thermal heat fluxes on surfaces of new hydrogen trailer using FDS software	Virginie Dréan, Borja Rengel, Aurélien Soubeyran, Laurence Bernard, Laurent Paris, Eric Guillaume, Philippe Papin	ISFEH	2025
<b>CORDA</b>	ELVHYS	Other	Numerical investigation on the pressure multi-peaks structure of a LH2 storage tank "BLEVE"	Cirrone D., Makarov D., Molkov V.	Proceedings of the 11th International Seminar on Fire and Explosion Hazards	2025
<b>CORDA</b>	GREEN HYSLAND	Article	Palm trees, energy security and green hydrogen futures: Tourists' views on Mallorca's low carbon transition	Noreen Brennan; Thomas M. van Rensburg	Energy research & social science	2025
<b>CORDA</b>	HIGHLANDER	Article	Platinum-based nanoalloys for the oxygen reduction reaction: exposing the true active phase via in situ/operando techniques	Carlos A. Campos-Roldàn; Sara Cavalière; Pierre-Yves Blanchard; Deborah J. Jones; Raphaël Chattot	Physical chemistry chemical physics/PCCP. Physical chemistry chemical physics	2025

<b>CORDA</b>	ELECTROLIFE	Article	Power loss tracking for the PEM electrolyser using multiphysics dynamical bond graph model	Mahdi Boukerdja, Sumit Sood, Belkacem Ould-Bouamama, Anne-Lise Gehin, Abd Essalam Badoud	International Journal of Hydrogen Energy	2025
<b>CORDA</b>	HYPOP	Other	Public information and engagement strategy (D3.2)	Daniela Martin; Lali van Zuydam; Aaron Jensen; Fanie van Rooyen	0	2025
<b>CORDA</b>	RealHyFC	Article	Real-time capable nonlinear distributed parameter observer considering two-phase flow in PEM fuel cells	Andraž Kravos; Tomaž Katrašnik; Christoph Hametner; Martin Vrlič; Stefan Jakubek	International journal of hydrogen energy	2025
<b>CORDA</b>	ELECTROLIFE	Article	Renewable Energy Storage in a Poly-Generative System Fuel Cell/Electrolyzer, Supporting Green Mobility in a Residential Building	Giuseppe De Lorenzo; Antonio Vita; Nicola Briguglio	Energies	2025
<b>CORDA</b>	NICOLHy	Conference paper	Repeatable Testing of a Cryogenic Storage Tank with Variable Insulation Material in Fire Like Conditions	Robert Eberwein, Aliasghar Hajhariri, Frank Otremba, Davide Camplese, Giordano Emrys Scarponi, Valerio Cozzani, Holger Seidlitz	18th Cryogenics 2025 IIR Conference	2025
<b>CORDA</b>	HYPOP	Other	Report on certification requirements: certification instruments to facilitate the acceptance by safety and permitting authorities (D2.3)	Mattia Miglietta	0	2025
<b>CORDA</b>	HYPOP	Other	Report on permitting requirements (D2.2)	María Panadero; Gema Rodado	0	2025
<b>CORDA</b>	HYPOP	Other	Report on public engagement activities	Daniela Martin; Dr Fanie van Rooyen	0	2025
<b>CORDA</b>	HYPOP	Other	Report on safety requirements (D2.1)	Environment Park	0	2025

<b>CORDA</b>	TRIERES	Article	RES-electrolyser coupling within TRIERES hydrogen valley – A flexible techno-economic assessment tool	Nikolaos Skordoulis; Georgios Mitkidis; Dimitrios V. Lyridis; S.G. Giannissi; Sotirios Karellas	Energy conversion and management	2025
<b>CORDA</b>	PH2OTOGEN	Article	Resolving Peak Overlap in HPLC Analysis of Glycerol Oxidation Products by Utilizing Various Detectors: Application to BiVO <sub>4</sub> Photoanodes	Heejung Kong; Siddharth Gupta; Matthew T. Mayer; Eva Ng; Camilo A. Mesa; Sixto Giménez; Fatwa F. Abdi; Roel van de Krol; Marco Favaro	ACS Omega	2025
<b>CORDA</b>	HYPOP	Article	Responsible research impact: Ethics for making a difference	Eric Jensen; Rafael Ortega; Marta Ballesteros; Lindsay C. Stringer; Sadiq Bhanbhro; Mark S. Reed; Anne Toomey; Daniel Milosavljevic; Ian D. Marder; Andrzej Klimczuk; Gabriella Arrigoni; Bethann Garramon Merkle; Ursula Pool; Louise Rutt; Aaron Michael Jensen; Andrew N Makohon-George; Philly Iglehart; Sawsan Khuri; Simon Robinson; Josmel Pacheco-Mendoza; Caitlin Hafferty; Steve Taylor; Daniela Martin; James Daybell; Lisa Louise Taylor-Sayles	Open research Europe	2025
<b>CORDA</b>	NICOLHy	Article	Safety Assessment of MLI Super-Insulation Systems for Cryogenic Liquid-Hydrogen Tanks in Fire Scenarios	Davide Campese, Chiara Cozzolino, Giordano Emrys Scarponi, Robert Eberwein, Frank Otremba, Valerio Cozzani	CHEMICAL ENGINEERING TRANSACTIONS	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	Scalable synthesis of NiFe-layered double hydroxide for efficient anion exchange membrane electrolysis	Álvaro Seijas-Da Silva; Gonzalo Abellán; Sébastien Legendre; Alice Fiocco; M. Varela; José J.	Nature communications	2025

				Baldoví; Adrian Hartert; Vicent Lloret; Deleted Author ID; Luuk J.J. Muris; Grégoire Thorez; Anna T.S. Freiberg; Jorge Romero; Serhiy Cherevko; Víctor Oestreicher; Guillaume Ducourthial; Cristián Huck-Iriart; Bruno J. C. Vieira; João C. Waerenborgh; Diego López-Alcalá; Simon Thiele; Camilo Jaramillo-Hernández; Karl J. J. Mayrhofer; Martín Mizrahi		
<b>CORDA</b>	HYPOP	Other	S-LCA of two selected hydrogen systems and set of indicators for citizenship (D3.1)	S.K.R. Maddula, J. Dufour, D. Iribarren	0	2025
<b>CORDA</b>	SHIMMER	Article	Standards and codes for hydrogen in pipeline infrastructure: testing, qualification, and integrity assessment	Marcos Sánchez; N.O. Larrosa; Nevena Marinova; E. Silveira	Journal of pipeline science and engineering	2025
<b>CORDA</b>	PH2OTOGEN	Article	Sustainable upgrading of biomass: a thermodynamic approach to fine-tuning product selectivity for glycerol oxidation	Andrés F. Pérez-Torres; Marco Favaro; Roel van de Krol; Fatwa F. Abdi; Heejung Kong	Chemical communications	2025
<b>CORDA</b>	BRAVA	Article	System Analysis and Comparison Between a 2 MW Conventional Liquid Cooling System and a Novel Two-Phase Cooling System for Fuel Cell-Powered Aircraft	Henk Jan van Gerner; Marcus-Benedict Buntz; Georg Mühlthaler; William Resende; Tim Luten	Energies	2025
<b>CORDA</b>	AMON	Article	Techno-economic analysis of ammonia to hydrogen and power pathways considering the emerging hydrogen purification and fuel cell technologies	Du Wen; Jan Van herle; Aris Maroonian; Antonin Bruneau; François Maréchal; Xinmiao Wei	Applied energy	2025

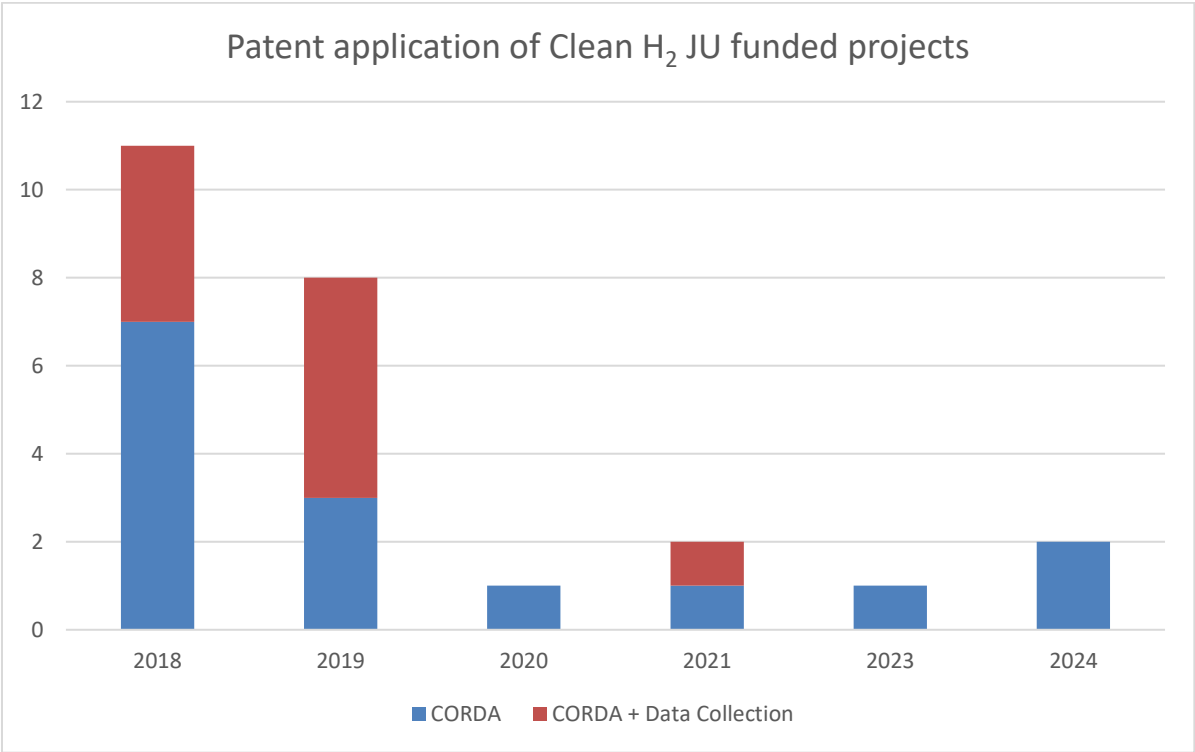
<b>CORDA</b>	H2tALENT	Article	Techno-Economic Assessment of Linear Fresnel-Based Hydrogen Production in the MENA Region: Toward Affordable, Locally Driven Deployment for Enhanced Profitability and Reduced Costs	Abdellatif Azzaoui; Ahmed Alami Merrouni; Hugo Silva; Mohammed Attiaoui; Elmiloud Chaabelasri	Energies	2025
<b>CORDA</b>	BRAVA	Article	Test Results for a Novel 20 kW Two-Phase Pumped Cooling System for Aerospace Applications	Henk Jan van Gerner; Marcus-Benedict Buntz; Georg Mühlthaler; Sigurd Scholten; Tim Luten	Aerospace	2025
<b>CORDA</b>	NICOLHy	Article	Testing of Vacuum Insulation Panels for Liquefied Hydrogen Storage Tanks	Finn Harwege, Robert Eberwein	CHEMICAL ENGINEERING TRANSACTIONS	2025
<b>CORDA</b>	NICOLHy	Conference paper	Testing of vacuum insulation panels for liquid hydrogen storage tanks	Finn Harwege, Heiko Schmidt, Robert Eberwein	18th Cryogenics 2025 IIR Conference	2025
<b>CORDA</b>	FLEX4H2	Other	The effect of transversal velocity fluctuations on the thermoacoustic response of reheat flames	Simon Heinzmann, Nino Leder, Mirko Bothien,	0	2025
<b>CORDA</b>	ELVHYS	Article	The multi-peaks structure of the blast wave generated by a liquid hydrogen storage tank BLEVE	Donatella Cirrone; Vladimir Molkov; Dmitriy Makarov	International journal of hydrogen energy	2025
<b>CORDA</b>	FLEX4H2	Other	Thermoacoustic FEM modeling of partly autoignition and propagation-stabilized flames	Simon Heinzmann, Nino Leder, Harish Gopalakrishnan, Mirko Bothien	0	2025
<b>CORDA</b>	ELVHYS	Article	Thermo-Fluid Dynamics Modelling of Liquid Hydrogen Storage and Transfer Processes	Lucas M. Claussner; Federico Ustolin; Giordano Emrys Scarponi	Hydrogen	2025
<b>CORDA</b>	NICOLHy	Conference paper	Thermo-Mechanical Assessment of a Novel Insulation Concept for Liquid Hydrogen Tanks	Alessandro Campari, Anna Piazzi, Ernesto Salzano, Federico Ustolin	18th Cryogenics 2025 IIR Conference	2025

<b>CORDA</b>	ELVHYS	Other	Towards CFD Modelling of Multi-Peak Structure of Liquid Hydrogen Storage Tank “BLEVE”	Donatella Cirrone, Dmitriy Makarov, Vladimir Molkov	Chemical Engineering Transactions	2025
<b>CORDA</b>	HYPOP	Other	Training material for S-LCA addressed to decision-makers (D4.1)	S.K.R. Maddula, J. Dufour, D. Iribarren	0	2025
<b>CORDA</b>	NOAH2	Article	Understanding the microstructure-performance correlations of infiltrated freeze tape cast electrodes for solid oxide cells by physics-based modelling	Davide Cademartori; Jérôme Laurencin; Ángel Triviño-Peláez; Maria Paola Carpanese; Maxime Hubert	Electrochimica acta	2025
<b>CORDA</b>	SEAL-HYDROGEN	Article	Wet-chemical synthesis of MoS <sub>2</sub> /graphene heterostructures with enhanced electrocatalytic performance: Substantiating the role of the covalent bond	Natalia V. Vassilyeva; Eugenio Coronado; Alicia Forment-Aliaga; Matteo Andrea Lucherelli; J. Martinez; Luuk J.J. Muris; Álvaro Seijas-Da Silva; Gonzalo Abellán	Carbon	2025

### 5.4. Patent from projects

The patents reported below concern H2020 projects for the whole duration of the Programme, not just for year 2025. The reason is the long time required for their processing and approval, which can take more than 5 years. Concerning the source of information, they have been mainly extracted from CORDA, complemented by the Clean Hydrogen JUs annual data collection of 2025. As expected, there are no patents related to Horizon Europe projects yet.

**FIGURE 29. PROJECT PATENTS IDENTIFIED IN 2025**



### 5.4.1 Information extracted from CORDA

TABLE 47. PATENT INFORMATION TAKEN FROM CORDA

Project number	Project acronym	Patent application title	Patent appl. name	Patent appl. date	Patent awarded	Patent No	Link
671403	INNO-SOFC	Protection arrangement and method of solid oxide cells	Elcogen Oy	14-03-18	YES	US10535883B2	<a href="https://patents.google.com/patent/US10535883B2/en?q=TI%3d(Protection+arrangement+and+method+of+solid+oxide+cells)&amp;patents=false&amp;oq=TI%3d(Protection+arrangement+and+method+of+solid+oxide+cells)">https://patents.google.com/patent/US10535883B2/en?q=TI%3d(Protection+arrangement+and+method+of+solid+oxide+cells)&amp;patents=false&amp;oq=TI%3d(Protection+arrangement+and+method+of+solid+oxide+cells)</a>
826379	HYDROSOL-beyond	GAS-SOLID PHASE REACTION	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS & DEUTSCHES ZENTRUM FUR LUFT - UND RAUMFAHRT EV	19-07-05	YES	EP1712517	<a href="https://worldwide.espacenet.com/patent/search/family/36636469/publication/WO2006108769A1?q=WO2006108769">https://worldwide.espacenet.com/patent/search/family/36636469/publication/WO2006108769A1?q=WO2006108769</a>

101007 223	SHERLOHCK	METHOD FOR OPERATING A REACTOR, WHICH COMPRISES A CATALYST MATERIAL, FOR CATALYTICALLY STORING OR RELEASING HYDROGEN GAS, AND SYSTEM COMPRISING SUCH A REACTOR	HYDROGENIOUS LOHC TECHNOLOGIES GMBH	05-10-23	YES	DE102022210824 A1C01B3/0015(E P);C01B3/22(EP); C01B2203/0277(E P);	<a href="https://patents.google.com/patent/DE102022210824A1/en?q=DE102022210824A1C01">https://patents.google.com/patent/DE102022210824A1/en?q=DE102022210824A1C01</a>
671403	INNO-SOFC	SEALING ARRANGEMENT AND METHOD OF SOLID OXIDE CELL STACKS	Elcogen Oy	17-07-14	YES	EP3170219	<a href="https://patents.google.com/patent/EP3170219A1/en?q=EP3170219">https://patents.google.com/patent/EP3170219A1/en?q=EP3170219</a>
671473	D2Service	Heat Exchanger and Method for Manufacturing a Heat Exchanger Core with Manifold	Bosal Emission Control Systems Nv	19-04-18	YES	US1fin9873B2	<a href="https://patents.google.com/patent/US11359873B2/en?q=TI%3d(Heat+Exchanger+and+Method+for+Manufacturing+a+Heat+Exchanger+Core+with+Manifold)&amp;patents=false&amp;oq=TI%3d(Heat+Exchanger+and+Method+for+Manufacturing+a+Heat+Exchanger+Core+with+Manifold)">https://patents.google.com/patent/US11359873B2/en?q=TI%3d(Heat+Exchanger+and+Method+for+Manufacturing+a+Heat+Exchanger+Core+with+Manifold)&amp;patents=false&amp;oq=TI%3d(Heat+Exchanger+and+Method+for+Manufacturing+a+Heat+Exchanger+Core+with+Manifold)</a>
700101	Giantleap	Inrichting voor het koppelen van een trekkend voertuig met een te trekken voertuig	VDL Enabling Transport Solutions BV	06-02-18	YES	NL2020382B1	<a href="https://patents.google.com/patent/NL2020382B1/nl?q=TI%3d(Inrichting+voor+het+koppelen+van+een+trekkend+voertuig+met+een+te+trekken+voertuig)&amp;patents=false&amp;oq=TI%3d(Inrichting+voor+het+koppelen+van+een+trekkend+voertuig+met+een+te+trekken+voertuig)">https://patents.google.com/patent/NL2020382B1/nl?q=TI%3d(Inrichting+voor+het+koppelen+van+een+trekkend+voertuig+met+een+te+trekken+voertuig)&amp;patents=false&amp;oq=TI%3d(Inrichting+voor+het+koppelen+van+een+trekkend+voertuig+met+een+te+trekken+voertuig)</a>

700667	SOSLeM	Recursive, Time-Series-Based Method for Determining the State of an Electrochemical Reactor	AVL List GmbH	27-11-18	YES	US20200386818A1	<a href="https://patents.google.com/patent/US20200386818A1/en?q=TI%3d(Recursive%2c+Time-Series-Based+Method+for+Determining+the+State+of+an+Electrochemical+Reactor)&amp;patents=false&amp;oq=TI%3d(Recursive%2c+Time-Series-Based+Method+for+Determining+the+State+of+an+Electrochemical+Reactor)">https://patents.google.com/patent/US20200386818A1/en?q=TI%3d(Recursive%2c+Time-Series-Based+Method+for+Determining+the+State+of+an+Electrochemical+Reactor)&amp;patents=false&amp;oq=TI%3d(Recursive%2c+Time-Series-Based+Method+for+Determining+the+State+of+an+Electrochemical+Reactor)</a>
700667	SOSLeM	Method for Determining an Operating State of an Electrochemical System	AVL List GmbH	07-12-18	YES	AT520682B1	<a href="https://patents.google.com/patent/AT520682B1/en?q=TI%3d(Method+for+Determining+an+Operating+State+of+an+Electrochemical+System)&amp;patents=false&amp;oq=TI%3d(Method+for+Determining+an+Operating+State+of+an+Electrochemical+System)">https://patents.google.com/patent/AT520682B1/en?q=TI%3d(Method+for+Determining+an+Operating+State+of+an+Electrochemical+System)&amp;patents=false&amp;oq=TI%3d(Method+for+Determining+an+Operating+State+of+an+Electrochemical+System)</a>
779644	TAHYA	Composite Pressure Vessel with Reinforced Inner Liner and Process for the Production Thereof	Plastic Omnium New Energies France SAS	26-06-19	YES	EP3814673B1	<a href="https://patents.google.com/patent/EP3814673B1/en?q=TI%3d(Composite+Pressure+Vessel+with+Reinforced+Inner+Liner+and+Process+for+the+Production+Thereof)&amp;patents=false&amp;oq=TI%3d(Composite+Pressure+Vessel+with+Reinforced+Inner+Liner+and+Process+for+the+Production+Thereof)">https://patents.google.com/patent/EP3814673B1/en?q=TI%3d(Composite+Pressure+Vessel+with+Reinforced+Inner+Liner+and+Process+for+the+Production+Thereof)&amp;patents=false&amp;oq=TI%3d(Composite+Pressure+Vessel+with+Reinforced+Inner+Liner+and+Process+for+the+Production+Thereof)</a>
779644	TAHYA	Composite Pressure Vessel with Boss Connector	<u>Plastic Omnium Advanced Innovation and Research SA</u>	26-06-19	YES	US11015762B2	<a href="https://patents.google.com/patent/US11015762B2/en?q=TI%3d(Composite+Pressure+Vessel+with+Boss+Connector)&amp;patents=false&amp;oq=TI%3d(Composite+Pressure+Vessel+with+Boss+Connector)">https://patents.google.com/patent/US11015762B2/en?q=TI%3d(Composite+Pressure+Vessel+with+Boss+Connector)&amp;patents=false&amp;oq=TI%3d(Composite+Pressure+Vessel+with+Boss+Connector)</a>

779644	TAHYA	Tank Liner Having Two Cylindrical Sections	Plastic Omnium New Energies France SAS	26-06-19	YES	US11506335B2	<a href="https://patents.google.com/patent/US11506335B2/en?q=TI%3d(Tank+Liner+Having+Two+Cylindrical+Sections)&amp;patents=false&amp;oq=TI%3d(Tank+Liner+Having+Two+Cylindrical+Sections)">https://patents.google.com/patent/US11506335B2/en?q=TI%3d(Tank+Liner+Having+Two+Cylindrical+Sections)&amp;patents=false&amp;oq=TI%3d(Tank+Liner+Having+Two+Cylindrical+Sections)</a>
101007 182	SH2APED	End Fitting for a Pressurised Fluid Reservoir	Plastic Omnium New Energies France SAS	14-01-21	NO	EP4090877A1	<a href="https://patents.google.com/patent/EP4090877A1/en?q=TI%3d(End+Fitting+for+a+Pressurised+Fluid+Reservoir)&amp;patents=false&amp;oq=TI%3d(End+Fitting+for+a+Pressurised+Fluid+Reservoir)">https://patents.google.com/patent/EP4090877A1/en?q=TI%3d(End+Fitting+for+a+Pressurised+Fluid+Reservoir)&amp;patents=false&amp;oq=TI%3d(End+Fitting+for+a+Pressurised+Fluid+Reservoir)</a>
875118	NEWELY	Composite ion-exchange membrane, method for preparing the same, and use thereof	KIST	11-06-20	YES	KR20210153842A	<a href="https://patents.google.com/patent/KR20210153842A/en?q=TI%3d(%E2%80%AFComposite+ion-exchange+membrane%2c+method+for+preparing+++the+same%2c+and+use+thereof+)&amp;patents=false&amp;oq=TI%3d(%E2%80%AFComposite+ion-exchange+membrane%2c+method+for+preparing+++the+same%2c+and+use+thereof+))">https://patents.google.com/patent/KR20210153842A/en?q=TI%3d(%E2%80%AFComposite+ion-exchange+membrane%2c+method+for+preparing+++the+same%2c+and+use+thereof+)&amp;patents=false&amp;oq=TI%3d(%E2%80%AFComposite+ion-exchange+membrane%2c+method+for+preparing+++the+same%2c+and+use+thereof+))</a>
875118	NEWELY	Polymer grafted with cationic groups as side chain, preparation method thereof, and anion exchange membrane made of the same	KIST, Technion	27/01/2021	YES	KR20220108630A	<a href="https://patents.google.com/patent/KR20220108630A/en?q=TI%3d(%E2%80%AFPolymer+grafted+with+cationic+groups+as+side+chain%2c+preparation+method+thereof%2c+and+anion+exchange+++membrane+m+ade+of+the+same)&amp;patents=false&amp;oq=TI%3d(%E2%80%AFPolymer+grafted+with+cationic+groups+as+side+chain%2c+preparation+method+thereof%2c+and+anion+exchange+++membrane+m+ade+of+the+same))">https://patents.google.com/patent/KR20220108630A/en?q=TI%3d(%E2%80%AFPolymer+grafted+with+cationic+groups+as+side+chain%2c+preparation+method+thereof%2c+and+anion+exchange+++membrane+m+ade+of+the+same)&amp;patents=false&amp;oq=TI%3d(%E2%80%AFPolymer+grafted+with+cationic+groups+as+side+chain%2c+preparation+method+thereof%2c+and+anion+exchange+++membrane+m+ade+of+the+same))</a>

101007 170	MORELife	COATED POROUS MEDIA, METHOD OF MANUFACTURING A COATED POROUS MEDIA AND THE USE OF SUCH COATED POROUS MEDIA	TECHNISCHE UNIVERSITEIT EINDHOVEN	07-10-24	YES	NL2035972B1	<a href="https://patents.google.com/patent/NL2035972B1/en">https://patents.google.com/patent/NL2035972B1/en</a>
101007 223	SHERLOHCK	METHOD FOR OPERATING A REACTOR, WHICH COMPRISES A CATALYST MATERIAL, FOR CATALYTICALLY STORING OR RELEASING HYDROGEN GAS, AND SYSTEM COMPRISING SUCH A REACTOR	HYDROGENIOUS LOHC TECHNOLOGIES GMBH	18-04-24	Yes	WO/2024/07896 0	<a href="https://patentscope.wipo.int/search/en/WO2024078960">https://patentscope.wipo.int/search/en/WO2024078960</a>

## 5.4.2 Additional information on patents, complementing the partial information on CORDA

TABLE 48. ADDITIONAL PATENT INFORMATION FROM PREVIOUS CLEAN HYDROGEN JU DATA COLLECTIONS

Project number	Project acronym	Patent application title	Patent applicant name	Patent application date	Patent awarded	Publication No	Link
700266	Cell3Ditor	Method and machine for producing parts made of ceramic or metallic material by additive manufacturing	3DCERAM	20/06/2018	YES	EP3444049B1	<a href="https://patents.google.com/patent/EP3444049B1/en?q=TI%3d(Method+and+machine+for+producing+parts+m ade+of+ceramic+or+metallic+material+by+additive+ma nufacturing)&amp;patents=false&amp;oq=TI%3d(Method+and+m achine+for+producing+parts+m ade+of+ceramic+or+met allic+material+by+additive+manufacturing)">https://patents.google.com/patent/EP3444049B1/en?q=TI%3d(Method+and+machine+for+producing+parts+m ade+of+ceramic+or+metallic+material+by+additive+ma nufacturing)&amp;patents=false&amp;oq=TI%3d(Method+and+m achine+for+producing+parts+m ade+of+ceramic+or+met allic+material+by+additive+manufacturing)</a>
700266	Cell3Ditor	Method and machine for producing at least one part in at least one ceramic and/or metal material by additive manufacturing	3DCERAM	20/06/2018	YES	EP3444050B1	<a href="https://patents.google.com/patent/EP3444050B1/en?q=TI%3d(Method+and+machine+for+producing+at+least +one+part+in+at+least+one+ceramic+and%2for+metal+ material+by+additive+manufacturing)&amp;patents=false&amp;o q=TI%3d(Method+and+machine+for+producing+at+leas t+one+part+in+at+least+one+ceramic+and%2for+metal +material+by+additive+manufacturing)">https://patents.google.com/patent/EP3444050B1/en?q=TI%3d(Method+and+machine+for+producing+at+least +one+part+in+at+least+one+ceramic+and%2for+metal+ material+by+additive+manufacturing)&amp;patents=false&amp;o q=TI%3d(Method+and+machine+for+producing+at+leas t+one+part+in+at+least+one+ceramic+and%2for+metal +material+by+additive+manufacturing)</a>
700266	Cell3Ditor	Method of manufacturing pieces by the technique of additive manufacturing by pasty process with an improved supply of paste and manufacturing machine for implementing the method	3DCERAM	15/02/2018	YES	KR102039061 B1	<a href="https://patents.google.com/patent/KR102039061B1/en?q=TI%3d(Method+of+manufacturing+pieces+by+the+t echnique+of+additive+manufacturing+by+pasty+proces s+with+an+improved+supply+of+paste+and+manufactu ring+machine+for+implementing+the+method)&amp;patent s=false&amp;oq=TI%3d(Method+of+manufacturing+pieces+b y+the+technique+of+additive+manufacturing+by+pasty +process+with+an+improved+supply+of+paste+and+ma nufacturing+machine+for+implementing+the+method)">https://patents.google.com/patent/KR102039061B1/en?q=TI%3d(Method+of+manufacturing+pieces+by+the+t echnique+of+additive+manufacturing+by+pasty+proces s+with+an+improved+supply+of+paste+and+manufactu ring+machine+for+implementing+the+method)&amp;patent s=false&amp;oq=TI%3d(Method+of+manufacturing+pieces+b y+the+technique+of+additive+manufacturing+by+pasty +process+with+an+improved+supply+of+paste+and+ma nufacturing+machine+for+implementing+the+method)</a>

700266	Cell3Ditor	Electrochemical cell device for use in a SOFC and/or a SOEC and methods for operating a SOFC or a SOEC by using thereof	ICREA, IREC	18/06/2019	YES	EP3754768A1	<a href="https://patents.google.com/patent/EP3754768A1/en?q=TI%3d(Electrochemical+cell+device+for+use+in+a+SOFC+and%2for+a+SOEC+and+methods+for+operating+a+SOFC+or+a+SOEC+by+using+thereof)&amp;patents=false&amp;og=TI%3d(Electrochemical+cell+device+for+use+in+a+SOFC+and%2for+a+SOEC+and+methods+for+operating+a+SOFC+or+a+SOEC+by+using+thereof)">https://patents.google.com/patent/EP3754768A1/en?q=TI%3d(Electrochemical+cell+device+for+use+in+a+SOFC+and%2for+a+SOEC+and+methods+for+operating+a+SOFC+or+a+SOEC+by+using+thereof)&amp;patents=false&amp;og=TI%3d(Electrochemical+cell+device+for+use+in+a+SOFC+and%2for+a+SOEC+and+methods+for+operating+a+SOFC+or+a+SOEC+by+using+thereof)</a>
735918	INLINE	Kalibrierverfahren für einen Projektor	Profactor GmbH	07/05/2019	YES	AT522320B1	<a href="https://patents.google.com/patent/AT522320B1/en?q=TI%3d(Kalibrierverfahren+f%C3%BCr+einen+Projektor)&amp;patents=false">https://patents.google.com/patent/AT522320B1/en?q=TI%3d(Kalibrierverfahren+f%C3%BCr+einen+Projektor)&amp;patents=false</a>
700355	HyGrid	Carbon molecular sieve membrane and its use in separation processes	TUE Tecnalía	19/10/2019	YES	EP4072715A	<a href="https://www.patentguru.com/EP4072715A">https://www.patentguru.com/EP4072715A</a>
700355	HyGrid	Method for low hydrogen content separation from a natural gas mixture	TUE Tecnalía	09/12/2019	YES	US20210339190A1	<a href="https://www.patentguru.com/US20210339190A1">https://www.patentguru.com/US20210339190A1</a>
826204	DOLPHIN	Procédé de fabrication d'un guide d'écoulement pour réacteur électrochimique	CEA	20/12/2021	YES	EP4016677A1	<a href="https://patentimages.storage.googleapis.com/04/31/13/bb1f9368ef6a02/EP4016677A1.pdf">https://patentimages.storage.googleapis.com/04/31/13/bb1f9368ef6a02/EP4016677A1.pdf</a>
735918	INSIGHT	Fuel cell stack, indicator fuel cell, fuel cell system and method for determining degradation of a fuel cell stack	AVL	2019	YES	AT522869A1	<a href="https://patents.google.com/patent/AT522869A1/en?og=AT522869+">https://patents.google.com/patent/AT522869A1/en?og=AT522869+</a>
735918	INSIGHT	Procedure for providing an indicator	AVL	25/10/2018	YES	AT521864A2	<a href="https://patents.google.com/patent/AT521864A2/en?og=AT521864">https://patents.google.com/patent/AT521864A2/en?og=AT521864</a>
875088	CHANNEL	Cathode catalyst (NiMo) for water electrolysis	Norwegian University of Science and Technology (NTNU)	9/11/2022	NO		Application No. 2216708.4 at UK Intellectual Property Office

## 5.5. Scoreboard of Horizon 2020 legacy Key Performance Indicators (If relevant)

In the two subsections below one can find the Horizon 2020 legacy KPIs, that were reported for the FCH 2 JU in its Annual Activity Reports. When a row has a grey shade, it means that either the reported value is the same as the one reported in AAR2021 and is not expected to change in the future or that it is not relevant any more as there are no more Calls for H2020 after 2020. A third table, concerning the KPIs specific to FCH 2 JU has been omitted as it is not relevant anymore. It's last reporting can be found in AAR2022.

### 5.5.1 Scoreboard of common KPIs

TABLE 49. SCOREBOARD OF COMMON KPIs

	H2020 KPI number	KPI	Type of data required	Results H2020 <sup>65</sup> (Calls 2014-2020)
INDUSTRIAL LEADERSHIP	12	SME - Share of participating SMEs introducing innovations new to the company or the market (covering the period of the project plus three years)	Number of SMEs that have introduced innovations to the company or market	135
	13	SME - Growth and job creation in participating SMEs	Turnover of company, number of employees	Turnover of SMEs at most recent reporting: EUR 1,802.4 Mil No of employees at SMEs at most recent reporting: 18,641 employees
SOCIETAL CHALLENGES	14	Publications in peer-reviewed high-impact journals	Publications from relevant funded projects (as reported in CORDA)	780 publications in peer-reviewed journals
	15	Patent applications and patents awarded in the area of the JTI	Patent application number (combined sources, aligned with Section <b>Error! Reference source not found.</b> )	25 patents awarded and 6 patent pending applications
	16	Number of prototypes testing activities and clinical trials	Reports on prototypes, and testing activities, clinical trials	Nr of prototypes: 722 Nr of testing activities: 764 Nr of clinical trials: 1

<sup>65</sup> Data were extracted from CORDA on 21<sup>st</sup> February 2024.

	H2020 KPI number	KPI	Type of data required	Results H2020 <sup>65</sup> (Calls 2014-2020)
	17	Number of joint public-private publications in projects	Properly flagged publications data (DOI) from relevant funded projects (as reported in CORDA)	131 Joint Public/Private (not reported in CORDA anymore)
	18 <sup>66</sup>	New products, processes and methods launched on the market	Project count and drop-down list enabling choice of the type of processes, products and methods	Nr of projects with: New products: 83 New processes: 42 New methods: 36
EVALUATION	NA	Time to inform (TTI) <u>all applicants</u> of the outcome of the evaluation of their application from the final date for submission of completed proposals	Number and % of information letters sent to applicants within target Average TTI (calendar days) Maximum TTI (calendar days)	-
	NA	Redress after evaluations	Number of redresses requested	-
GRANTS	N/A	Time to Grant (TTG) measured (average) from call deadline to signature of grants	Average TTG in calendar days Maximum TTG in calendar days	-
GRANTS	NA	Time to grant (TTG) measured (average) from call deadline to signature of grants	Number and % of grants signed within target	-
PAYMENTS	N/A	Time to Pay (TTP) (% made on time) -pre-financing -interim payment -final payment	Average TTP in calendar days	
HR	N/A	Vacancy rate (%)	Vacancy rate (%)	

<sup>66</sup> This indicator is not legally compulsory but covers several additional specific indicators requested for more societal challenges by the services in charge.

	H2020 KPI number	KPI	Type of data required	Results H2020 <sup>65</sup> (Calls 2014-2020)
JU EFFICIENCY	NA	Time to sign (TTS) grant agreements from the date of informing successful applicants (information letters)	Average TTS in calendar days Maximum TTS in calendar days	Average TTS: 110 days Maximum TTS: 170 days (after approval of a request for GAP extension by the consortium)
	N/A	Administrative budget: Number and % of total of late payments	Number and % of total of late payments	

## 5.5.2 Indicators for monitoring cross-cutting issues

TABLE 50. INDICATORS FOR MONITORING CROSS-CUTTING ISSUES

Number	Definition/Responding to question	Type of data required	AAR 2025 (CALLS 2014-2020) <sup>67</sup>																																																						
2.1	Total number of participations by EU-27 Member States + the UK	Nationality of H2020 applicants and beneficiaries (number)	<p>EU-27 + UK</p> <table border="1"> <tr> <td>Application Participations</td> <td>3197</td> <td>Application Participants</td> <td>1329</td> </tr> <tr> <td>Grant Participations</td> <td>1441</td> <td>Grant Participants</td> <td>738</td> </tr> </table>	Application Participations	3197	Application Participants	1329	Grant Participations	1441	Grant Participants	738																																														
Application Participations	3197	Application Participants	1329																																																						
Grant Participations	1441	Grant Participants	738																																																						
2.2	Total amount of EU financial contribution by EU-27 Member State + the UK (EUR million)	Nationality of H2020 beneficiaries and corresponding EU financial contribution	<p>In EUR million per country (total EUR 574 million):</p> <table border="1"> <tr> <td>AT</td> <td>24.49</td> <td>ES</td> <td>30.68</td> <td>LV</td> <td>1.12</td> </tr> <tr> <td>BE</td> <td>22.46</td> <td>FI</td> <td>18.81</td> <td>MT</td> <td>0.03</td> </tr> <tr> <td>BG</td> <td>0.39</td> <td>FR</td> <td>88.76</td> <td>NL</td> <td>53.38</td> </tr> <tr> <td>CY</td> <td>0.17</td> <td>HR</td> <td>0.72</td> <td>PL</td> <td>1.06</td> </tr> <tr> <td>CZ</td> <td>1.46</td> <td>HU</td> <td>0.02</td> <td>PT</td> <td>0.73</td> </tr> <tr> <td>DE</td> <td>152.11</td> <td>IE</td> <td>0.07</td> <td>RO</td> <td>0.26</td> </tr> <tr> <td>DK</td> <td>27.53</td> <td>IT</td> <td>55.43</td> <td>SE</td> <td>9.96</td> </tr> <tr> <td>EE</td> <td>0.83</td> <td>LT</td> <td>0.13</td> <td>SI</td> <td>3.63</td> </tr> <tr> <td>EL</td> <td>6.13</td> <td>LU</td> <td>1.64</td> <td>UK</td> <td>72.08</td> </tr> </table>	AT	24.49	ES	30.68	LV	1.12	BE	22.46	FI	18.81	MT	0.03	BG	0.39	FR	88.76	NL	53.38	CY	0.17	HR	0.72	PL	1.06	CZ	1.46	HU	0.02	PT	0.73	DE	152.11	IE	0.07	RO	0.26	DK	27.53	IT	55.43	SE	9.96	EE	0.83	LT	0.13	SI	3.63	EL	6.13	LU	1.64	UK	72.08
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EL	6.13	LU	1.64	UK	72.08																																																				

<sup>67</sup> The figures concern the maximum EU contribution for 133 projects, not including ELECTROU which was terminated very early. Data were extracted from CORDA on 04<sup>th</sup> March 2026.

N/A	Total number of participations by Associated Countries	Nationality of H2020 applicants and beneficiaries (number)	<table border="1"> <thead> <tr> <th colspan="2">Associated Countries</th> </tr> </thead> <tbody> <tr> <td>Application Participations</td> <td>Application Participants</td> </tr> <tr> <td>350</td> <td>146</td> </tr> <tr> <td>Grant Participations</td> <td>Grant Participants</td> </tr> <tr> <td>157</td> <td>83</td> </tr> </tbody> </table>	Associated Countries		Application Participations	Application Participants	350	146	Grant Participations	Grant Participants	157	83		
Associated Countries															
Application Participations	Application Participants														
350	146														
Grant Participations	Grant Participants														
157	83														
N/A	Total amount of EU financial contribution by Associated Country (EUR million)	Nationality of H2020 beneficiaries and corresponding EU financial contribution	<p>In EUR million per country (total EUR 48.34 million):</p> <table border="1"> <tbody> <tr> <td>CH</td> <td>13.81</td> </tr> <tr> <td>IL</td> <td>0.24</td> </tr> <tr> <td>IS</td> <td>1.07</td> </tr> <tr> <td>NO</td> <td>32.33</td> </tr> <tr> <td>TR</td> <td>0.85</td> </tr> <tr> <td>UA</td> <td>0.06</td> </tr> </tbody> </table>	CH	13.81	IL	0.24	IS	1.07	NO	32.33	TR	0.85	UA	0.06
CH	13.81														
IL	0.24														
IS	1.07														
NO	32.33														
TR	0.85														
UA	0.06														
3.1	Share of EU financial contribution going to SMEs (Enabling and industrial tech and Part III of H2020)	<p>Number of H2020 beneficiaries flagged as SMEs</p> <hr/> <p>% of EU contribution going to beneficiaries flagged as SMEs</p>	<table border="1"> <thead> <tr> <th colspan="3">SME beneficiaries</th> </tr> </thead> <tbody> <tr> <td>Grants participations</td> <td>Grant participants</td> <td>Funding EUR</td> </tr> <tr> <td>360 (22 %)</td> <td>173 (21 %)</td> <td>175.8mil. (28 %)</td> </tr> </tbody> </table>	SME beneficiaries			Grants participations	Grant participants	Funding EUR	360 (22 %)	173 (21 %)	175.8mil. (28 %)			
SME beneficiaries															
Grants participations	Grant participants	Funding EUR													
360 (22 %)	173 (21 %)	175.8mil. (28 %)													
6.1	Percentage of women participants in H2020 projects	Gender of participants in H2020 projects	26 % (12,992 women)												
6.2	Percentage of women project coordinators in H2020	Gender of MSC fellows, ERC principal investigators and scientific coordinators in other H2020 activities	39/133 (29 %)												
6.3	Percentage of women in EC advisory groups, expert groups, evaluation panels, individual experts, etc.	Gender of members of advisory groups, panels, etc.	<p>Scientific Com: 3/9 (33.3 %)</p> <p>SRG: 9/42 (21.4 %)</p> <p>Evaluators: N/A</p>												
7.1	Share of third-country participants in H2020	Nationality of H2020 beneficiaries	<table border="1"> <thead> <tr> <th colspan="3">Third Countries</th> </tr> </thead> <tbody> <tr> <td>Grants participations</td> <td>Grant participants</td> <td>EU Funding</td> </tr> <tr> <td>14</td> <td>13</td> <td>EUR 0.24 mil.</td> </tr> </tbody> </table>	Third Countries			Grants participations	Grant participants	EU Funding	14	13	EUR 0.24 mil.			
Third Countries															
Grants participations	Grant participants	EU Funding													
14	13	EUR 0.24 mil.													

7.2	Percentage of EU financial contribution attributed to third-country participants	Nationality of H2020 beneficiaries and corresponding EU financial contribution	0.04 %																		
9.1	Share of projects and EU financial contribution allocated to IAs	Number of IA proposals and projects properly flagged in the WP; follow-up at grant level	Number: 36 / 133 (28.2%) Funding: EUR 366.7 / EUR 632.7 (57.97 %)																		
9.2	Within the IAs, share of EU financial contribution focused on demonstration and first-of-a-kind activities	Topics properly flagged in the WP; follow-up at grant level	EUR 366.7 / EUR 880 (42%)																		
N/A	Scale of impact of projects (high technology readiness level - TRL)	Number of projects addressing TRL between (2-3, 4-6, 5-7)	Based on TRL specified in the topic (project start) <table border="1"> <thead> <tr> <th>TRL</th> <th># projects</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>14</td> </tr> <tr> <td>3</td> <td>30</td> </tr> <tr> <td>4</td> <td>28</td> </tr> <tr> <td>5</td> <td>15</td> </tr> <tr> <td>6</td> <td>11</td> </tr> <tr> <td>7</td> <td>10</td> </tr> <tr> <td>8</td> <td>1</td> </tr> <tr> <td>unspecified</td> <td>24</td> </tr> </tbody> </table>	TRL	# projects	2	14	3	30	4	28	5	15	6	11	7	10	8	1	unspecified	24
TRL	# projects																				
2	14																				
3	30																				
4	28																				
5	15																				
6	11																				
7	10																				
8	1																				
unspecified	24																				
11.1	Percentage of H2020 beneficiaries from the private-for-profit sector	Number of and % of the total H2020 beneficiaries classified by type of activity and legal status	Participations: 977 / 1612 (61 %) Participants: 561/ 834 (67 %)																		
11.2	Share of EU financial contribution going to private-for-profit entities (Enabling and industrial tech and Part III of Horizon 2020)	H2020 beneficiaries classified by type of activity; corresponding EU contribution	EUR 436.2 mil (70 %)																		
12.1	EU financial contribution for public-private partnerships (PPP) (Art. 187)	EU contribution to PPP (Art. 187)	EUR 665,000,000, with additional EUR 95,000,000 for administrative costs (article 3 of FCH 2 JU founding regulation)																		
12.2	PPPs leverage: total amount of funds leveraged through Art. 187 initiatives, including additional activities, divided by the EU contribution	Total funding made by private actors involved in PPPs  - in-kind contribution already committed by private members in projects selected for funding	See section 5.2																		

		- additional activities (i.e. research expenditure/investment of industry in the sector, compared to previous year)													
13.3	Dissemination and outreach activities other than peer-reviewed publications [conferences, workshops, press releases, publications, flyers, exhibitions, training, social media, websites, communication campaigns (e.g. radio, TV)]	A drop-down list allows for selection of the type of dissemination activity. Number of events, funding amount and number of persons reached thanks to the dissemination activities	<p>Activities as reported by the projects during the Clean Hydrogen data collection exercise of 2025 for the reporting year of 2024 respectively:</p> <table border="1"> <thead> <tr> <th>Dissemination activities (excl. Scientific Publications)</th> <th>2025</th> </tr> </thead> <tbody> <tr> <td>Total Activities</td> <td>556</td> </tr> <tr> <td>Conferences/Events (Presentations)</td> <td>148</td> </tr> <tr> <td>Meetings (with policy stakeholders/working groups, etc)</td> <td>314</td> </tr> <tr> <td>Education &amp; Training Activities</td> <td>94</td> </tr> <tr> <td>Other</td> <td>50</td> </tr> </tbody> </table>	Dissemination activities (excl. Scientific Publications)	2025	Total Activities	556	Conferences/Events (Presentations)	148	Meetings (with policy stakeholders/working groups, etc)	314	Education & Training Activities	94	Other	50
Dissemination activities (excl. Scientific Publications)	2025														
Total Activities	556														
Conferences/Events (Presentations)	148														
Meetings (with policy stakeholders/working groups, etc)	314														
Education & Training Activities	94														
Other	50														
14.2	Proposal evaluators by country	Nationality of proposal evaluators (at pool level)	N/A (no more H2020 evaluations)												
14.3	Proposal evaluators by organisations' type of activity	Type of activity of evaluators' organisations	N/A (no more H2020 evaluations)												
N/A	Participation of RTO[3]s and universities in PPPs (Art. 187 initiatives)	Number of RTOs participations in funded projects and % of the total	306 / 1612 (19 %)												
		Number of universities participations in funded projects and % of the total	213 / 1612 (13 %)												
		% of budget allocated to RTOs and to universities	RTO: EUR 98.7 million (16 %) HES: EUR 49.1 million (8 %)												

N/A	The aim is to ensure that research projects funded are efficiently compliant with provisions on ethics	% of proposals not granted because of non-compliance with ethical rules/proposals invited to grant (target 0 %); time to ethics clearance (target 45 days)	N/A
N/A	Error rate	% of representative error; % residual error	
N/A	Implementation of <i>ex-post</i> audit results	Number of cases implemented; in total EUR million; of cases implemented/total cases	

## 5.6. Scoreboard of Horizon Europe common Key Impact Pathway Indicators (KIPs)<sup>68</sup>

TABLE 51. SCOREBOARD OF HORIZON EUROPE COMMON KIP INDICATORS

Key Impact Pathway <sup>4</sup>	Short-term	Medium-term	Longer-term	Detail per action or globally for [YEAR N]
<b>Towards scientific impact</b>				
<b>1-Creating high-quality new knowledge</b>	Publications -Number of peer-reviewed scientific publications resulting from the Programme <b>59</b> 2023:13 2024: 30 2025: 16	Citations -Field-Weighted Citation Index of peer-reviewed Publications resulting from the Programme	World-class science - Number and share of peer-reviewed publications resulting from the projects funded by the Programme that are core contribution to scientific fields	
<b>2-Strengthening human capital in R&amp;I</b>	Skills -Number of researchers involved in upskilling (training, mentoring/coaching, mobility and access to R&I infrastructures) activities in projects funded by the Programme	Careers -Number and share of upskilled researchers involved in the Programme with increased individual impact in their R&I field	Working conditions - Number and share of upskilled researchers involved in the Programme with improved working conditions, including researchers' salaries	

<sup>68</sup> (based on Annex V to Regulation 2021/695/EU)

	<p><b>2,092</b> Women: 33.94% Men: 66.11%</p>			
<b>3-Fostering diffusion of knowledge and open science</b>	<p>Shared knowledge Share of research outputs (open data/publication/software etc.) resulting from the Programme shared through open knowledge infrastructures</p> <p><b>82.93%</b> OpenAccess Publications: 82.2% OpenAccess Datasets: 100%</p>	<p>Knowledge diffusion -Share of open access research outputs resulting from the Programme actively used/cited</p>	<p>New collaborations - Share of Programme beneficiaries which have developed new transdisciplinary/transsectoral collaborations with users of their open access research outputs resulting from the Programme</p>	
<b>Towards societal impact</b>				
<b>4-Addressing Union policy priorities and global challenges through R&amp;I</b>	<p>Results -Number and share of results aimed at addressing identified Union policy priorities and global challenges (including SDGs) (multidimensional: for each identified priority) Including: Number and share of climate-relevant results aimed at delivering on the Union's commitment under the Paris Agreement</p> <p><i>Number (share of total)</i></p> <ul style="list-style-type: none"> <li><b>EC Priority: 84 projects (0.39%)</b></li> </ul>	<p>Solutions -Number and share of innovations and research outcomes addressing identified Union policy priorities and global challenges (including SDGs) (multidimensional: for each identified priority) Including: Number and share of climate-relevant innovations and research outcomes delivering on Union's commitment under the Paris Agreement</p>	<p>Benefits -Aggregated estimated effects from use/exploitation of results funded by the Programme on tackling identified Union policy priorities and global challenges (including SDGs), including contribution to the policy and law-making cycle (such as norms and standards) (multidimensional: for each identified priority) Including: Aggregated estimated effects from use/exploitation of climate-relevant results funded by the Programme on delivering on the</p>	

	<ul style="list-style-type: none"> <li>• <b>SDG: 80 projects (0.38%)</b></li> <li>• <b>Climate Score: 121 projects (0.57%)</b></li> </ul>		Union's commitment under the Paris Agreement including contribution to the policy and law-making cycle (such as norms and standards)	
<b>5-Delivering benefits and impact through R&amp;I missions</b>	R&I mission results - Results in specific R&I missions (multidimensional: for each identified mission)	R&I mission outcomes Outcomes in specific R&I missions (multidimensional: for each identified mission)	R&I mission targets met -Targets achieved in specific R&I missions (multidimensional: for each identified mission)	Not applicable for the JUs
<b>6-Strengthening the uptake of R&amp;I in society</b>	Co-creation -Number and share of projects funded by the Programme where Union citizens and end-users contribute to the co-creation of R&I content <b>Signed grants with any engagement activity (of citizens or end-users): 38 projects (45.78%)</b>	Engagement - Number and share of participating legal entities which have citizen and end-users engagement mechanisms in place after the end of projects funded by the Programme	Societal R&I uptake - Uptake and outreach of co-created scientific results and innovative solutions generated under the Programme	
<b>Towards technological / economic impact</b>				
<b>7-Generating innovation-based growth</b>	Innovative results - Number of innovative products, processes or methods resulting from the Programme (by type of innovation) & Intellectual Property Rights (IPR) applications  <b>Number of innovative products, processes or methods: 54</b> Design: 7 (13%)	Innovations - Number of innovations resulting from the projects funded by the Programme (by type of innovation) including from awarded IPRs	Economic growth - Creation, growth & market shares of companies having developed innovations in the Programme	

	Business model: 3 (5.6%) Service: 3 (5.6%) Product: 18 (33.3%) Method: 12 (22.2%) Industrial Process: 11 (20.4%) <b>Intellectual Property Rights (IPR) applications: 0</b>			
<b>8-Creating more and better jobs</b>	Supported employment - Number of full time equivalent (FTE) jobs created, and jobs maintained in participating legal entities for the project funded by the Programme (by type of job) <b>981.13</b>	Sustained employment - Increase of FTE jobs in participating legal entities following the project funded by the Programme (by type of job)	Total employment - Number of direct & indirect jobs created or maintained due to diffusion of results from the Programme (by type of job)	
<b>9- Leveraging investments in R&amp;I</b>	Co-investment - Amount of public & private investment mobilised with the initial investment from the Programme <b>Total (2022-2025): 957.18 M</b> 2022: 2.9M 2023: 861.45M 2024: 47.8M 2025: 45.03 M	Scaling-up - Amount of public & private investment mobilised to exploit or scale-up results from the Programme (including foreign direct investments)	Contribution to '3 % target' - Union progress towards 3 % GDP target due to the Programme	

## 5.7 Horizon Europe Partnership common Key Performance Indicators<sup>69</sup>

TABLE 52. COMMON KPI BASELINE VALUES, RESULTS FOR 2025 AND TARGETS FOR 2027

<sup>69</sup> Based on an interim report published on 21 June 2021 (Commission Experts' report, Section 5 and Appendix

N°	Criterion addressed	Proposed common indicators	Baseline	Results for [YEAR N]	Target 2027
1	<b>Additionality</b>	Progress towards (financial and in-kind) contributions from partners other than the Union – i.e. committed vs. actual			
2	<b>Additionality/ Synergies</b>	Additional investments triggered by the EU contribution, including qualitative impacts related to additional activities			
3	<b>Directionality</b>	Overall (public and private, in-kind and cash) investments mobilised towards EU priorities	100% towards Grean Deal	100% towards Grean Deal	100% towards Grean Deal
4	<b>International visibility and positioning</b>	International actors involved	68	124	N/A
5	<b>Transparency and openness</b>	Share & type of stakeholders and countries invited/engaged	Please see Table A below	Please see Table B below	N/A
6	<b>Transparency and openness</b>	No and types of newcomer members in partnerships and their countries of origin (geographical coverage)			
7	<b>Transparency and openness</b>	No and types of newcomer beneficiaries in funded projects (in terms of types and countries of origin)	Please see Table C below	Please see Table D below	N/A
8	<b>Coherence and synergies</b>	Number and type of coordinated and joint activities with other European Partnerships	N/A	Coordinated call for proposals: 0 Systemic collaboration: 3 Ad hoc collaboration:5	N/A
9	<b>Coherence and synergies</b>	Number and type of coordinated and joint activities with other R&I	Coordinated calls for proposals: 1	Coordinated call for proposals: 0	N/A

1 <https://op.europa.eu/en/publication-detail/-/publication/6b63295f-d305-11eb-ac72-01aa75ed71a1/language-en/format-PDF/source-215872593> )

N°	Criterion addressed	Proposed common indicators	Baseline	Results for [YEAR N]	Target 2027
		Initiatives at EU /national/regional/sectorial level	Hydrogen valleys: 3 Co-funding: 9	Hydrogen valleys: 21 Co-funding: 2 Formal collaboration: 10 Ad-hoc collaboration: 10 Various activities: 4	
10	<b>Coherence and synergies</b>	Complementary and cumulative funding from other Union funds (Horizon Europe, ERDF, RRF, Other cohesion policy funds, CEF, DEP, LIFE, other) and national funding	6.88%	?	N/A
11	<b>International visibility and positioning</b>	Visibility of the partnership in national, European, international policy/industry cycles			

Table A Share & type of stakeholders (=applicants) and their countries of h2020 (BASELINE)<sup>70</sup>

Country	HES	OTH	PRC	PUB	REC	Grand Total
AE	1					1
AT	4	3	36	2	6	51
BE	3	14	35	4	7	63
BG	1	1	5	2	2	11
CA	1		1			2
CH	8	1	34		2	45
CL		1	1			2
CN	3					3
CR			1			1
CY		1	4	2		7

<sup>70</sup> Types of organisations: [HES]: Higher Education Schools, [PRC]: Private Companies, [PUB]: Public Companies, [REC]: Research Centres, [OTH]: Other

<b>CZ</b>	3		13	1	3	20
<b>DE</b>	21	8	216	4	20	269
<b>DK</b>	2	2	34	6	2	46
<b>EE</b>	2		5		1	8
<b>EL</b>	7	1	26	1	6	41
<b>ES</b>	11	5	80	6	17	119
<b>FI</b>	4		16		3	23
<b>FR</b>	6	2	111	10	10	139
<b>HR</b>	2		4		2	8
<b>HU</b>	1		1			2
<b>IE</b>	3		7			10
<b>IL</b>	2		3			5
<b>IS</b>		1	6	2		9
<b>IT</b>	22	8	99	4	11	144
<b>JP</b>	1				1	2
<b>KR</b>					2	2
<b>LT</b>	2		3		1	6
<b>LU</b>			1			1
<b>LV</b>	2	1	5			8
<b>MA</b>		1				1
<b>MK</b>			1	1		2
<b>MT</b>	1	1	1	1		4
<b>NL</b>	8	4	78	10	6	106
<b>NO</b>	5	5	44	3	7	64
<b>PL</b>	8		11	2	4	25
<b>PT</b>	4	1	15	1	3	24
<b>RO</b>	4		7		2	13
<b>RS</b>					1	1

<b>SE</b>	5	1	24		2	32
<b>SI</b>	2		11	1	4	18
<b>SK</b>	2		3			5
<b>TN</b>	1		2			3
<b>TR</b>	4		10		1	15
<b>TW</b>					1	1
<b>UA</b>	1		3		2	6
<b>UK</b>	21	6	91	6	5	129
<b>US</b>	1	1	5			7
<b>ZA</b>	1					1
<b>Grand Total</b>	<b>180</b>	<b>69</b>	<b>1053</b>	<b>69</b>	<b>134</b>	<b>1505</b>

Table B Share & type of stakeholders (=applicants) and their countries of clean hydrogen ju in 2025

<b>Country</b>	<b>HES</b>	<b>OTH</b>	<b>PRC</b>	<b>PUB</b>	<b>REC</b>	<b>Grand Total</b>
<b>AE</b>	1		1		1	3
<b>AL</b>	1			1	2	4
<b>AT</b>	12	9	84	2	18	125
<b>AU</b>	2		1		1	4
<b>BA</b>	1					1
<b>BE</b>	10	19	93	5	11	138
<b>BG</b>	5	6	35	3	4	53
<b>BM</b>			1			1
<b>BR</b>			3			3
<b>CA</b>	4		4	3		11
<b>CH</b>	11	6	55	5	2	79
<b>CI</b>			1			1
<b>CO</b>			1			1
<b>CV</b>				1		1

<b>CY</b>	3	4	27	5	1	40
<b>CZ</b>	5	2	16		2	25
<b>DE</b>	41	21	317	15	31	425
<b>DK</b>	5	7	42	9	5	68
<b>DZ</b>	1			1		2
<b>EE</b>	4	4	20	2	1	31
<b>EG</b>	1		2	1		4
<b>EL</b>	11	8	82	13	9	123
<b>ES</b>	25	17	213	20	42	317
<b>FI</b>	10	11	61	16	2	100
<b>FR</b>	35	19	270	26	16	366
<b>GE</b>	1					1
<b>GH</b>	1	1				2
<b>HR</b>	8	1	8	5	2	24
<b>HU</b>	2	7	17	4	5	35
<b>IE</b>	7	1	19	2	5	34
<b>IL</b>	3		18	2		23
<b>IN</b>		1	1		1	3
<b>IS</b>	1		11	3	1	16
<b>IT</b>	33	16	191	13	15	268
<b>JE</b>			1			1
<b>JP</b>					1	1
<b>KE</b>	1		2			3
<b>KR</b>			7	1	2	10
<b>KZ</b>				1	1	2
<b>LB</b>					1	1
<b>LI</b>			2			2
<b>LT</b>	3	4	8		2	17

<b>LU</b>	1	1	17	1	1	21
<b>LV</b>	5	3	16	7	1	32
<b>LY</b>					3	3
<b>MA</b>	1	1	5		2	9
<b>MC</b>			1			1
<b>MD</b>				1		1
<b>ME</b>	1					1
<b>MK</b>		1	1	1	1	4
<b>MT</b>			3			3
<b>MU</b>		1				1
<b>MZ</b>		1		1		2
<b>NA</b>			1			1
<b>NG</b>			2			2
<b>NL</b>	11	13	164	8	9	205
<b>NO</b>	9	11	68	9	10	107
<b>NZ</b>	1	1	1		2	5
<b>PL</b>	13	11	67	7	16	114
<b>PT</b>	6	4	42	3	13	68
<b>RO</b>	6	4	15	4	5	34
<b>RS</b>	2	1	3		2	8
<b>RW</b>	1		1			2
<b>SA</b>	1					1
<b>SE</b>	10	4	72	12	7	105
<b>SI</b>	2	2	28	3	6	41
<b>SK</b>	2	6	27	5		40
<b>TN</b>	2		1		1	4
<b>TR</b>	14	6	67	8	4	99
<b>UA</b>	5	1	8	4	6	24

<b>UK</b>	37	11	124	6	7	185
<b>US</b>	1		3	2		6
<b>ZA</b>	5		4			9
<b>Grand Total</b>	<b>384</b>	<b>247</b>	<b>2355</b>	<b>241</b>	<b>280</b>	<b>3507</b>

Table C No and types of newcomer beneficiaries in funded projects (BASELINE)<sup>71</sup>

<b>Country</b>	<b>HES</b>	<b>OTH</b>	<b>PRC</b>	<b>PUB</b>	<b>REC</b>	<b>Grand Total</b>
<b>AT</b>	2	1	17	1	5	26
<b>BE</b>	1	7	21	3	8	40
<b>BG</b>	1				1	2
<b>CA</b>	1					1
<b>CH</b>	8	1	17		1	27
<b>CL</b>		1				1
<b>CN</b>	2					2
<b>CY</b>			2			2
<b>CZ</b>	1		2	1	3	7
<b>DE</b>	13	5	112		15	145
<b>DK</b>	2	2	15	3	1	23
<b>EE</b>	1		2			3
<b>EL</b>		1	7	1	3	12
<b>ES</b>	5	3	43	7	12	70
<b>FI</b>			8		2	10
<b>FR</b>	16	2	72	6	10	106
<b>HR</b>	2		1			3
<b>HU</b>	1		1			2
<b>IE</b>	1		2			3

<sup>71</sup> Newcomers compared to FP7. As the H2020 Programme continues, the number of beneficiaries continues to change, which is the reason for the small difference from the reported baseline of AAR22.

<b>IL</b>			1			1
<b>IS</b>			3	1		4
<b>IT</b>	15	2	58		7	82
<b>JP</b>					1	1
<b>KR</b>					1	1
<b>LT</b>			1			1
<b>LU</b>			1			1
<b>LV</b>		1	3			4
<b>MA</b>		1				1
<b>MH</b>			1			1
<b>MT</b>				1		1
<b>NL</b>	4	3	66	14	4	91
<b>NO</b>	3	3	35	1	4	46
<b>PA</b>			1			1
<b>PL</b>	1		3		3	7
<b>PT</b>	2		5		1	8
<b>RO</b>	2				2	4
<b>SE</b>	2	1	14	1	1	19
<b>SI</b>	1		4	2	1	8
<b>SK</b>			1			1
<b>TR</b>	1		3			4
<b>UA</b>	1					1
<b>UK</b>	8	5	40	6	2	61
<b>US</b>			3			3
<b>ZA</b>	1					1
<b>Grand Total</b>	<b>98</b>	<b>39</b>	<b>565</b>	<b>48</b>	<b>88</b>	<b>838</b>

Table D No and types of newcomer beneficiaries in funded projects for clean hydrogen ju in 2025<sup>72</sup>

Country	HES	OTH	PRC	PUB	REC	Grand Total
AT		2	29	1	4	36
AU	1				1	2
BE	2	5	16	1		24
BG	1	3	10		1	15
BR			2			2
CA	1					1
CH		1	13	1		15
CY		1	3			4
CZ		1	2		1	4
DE	4	1	55	1	4	65
DK		3	16			19
EE		2	8	1	1	12
EG			1			1
EL	2	1	29	4	1	37
ES	4	4	58	2	11	79
FI	2	1	15			18
FR	9	5	78	8	3	103
HR	3	1	6	2		12
HU		1			1	2
IE	1	2	7	1	2	13
IL	1					1
IS	1		9	1	1	12
IT	5	5	53	4	5	72
KE	1					1
KR			1			1
LT		1				1
LU	1	1	10	1	1	14
LV	1	1	1	1		4
MA	2				1	3
MK					1	1
MU		1				1
NG			1			1
NL	1	2	32		2	37
NO	1	2	4		1	8
NZ			1		2	3
PL	4	3	11	1	2	21
PT	3	4	9	3	4	23
RO	1	2	1		1	5
SA	1					1
SE	1		7		1	9
SI			9	2	1	12
SK	1	1	12	1	1	16
TR	3		10	1	2	16

<sup>72</sup> Newcomers compared to FP7 and H2020.

UA	1	1	4			6
UK	5	1	24			30
US	1			1		2
Grand Total	65	59	547	38	56	765

## 5.8. Scoreboard of Key Performance Indicators specific to Clean Hydrogen JU - Operational

TABLE 53. SCOREBOARD OF OPERATIONAL KPIS SPECIFIC TO THE CLEAN HYDROGEN JU

KPI Name		Unit of measurement	Baseline	Actual 2025 <sup>1</sup>	Target t	Target 2023	Target 2025	Target 2027	Target 2030	Ambition	Status
<b>Resources (input), processes and activities</b>											
1. Supporting climate neutral and sustainable solutions	1a. Hydrogen end-use solutions in hard to abate sectors	% of JU budget	2.5 <sup>2</sup>	32%	15	30	40				On track
	1b. Circular and sustainable solutions	% of JU budget	< 1 <sup>2</sup>	14%	5	10	15				On track
2. Early research projects		% of budget	10 <sup>2</sup>	17%	10	10	10				On track
3. Demonstration projects		# of projects	43 <sup>2</sup>	40	20	40	60				On track
4. Education and training		# of projects	4 <sup>2</sup>	20	2	4	6				On track
5. Monitoring technology progress		<i>Qualitative indicator</i>	N/A	Please see section <b>Error! Reference source not found.</b>	N/A	N/A	N/A				On track
6. Supporting EC in H2 market uptake		<i>Qualitative indicator</i>	N/A	Please see Section <b>Error! Reference source not found.</b>	N/A	N/A	N/A				On track
<b>Outcomes</b>											

KPI Name	Unit of measurement	Baseline	Actual 2025 <sup>1</sup>	Target 2023	Target 2025	Target 2027	Target 2030	Ambition	Status
<b>Resources (input), processes and activities</b>									
7. Environmental impact and sustainability	7a. Reduction in the use and increase in the recycling rate of Critical Raw Materials (CRM)	% of CRM relevant KPIs reached	0	N/A <sup>1</sup>	N/A	75 <sup>2</sup>	75	100	N/A <sup>1</sup>
	7b. Improvement in the quality of Life Cycle Assessments (LCA)	Quality of LCA submitted by projects (rating in %)	60 <sup>2</sup>	N/A	N/A	65	70	75	N/A
8. Capital cost of hydrogen applications	8a. Capital cost of electrolysers	% reduction across electrolyser technologies	100	51.3 <sup>7</sup>	N/A	65	55	45	N/A <sup>7</sup>
	8b. Capital cost of heavy-duty road applications	Cost of FC module CAPEX in €/kilowatt	1,500	N/A <sup>5</sup>	N/A	420	290	100	N/A <sup>5</sup>
9. Research and Innovation Synergies		# of projects	5 <sup>2</sup>	19	5	10	20		On track
10. Public perception of hydrogen		<i>Qualitative indicator</i>	N/A	N/A <sup>5</sup>	N/A	N/A	N/A		N/A <sup>5</sup>
11. Total persons trained		# of persons in thousands	5 <sup>2</sup>	6.2	N/A	110	160	240	On track
12. Patents and publications		# of patents / publications	12 <sup>2</sup> / 289	25/635	17/ 100	20/ 400	25/ 450		On track
13. Promoting cross-sectoral solutions		% of budget	15 <sup>2</sup>	23	10	15	25		On track <sup>3</sup>
<b>Impacts*</b> (KPIs reporting progress of hydrogen sector at EU level, to which the JU is contributing)									
14. Expected avoided emissions		Million tonnes of CO <sub>2</sub> -eq/year	0.085	0.91 <sup>8</sup>	N/A	N/A	N/A	223	Off track <sup>9</sup>
15. Deployment of electrolysers		Gigawatt	0.077	0.4 <sup>8</sup>	4	6	10	40	Off track <sup>9</sup>
16. Market uptake of clean hydrogen		Mt of clean hydrogen consumed	0.008	0.04 <sup>10</sup>	0.7	1	2	10	Off track <sup>9</sup>

KPI Name		Unit of measurement	Baseline	Actual 2025 <sup>1</sup>	Target t	Target 2023	Target 2025	Target 2027	Target 2030	Ambition Status
<b>Resources (input), processes and activities</b>										
17. Total cost of producing renewable hydrogen		€/kg	8	6.86 <sup>8</sup>	6.5	5.5	4.5	3		On track
18. Size of private hydrogen sector	18a. Activity in terms of companies	# of companies	300	1,413 <sup>8</sup>	1,000	1,500	2,000	-		On track
	18b. Activity in terms of projects in the pipeline (ongoing or under construction)	# of Projects	50	309 <sup>8</sup>	200	500	800	-		On track <sup>9</sup>
	18c. Electrolyser manufacturing capacity	GW/year	1	10.2 <sup>8</sup>	5	17.5	30	-		Off track <sup>9</sup>

**Text space below the table:**

\* The set of KPIs under “impact” report the progress of the hydrogen sector at EU level, to which the JU is contributing. Targets for KPI-14 to KPI-17 are based on the relevant ambition set in EU’s Hydrogen Strategy. Targets for KPI-18a and KPI-18b are based on current trends and expectations for the sector, while KPI-18c reflects the 2025 target mentioned in the Joint Declaration signed between the European Commission and the European electrolysers manufacturers in May 2022. For this set of KPIs, the status refers to Europe as a whole and not on the individual performance of the JU, helping to identify where more effort should also be placed by the JU in the coming years.

1 The latest values available by end of 2024 are reported. For KPIs (#1-4, 9, 13) these reflect the signed grants of Call 2022, Call 2023, Call 2024 and Call 2025. For the KPIs on project results (#7, 8b) there is nothing to report yet, as the first grants were only signed in 2022. For KPI 12 the latest data are reported, as reported in this Annual Activity Report of the JU (AAR 25). All KPIs on impacts (14-18) come from the latest available data on the European Hydrogen Observatory. For the qualitative KPIs (#5-6, 10), these are described in AAR25.

2 Baseline refers to the achievement over the lifetime of the predecessor partnership (FCH 2 JU).

3 First relevant project was signed only in first half of 2022, more are expected to be signed the coming years. Results will become available gradually as the projects advance, mostly towards the end of the projects.

4 Target for 2025 measured against SRIA 2024 targets, while targets for 2027 and 2030 measured against SRIA 2030 targets.

5 [https://www.clean-hydrogen.europa.eu/projects-repository/hypop\\_en](https://www.clean-hydrogen.europa.eu/projects-repository/hypop_en)

6 Reported figures come from Annex 5 of the Annual Activity Report and refer to awarded patents. Current source of data is eGrants and the Clean Hydrogen JU data collection, but it is considered incomplete, especially in relation to patents. The JU is currently working with JRC and external sources to improve the data collection methodology concerning this series.

7 KPI-8a was calculated based on three technologies (AEL, PEMEL, and SOEL), as no projects reported this value in the latest data reporting exercise.

Calculated from the European Hydrogen Observatory; data from 2025. KPI-17 was calculated using the methodology proposed by the Observatory contractors.

8 KPIs 15-16 are off track, and thus KPI 14 which is directly linked to them, as despite the ambitiousness of the Hydrogen Strategy hydrogen technologies require more time and research to be ready for commercialisation and scaling up. Nevertheless, the significant funding planned via the European Hydrogen Bank and other European, regional and national instruments may be able to turn this around in the coming years. This can be further supported by the activities of the Clean Hydrogen JU, which although may have a limited direct impact to these deployment figures due to its small budget compared to the ambition, it can play an important role in increasing the technology readiness of the hydrogen solutions, allowing their faster market uptake.

9 Expected to be on track in 2025, based on project announcements.

10 KPI-16 the value is only for hydrogen based on electrolysis. However, in case that "clean hydrogen" can also encompass blue hydrogen and other low-carbon hydrogen types, then the correct number is 0.1Mt.

## 5.9. Scoreboard of Key Performance Indicators specific to Clean Hydrogen JU – Administrative

TABLE 54. SCOREBOARD OF ADMINISTRATIVE KPIS SPECIFIC TO THE CLEAN HYDROGEN JU

Field	KPI name	Unit of measurement	Results for 2024
HR	Vacancy rate (%)	Vacancy rate (%)	Vacancy rate= 6.67 %
JU EFFICIENCY	Time to sign (TTS) grant agreements from the date of informing successful applicants (information letters)	Average TTS in calendar days Maximum TTS in calendar days	Average TTS: 130 days Maximum TTS: 133 days (after approval of a request for GAP extension by the consortium)
	Administrative budget: Number and % of total of late payments	Number and % of total of late payments	% of late payments: 6.08 % Number of late payments: 29

## 5.10. IKAA Report

No further IKAA data was collected for 2025 as the IKAA target as per SBA was reached and exceeded already in the AAR 2024<sup>73</sup>. As per the approved Minutes of GB meeting 10 June 2025, the GB Chairperson at the time announced no further IKAA to be collected as SBA target was already exceeded in year 3 of the IKAA data collection for Horizon Europe programme. The data below is hence the same data as reported in the 2024 AAR.

**TABLE 55. IKAA REPORT FOR YEAR 2025**

DETAILED CERTIFIED IKAA			
Description of the AA	Certified IKAA 2024 (€)	Certified IKAA 2023 (€)	Certified IKAA 2022 (€)
A Pre-commercial trials and field tests	3,493,038.78	8,957,290.13	12,791,464.00
B Proof of concept	43,753,362.90	43,972,743.31	30,139,268.93
C Improvement of existing production lines for up-scaling	76,477,268.23	81,338,367.75	45,593,368.64
D Large scale case studies	225,812,416.85	201,357,068.83	33,973,715.30
E Awareness-raising activities on hydrogen technologies and safety measures	726,875.00	99,676.00	684,940.00
F Uptake of results from projects into products, further exploitation and activities within the research chain either at higher TRLs or in parallel strands of activity	227,295,357.99	39,982,479.56	19,484,153.03
G The research and innovation activities or projects with a clear link to the Strategic Research and Innovation Agenda, and co-funded under national or regional programmes within the Union	114,632,702.83	99,064,538.68	109,965,280.83
H Other, contributing to the JU objectives	5,878,764.45	8,183,873.92	4,309,010.68
<b>TOTAL CERTIFIED IKAA</b>	<b>698,069,787.03</b>	<b>482,956,038.18</b>	<b>256,941,201.41</b>

**TOTAL CERTIFIED IKAA 2022, 2023 AND 2024**

**1,437,967,026.62**

TOTAL CERTIFIED IKAA 2024: BREAKDOWN PER COUNTRY	
Country	Value (€)
AT	7609,608.82
BE	9,612,258.29
CZ	1,025,974.00
DE	488,486,659.92
ES	1,719,846.88

TOTAL CERTIFIED IKAA 2023: BREAKDOWN PER COUNTRY	
Country	Value (€)
AT	7,713,640.93
BE	10,190,840.78
DE	260,337,530.87
ES	1,598,974.69
FI	11,677,223.30

TOTAL CERTIFIED IKAA 2022: BREAKDOWN PER COUNTRY	
Country	Value (€)
AT	5,580,027.48
DE	84,990,257.08
DK	10,680,258.00
FR	45,103,855.36
NO	74,410,342.00

<sup>73</sup> [https://www.clean-hydrogen.europa.eu/about-us/key-documents/annual-activity-reports\\_en](https://www.clean-hydrogen.europa.eu/about-us/key-documents/annual-activity-reports_en)

TOTAL CERTIFIED IKAA 2024: BREAKDOWN PER COUNTRY	
Country	Value (€)
FI	8,056,637.86
FR	31,788,060.13
GR	2,015,426.07
IT	1,992,042.45
NL	5,064,654.40
NO	100,022,862.00
SE	11,213,560.90
UK	27,795,300.83
Others	1,666,894.48
<b>TOTAL IKAA</b>	<b>698,069,787.03</b>

TOTAL CERTIFIED IKAA 2023: BREAKDOWN PER COUNTRY	
Country	Value (€)
FR	37,321,163.00
NL	5,355,816.23
NO	101,707,625.00
PL	5,941,131.75
UK	26,961,617.00
Others	14,150,474.63
<b>TOTAL IKAA</b>	<b>482,956,038.18</b>

TOTAL CERTIFIED IKAA 2022: BREAKDOWN PER COUNTRY	
Country	Value (€)
UK	18,289,376.00
Others	17,887,085.49
<b>TOTAL IKAA</b>	<b>256,941,201.41</b>

**TOTAL CERTIFIED IKAA 2022, 2023 AND 2024**

**€1,437,967,026.62**

	TOTAL CERTIFIED IKAA – Value in (€)	
	Hydrogen Europe	Hydrogen Europe Research
2024	640,423,310.49	57,646,476.54
2023	407,949,223.47	75,006,814.71
2022	198,606,992.67	58,334,208.74

### 5.11. Draft/final annual accounts (Optional)

The annual accounts are provided in a separate document, which is officially handed over to the budgetary authorities, the European Court of Auditors and the external auditors.

They are also published on the [Clean Hydrogen JU](#) website.

### 5.12. Materiality criteria

The ‘materiality’ concept provides the Executive Director with a basis for assessing the importance of the weaknesses/risks identified and thus whether those weaknesses should be subject to a formal reservation to the Executive Director’s declaration. The same materiality criteria are applicable to the H2020 and HE programmes.

When deciding whether or not something is material, qualitative and quantitative terms have to be considered. In qualitative terms, when assessing the significance of any weakness, the following factors are taken into account:

- the nature and scope of the weakness;
- the duration of the weakness;
- the existence of compensatory measures (mitigating controls that reduce the impact of the weakness);
- the existence of effective corrective actions to correct the weaknesses (action plans and financial corrections) that have had a measurable impact.

In quantitative terms, in order to make a judgement on the significance of a weakness, the potential maximum (financial) impact is quantified. Although the JU control strategy is of a multiannual nature (i.e. the effectiveness of the JU's control strategy can only be assessed at the end of the programme, when the strategy has been fully implemented and the errors detected have been corrected), the Executive Director is required to sign a declaration of assurance for each financial year. In order for them to determine whether to qualify the declaration of assurance with a reservation, the effectiveness of the JU's control system has to be assessed not only for the year of reference but, more importantly, from a multiannual outlook.

The **control objective** for the JU is to ensure that the **residual error rate** – the level of errors that remain undetected and uncorrected – does not exceed 2 % by the end of the JU programme. Progress towards this objective is to be (re)assessed annually, in view of the results of the implementation of the ex post audit strategy.

If the residual error rate is not below 2 % at the end of a reporting year within the programme's life cycle, a reservation would be added. Nevertheless, apart from the residual error rate, the Executive Director may also take into account other management information at their disposal to identify the overall impact of a weakness and determine whether or not it leads to a reservation. If an adequate calculation of the residual error rate is not possible, for reasons not involving control deficiencies, the consequences are to be assessed quantitatively by estimating the likely exposure for the reporting year. The relative impact on the declaration of assurance would then be considered by analysing the available information on qualitative grounds and considering evidence from other sources and areas (e.g. information available on error rates in more experienced organisations with similar risk profiles). Considering the crucial role of ex post audits in the JU's control system, measuring their effectiveness requires checking whether the scope and results of these audits are sufficient and adequate to meet the control objectives.

### **Effectiveness of controls**

The **starting point** to determine the effectiveness of the controls in place is the cumulative level of error expressed as the percentage of errors in favour of the EU budget, detected by ex-post controls, measured with respect to the amounts accepted after ex-ante controls.

According to the JU *ex post* audit strategy approved by the Governing Board, the representative error rate will be based on the simple average error rate (AER) for a stratified population, from which a representative sample has been drawn according to the following formula:

$$AER\% = \frac{\Sigma (err)}{r} = RepER\%$$

- $\Sigma (err)$  = the sum of all individual error rates of the sample (in %) (only those errors in favour of the JU will be taken into consideration);
- $r$  = the sample size.

The second step is the calculation of the **residual error rate**.

To take into account the impact of the *ex post* controls, this error level is to be adjusted by subtracting: This results in a residual error rate —used for H2020 and Horizon Europe<sup>74</sup>—which is calculated as follows:

$$ResER\% = \frac{(RepER\% * (P - A)) - (RepERSys\% * E)}{P}$$

Where:

- **ResER%** = the residual error rate, expressed as a percentage;
- **RepER%** = the representative error rate, or error rate detected in the representative sample, in the form of the AER, expressed as a percentage and calculated as described above (*AER%*);
- **RepERSys%** = the systematic portion of the *RepER%* (the *RepER%* is composed of complementary portions reflecting the proportion of ‘systematic’ and ‘non-systematic’ errors detected) expressed as a percentage;
- **P** = the total amount in euro of the auditable population
- **A** = the total of all audited amounts, expressed in euro;
- **E** = the total non-audited amounts of all audited beneficiaries, comprising the total amount, expressed in euro, of all non-audited validated cost statements for all audited beneficiaries, excluding those beneficiaries for which an extrapolation is ongoing.

This calculation will be performed on a point-in-time basis, meaning that all the figures will be provided as of a certain date.

### 5.13. Specific annexes related to "financial management"

A significant undertaking during the year was the preparation for the roll-out of SUMMA, the new financial and accounting management system, which necessitated comprehensive updates to operational and administrative budgets and to many IT tools. This involved the establishment of a new budget structures, the implementation of new access rights, and the successful migration of data from the existing ABAC system to SUMMA. By the end of the year, Clean Hydrogen achieved a readiness indicator of 100%, marking a major milestone.

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<sup>74</sup> The HORIZON population is stratified in two: one stratum composed of financial statements for actual costs reimbursements (including unit costs and specific unit costs) and a second stratum composed only of financial statements of lump sums specific grants (ex post controls based on technical reviews). As indicated in the formula, the calculation of the residual error rate for the Programme will be derived from both strata.

## **Reports and documentation considered for the assessment of the JU's functioning in view of the AOD's assurance**

Assurance is provided based on an objective examination of evidence of the effectiveness of risk management, control and governance processes. This examination is carried out by management, who monitors the functioning of the internal control systems on a continuous basis, and by internal and external auditors. The results are explicitly documented and reported to the Director. The following reports have been considered:

- regular managerial meetings;
- internal reporting mechanisms, which include reporting on internal control developments
- ongoing process of risk management to identify, assess and mitigate potential achievement of its objectives;
- \* the register of recorded exceptions, non-compliance events and internal control weaknesses;
- the outcome of ex-post audits and fraud prevention measures on grant beneficiaries;
- the limited conclusion on the state of control and the observations and recommendations reported by the Internal Audit Service (IAS);
- the observations and recommendations reported by the European Court of Auditors;
- the continuous follow-up of the implementation of action plans stemming from audit recommendations, risk management, process improvements for improved efficiency of operations, follow up of survey results, etc.;
- the annual internal control framework review and latest results from the internal control monitoring criteria;
- the follow-up of legal and data protection matters;
- the registers of security and data breaches.
- the reports on financial performance and accounting quality.

The systematic analysis of all the available evidence listed above provides sufficient guarantee as to the completeness and reliability of the information reported and results in the full coverage of the budget delegated to the JU Executive Director.

## **5.14. Reporting on the internal and external audits and assessing the effectiveness of internal control systems**

### **Internal audit service audit results**

In October 2024, the IAS issued its audit report on operational synergies, identifying one very important finding related to "Synergies strategy, roles and guidelines" and one important finding concerning the "monitoring and reporting of synergies."

In January 2025, immediately after agreeing with the IAS on the action plan, Clean Hydrogen Management assessed the available implementation options and decided to outsource the drafting of the strategy. This decision was based on:

- workload constraints at both staff and management level in 2025;
- the need for specialised expertise and a comprehensive transversal view;
- the objective of ensuring alignment with best practices and comparable initiatives.

On 26 February 2025, the Clean Hydrogen Joint Undertaking launched a call for tender for technical assistance to analyse synergies activities, develop a synergies strategy, and advise on best practices. The call was published via ex-ante publicity on the JU website, with a submission deadline for 12 March 2025. Three offers were received. The evaluation and selection process was conducted in full compliance with the applicable legal and procurement rules. (Further details available at request to JU Legal officer – HoA Adm).

At the start of the assignment, the consultant was provided with comprehensive guidance and documentation to ensure a rapid and effective start. In December 2025, the consultant delivered a final draft report. (The document is draft and confidential at this stage of the process, it could be provided by a direct request to the JU Operation HoU).

Following an internal thorough review, Clean Hydrogen Management concluded that, while the report captures most of the elements initially requested and provides a solid analytical basis, it does not sufficiently propose concrete and innovative actions to fully exploit potential synergies. In addition, certain aspects would benefit from deeper operational insights that can be more effectively developed internally by the JU Synergy Officer and the JU Head of Operations. Management therefore decided to further develop and finalise the strategy internally, building on the consultant’s work.

Future steps planned for 2026

- Consultations to be finalised following SG and SRG meetings, with the final version to be shared with the Governing Board (planned for February 2026);
- Endorsement of the strategy by the Governing Board (planned for March 2026);
- In parallel, finalisation of both an internal (full) version and a public (shorter) version, including a concrete roadmap and action plan for implementation.

### **European Court of Auditors audit results**

The European Court of Auditors (ECA) audited:

- (a) the accounts of Clean Hydrogen, comprising the financial statements and the reports on the implementation of the budget for the financial year ended 31 December 2024; and
- (b) the legality and regularity of the transactions underlying those accounts, as required by Article 287 of the Treaty on the Functioning of the European Union (TFEU).

The ECA issued a clean opinion on both the accounts and the underlying transactions. However, it raised the following observations, which do not call into question its opinion:

- Private members’ contributions exceeded the Horizon 2020 programme target, mainly through additional activities;
- Private members’ contributions under Horizon Europe have already surpassed the target due to in-kind contributions related to additional activities;
- Weaknesses were identified in budget planning and implementation for administrative expenditure;
- In assessing the effectiveness of Clean Hydrogen’s management and control systems for the legality and regularity of operational expenditure (covering both Horizon 2020 and Horizon Europe transactions), one error with a financial impact was identified. This resulted from ineligible staff costs (due to the improper inclusion of subcontracting costs) and ineligible equipment costs (due to the incorrect calculation of depreciation). In addition, no Horizon Europe ex post audits had been performed and no error rate had been calculated;
- Reference was made to the IAS audit on synergies and the related recommendation.

Clean Hydrogen worked throughout 2025 to closely monitor and address the above observations.

## 5.15. Specific annexes related to “Assurance: Reservations” (if applicable)

*For financial reservations, the following analysis has to be done here. For-segments with a detected error rate above the materiality threshold, assess if the residual error rate is still above the materiality threshold. Where the residual error rate is above the materiality threshold, a reservation should be issued (or maintained). A reservation fiche should be included following the template below.*

*Present only the conclusion in the body under the Recapitulative Table.*

### 1. Reservation fiche (template to be adhered to)

*A fiche must be completed for each reservation at the end of the reporting year. See the example below, to be adapted as necessary.*

JU	Name of the JU.
Title of the reservation, including its scope	The title of the reservation should be <b>precise and clear</b> , as the declaration of assurance will only refer to the title of the reservation. The title needs to include the <b>scope</b> of the reservation, stated as precisely as possible. AODs are encouraged to indicate explicitly the programmes, control systems, etc., affected by the reservation.
Domain	The <b>management mode</b> as well as the broader <b>programme/budget line(s)</b> concerned (e.g. "Indirect management – grants").

Programme (or relevant segment) in which the reservation is made and total (annual) amount	Indicate the programme concerned (e.g. budget line(s) number and name, as applicable), the relevant segment ("Relevant Control System") and the corresponding total amount of authorised operations (payments/revenue) during the reporting year <sup>(75)</sup> .
Reason for the reservation	Explain why the problem occurred, the type of weakness how it was identified and why it is not yet solved.
Materiality criterion/criteria	Indicate which of the <b>materiality criteria</b> was breached. For financial reservations please mention the <b>residual error rate</b> . This is without prejudice of maintaining a reservation for its reputational reasons, if applicable.
Quantification of the financial impact (amount at risk)	Reservations should be quantified as precisely as possible and expressed <b>both as an amount in EUR and as a percentage</b> of the authorised operations (payments/revenue) in the budget line(s) affected by the reservation concerned.  If system audits revealed significant weaknesses, especially in indirect management, then the likelihood of errors occurring and the scope of the systems for which assurance cannot be gained should be estimated as precisely as possible. In some cases, reservations cannot be quantified. 'Non-quantified reservations' are defined as reservations for which the financial impact is zero, for which it is not possible to assess the financial impact accurately, or for which the effect is only reputational.
Impact on the assurance	Specify which part of the assurance is affected by the weakness and to what extent. <ul style="list-style-type: none"> <li>• <b>Report does not give a true and fair view;</b></li> <li>• <b>Resources not used for intended purpose;</b></li> <li>• <b>Principles of sound financial management not respected;</b></li> <li>• <b>Legality and regularity of financial transactions at stake;</b></li> </ul>
Responsibility for the weakness	Provide the reasons for determining <b>whether assurance is still possible</b> . As part of the analysis undertaken to identify the nature, cause and impact of reservations, the JU should seek to identify where responsibility for the weakness lies.
Responsibility for the corrective action	Indicate the main elements of the <b>action plan</b> set up by the JU to correct the weakness: <ul style="list-style-type: none"> <li>• what action(s)</li> <li>• who is responsible for taking corrective action</li> <li>• target date(s).</li> </ul> Give, if applicable, <b>details of the relevant corrective actions</b> such as recoveries, financial corrections, suspension of payments etc. (date, amount, reservation/weakness at the origin of the corrective action).  For recurring reservations, explain the progress made during the reporting year and any difficulties encountered.  If the corrective action is not ultimately the responsibility of the JU itself, or is not manageable by it, the JU should nevertheless seek to provide information on any action it might be able to take which could mitigate the adverse effects of the weakness.

## 5.16. Results of technical review (optional)

N/A

<sup>(75)</sup> If the reservation concerns financial instruments, revenue operations, non-expenditure items or extra-budgetary activities, the central services can provide advice on their quantification.

## **5.17. List of acronyms**

AAR – Annual activity report

AEL – Alkaline Electrolyser

AEMEL – Anion Exchange Membrane Electrolyser

AFIR – Alternative Fuels Infrastructure Regulation

AI – Artificial Intelligence

AWP – Annual Work Programme

CAAR – Consolidated Annual Activity Report

CAPEX – Capital Expenditure

CHJU / Clean Hydrogen JU – Clean Hydrogen Joint Undertaking

CHP – Combined Heat and Power

CRM(s) – Critical Raw Material(s)

CSA – Coordination and Support Action

DG – Directorate-General (European Commission department)

EC – European Commission

EHO – European Hydrogen Observatory

EHSP – European Hydrogen Safety Panel

EHS&CP – European Hydrogen Sustainability and Circularity Panel

EU – European Union

FC – Financial Contribution

FCET – Fuel Cell Electric Truck

FCEB – Fuel Cell Electric Bus

FCEV – Fuel Cell Electric Vehicle

FCH JU – Fuel Cells and Hydrogen Joint Undertaking

FCH 2 JU – Fuel Cells and Hydrogen 2 Joint Undertaking

FP7 – Seventh Framework Programme

GA – Grant Agreement

GAP – Grant Agreement Preparation

GHG – Greenhouse Gas

HDV – Heavy-Duty Vehicle

HE – Horizon Europe

HRS – Hydrogen Refuelling Station

IA – Innovation Action

ICT – Information and Communication Technology

IEC – International Electrotechnical Commission

IPCEI – Important Project of Common European Interest

IPHE – International Partnership for Hydrogen and Fuel Cells in the Economy

IPR – Interim Progress Review

JRC – Joint Research Centre

JU – Joint Undertaking

KIP(s) – Key Impact Pathway(s)

KPI(s) – Key Performance Indicator(s)

LCA / LCSA – Life Cycle Assessment / Life Cycle Sustainability Assessment

LCOH – Levelised Cost of Hydrogen

LH2 – Liquid Hydrogen

MEA – Membrane Electrode Assembly

NG – Natural Gas

NZIA – Net-Zero Industry Act

PEM – Proton Exchange Membrane

PEMEL – Proton Exchange Membrane Electrolyser

PEMFC – Proton Exchange Membrane Fuel Cell

PFAS – Per- and Polyfluoroalkyl Substances

PGM – Platinum Group Metals

PNR – Pre-Normative Research

R&I – Research and Innovation

RCS – Regulations, Codes and Standards

RIA – Research and Innovation Action

SME(s) – Small and Medium-sized Enterprise(s)

SOEL – Solid Oxide Electrolyser

SOFC – Solid Oxide Fuel Cell

SRIA – Strategic Research and Innovation Agenda

TRL – Technology Readiness Level

TTG – Time-To-Grant

TTI – Time-To-Inform

TTS – Time-To-Sign