

A Treaty-Based European Partnership on Clean Hydrogen and Derivatives

A Joint Undertaking or Treaty-Based Partnership is key to scaling up Europe's clean hydrogen and its derivatives sector while strengthening its resilience and competitiveness.

Hydrogen and its derivatives are at the heart of Europe's decarbonisation, competitiveness and resilience goals because they enable the decarbonisation of hard-to-abate sectors, which account for a significant share of EU emissions and underpin Europe's wider industrial economy. In particular, they:

- **Support decarbonisation** by providing essential green synthetic molecules to replace fossil fuels and feedstocks where direct electrification is not an option.
- **Support industrial competitiveness** by enabling the modernisation of strategic upstream industries, sustaining downstream value chain
- Contribute to resilience by **helping preserve essential industrial capabilities**, supported by adequate domestic capacity, diversified supplies, reliable partnerships and interconnected infrastructure.

Over the past 18 years, the Clean Hydrogen Partnership and its predecessors have **transformed Europe's fragmented hydrogen research landscape into a coordinated innovation and industrial ecosystem**. Aligning public funding with industry and research expertise, the Partnership has supported technologies from early research to industrial demonstration and regional deployment.

As Europe's hydrogen sector has evolved, so too have policy priorities and the urgency of decarbonising hard-to-abate sectors where hydrogen and its derivatives are recognised to provide the only viable technical solution, notably Europe's energy-intensive industries and heavy-duty transport. **Europe now faces the dual challenge of accelerating industrial decarbonisation while safeguarding its competitiveness and maintaining its global technological leadership.**

Against this backdrop, **a future Treaty-based Partnership is essential to provide the long-term strategic framework needed** to bring together European technology providers, actors from hard-to-abate sectors – including energy-intensive industries – and policymakers at European, national and regional levels. By aligning priorities, coordinating efforts and fostering collaboration across the value chain, such a Partnership can help translate Europe's decarbonisation ambitions into industrial opportunities, strengthen European value chains and ensure that critical technologies, manufacturing capabilities and expertise remain anchored in Europe.

To deliver on this ambition, **any future Hydrogen Partnership could broaden its scope to encompass the wider hydrogen and hydrogen derivatives value chains (the so-called 'green molecules')**. Integrating actors across these value chains will be critical to accelerating the deployment and uptake of hydrogen-based solutions in hard-to-abate sectors, including energy-intensive industries such as refining and chemicals. A broader and more integrated Partnership would therefore not only contribute to Europe's climate objectives, but also reinforce its industrial resilience, competitiveness and technological leadership in the global hydrogen economy.

An **institutionalised Joint Undertaking** therefore provides this sustained continuity need by bringing the European Commission, industry, and the research community together, within a permanent governance

structure, allowing **strategic priorities, R&I investments, and market needs to be aligned over time**. This creates a **stronger link and alignment between EU policy objectives and industrial realities**, while providing a permanent sector-specific capability to identify and anticipate emerging needs, adapt priorities and mobilise appropriate responses as technologies, markets and industrial conditions evolve. It also provides the sector-specific expertise and **long-term portfolio perspective** needed to connect individual projects into a **coherent pathway from research to demonstration and deployment**.

This document sets out the evidence underpinning these distinctive capabilities and assesses the case for maintaining them in the future framework.

Why a Joint Undertaking-type partnership is essential to Europe's clean hydrogen future

The Draghi Report recognises that Europe's competitiveness requires the mobilisation of both public and private investment and highlights public-private partnerships as a key means of accelerating innovation, technology development and industrial deployment, including in strategic sectors such as hydrogen¹. Compared with a work-programme-based partnership, the JU model therefore offers **the needed strategic continuity in providing the multi-annual framework necessary to tackle the existing challenges, secure long-term private sector commitment, accountability and, last but not least, the capacity to maintain and coordinate an evolving hydrogen ecosystem** – reducing fragmentation, helping in de-risking investment and supporting the development of European hydrogen value chains.

The Commission's Impact Assessment² already established that the **institutionalised public-private partnership model is particularly suited to developing the hydrogen sector, concluding that it provides the long-term strategy, commitment and integration needed from industry, Member States and the Commission, while leveraging industrial financial and in-kind resources to maximise the impact of EU funding**. An Article 187 model initiative also provides the Partnership with the necessary flexibility to achieve long-term objectives, and allows it to attain them by identifying annual priorities through consultations between the public – the EU represented by the European Commission and also Member States – and the private sector.

A Joint Undertaking is more than a funding instrument. It is a European strategic coordination capability. Furthermore, a Joint Undertaking provides a **dedicated governance and legal structure** which allows partners to jointly define priorities, commit resources, implement activities and monitor results over the long term. They therefore provide a stronger commitment, greater continuity of investment, clearer accountability, and better coordination of complex programmes.

- **Stronger long-term commitment:** An institutionalised partnership is uniquely positioned to turn cooperation into sustained commitment. Unlike looser forms of cooperation, public and private actors are embedded within a common governance structure, with shared objectives, responsibilities and resources, providing the continuity needed to pursue long-term strategic objectives even as market conditions and priorities evolve.
- **Joint strategic governance:** Public and private partners participate directly in programme governance, improving alignment between EU policy objectives, research priorities and industrial needs.

¹ Draghi Report - https://commission.europa.eu/topics/competitiveness/draghi-report_en

² COMMISSION STAFF WORKING DOCUMENT EXECUTIVE SUMMARY OF THE IMPACT ASSESSMENT REPORT Accompanying the document Proposal for a Council Regulation establishing the Joint Undertakings under Horizon Europe https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1755491681861&uri=CELEX%3A52021SC0038&utm_source=chatgpt.com

- **Greater investment leverage:** The Joint Undertaking structure can mobilise and coordinate substantial public and private resources around a common and agreed technological roadmap
- **Better suited to complex ecosystems:** An institutionalised PPP provides the means to coordinate long value chains involving industry, SMEs, research organisations and other stakeholders where individual projects alone would not create sufficient impact.
- **Sector-specific expertise embedded in implementation:** Complex hydrogen projects cannot be treated simply as a portfolio of grants. Effective implementation requires an understanding of the technologies, industrial constraints, evolving markets and project-specific barriers behind them. A dedicated institutionalised Partnership combines this sectoral expertise with the accountability and implementation requirements of an EU body, enabling it to work with beneficiaries to address emerging challenges while safeguarding the sound and consistent application of EU rules.
- **Permanent and adaptive sectoral capability:** An institutionalised Partnership is more than a funding instrument. It provides a permanent sector-specific capability to anticipate emerging needs, adapt priorities and mobilise the appropriate expertise and interventions as the sector evolves. Crucially, its capacity extends beyond grant funding: it can mobilise strategic intelligence and studies, project-development support, pre-normative research, knowledge activities and stakeholder engagement to respond to emerging bottlenecks in ways that a purely programme-based structure cannot easily replicate.
- **Continuity from research to deployment:** Stable governance over multiple years can help technologies move from R&D through demonstration and industrial uptake .
- **Clearer accountability:** A dedicated legal entity provides defined responsibilities, governance procedures, monitoring and reporting, making implementation more structured, efficient and impactful than a purely contractual partnership.

A dynamic institutionalised public-private collaboration remains essential to bring together research, industry and policymakers and to coordinate R&I efforts on hydrogen in order to secure Europe's long-term competitiveness and to untap its potential as a decarbonisation vector

Over the last 18 years, **Europe has built one of the strongest hydrogen research and innovation ecosystems in the entire world.** Experience shows that this was **possible because of a dedicated, long-term European public-private partnership** capable of connecting research and innovation with demonstration, industrial scale-up, skills, standards, investment, and market development. Despite significant technological progress in recent years, clean hydrogen has yet to reach full commercial maturity and deployment at scale in all its segments. **Continued R&I remains key** to improving technologies and reducing costs **to maintain the leadership Europe has achieved.** **Further efforts** are also needed **to accelerate market ramp-up, stimulate demand and support the deployment of clean hydrogen at scale.** Continued strong public-private collaboration **with a dedicated governance** remains essential to build on the progress made, address remaining barriers and support the sector as it moves towards greater scale and maturity.

Hydrogen is not a single technology or application: it encompasses a complex and evolving value chain, from production and storage to distribution and multiple industrial, energy and transport end uses. Because of its cross-sectoral nature, **developing hydrogen technologies requires sustained coordination between the European Commission, Member States and regions, industry, SMEs, research organisations, infrastructure operators, and other stakeholders, in a dedicated structure that can foster synergies,**

guarantee true gains in efficiency and that is able to continue triggering a meaningful amount of private co-funding

The next MFF should consequently retain a **dedicated hydrogen partnership in the portfolio of European Partnerships**, with the **Treaty-based model** maintained as its institutional form. The experience accumulated and impacts achieved by the Clean Hydrogen JU and its predecessors have shown continuously that **a dedicated partnership in the form of a Union body**, where public and private members come together in a true partnership, **is the optimum way to provide institutional continuity, sector-specific expertise, governance and portfolio perspective required to align EU policy objectives, R&I priorities, industrial needs and emerging market requirements over time**. This is also confirmed in the 2024 Clean Hydrogen Partnership Interim Evaluation Report³. The report highlighted that the Clean Hydrogen JU and its predecessors have been effective with regards to multiple objectives. In particular, the activities of both Partnerships were highly relevant to the challenges faced by Europe, such as climate neutrality, energy security and energy transition. The Report concluded that Clean Hydrogen JU's objectives are relevant to the EU Hydrogen Strategy and to the European Green Deal, as it provides support across the whole value chain in an integrated and coherent manner, including renewable hydrogen production, hydrogen storage and distribution and hydrogen end uses. The Report also emphasised that **a critical achievement of the JU was eliminating the fragmentation that previously existed in EU support for FCH technologies**, which had been dispersed between several support programmes. The JUs provided common ground for interaction among beneficiaries of national, regional and European grants, effectively contributing to overcoming the fragmentation of the sector and reinforcing synergies between stakeholders. The Report also concluded that the Clean Hydrogen JU and its predecessors have been pivotal in securing and consolidating Europe's role as a global leader in Hydrogen.

Furthermore, **the added value of a stable institutionalised partnership lies not only in coordinating stakeholders, but in maintaining the long-term portfolio perspective** needed to combine complementary interventions across the innovation-to-deployment pathway as technologies and market needs evolve. This is essential for Europe to maintain its global leadership, a position earned through the coordinated effort Europe has shown over almost the last two decades and in particular through the activities supported by the three evolutions of the JU established as of 2008⁴.

The value of such an approach becomes particularly evident when considering the **full innovation-to-investment pathway**. The JU has progressively developed a portfolio extending from technology development and high-TRL demonstration to integrated regional ecosystems, while also addressing the horizontal conditions required for market uptake. More than 60% of the Partnership's activities focus on high-TRL demonstrations, encompassing Hydrogen Valleys, electrolyzers, mobility applications, supply chains, and other flagship projects. **This shows the importance of maintaining an instrument capable of managing a coherent portfolio rather than treating individual R&I projects as isolated interventions.**

³ <https://op.europa.eu/en/publication-detail/-/publication/d0033af6-6354-11ef-a8ba-01aa75ed71a1/language-en>

⁴ Study on "European Hydrogen Competitiveness and the Role of Innovation", https://www.clean-hydrogen.europa.eu/media/publications/final-report-study-european-hydrogen-competitiveness-and-role-innovation_en

Why a continued institutionalised public-private partnership matters?

1. Continued R&I provides a strong foundation for EU competitiveness and scale-up

JU-funded R&I has delivered tangible technology progress. Building on these achievements now requires stronger links with deployment, energy costs, infrastructure, demand, finance and market development.

2. Europe must build on its technology strengths to accelerate market uptake

Significant investment in end-use technologies has created a strong technology base. The next step is to translate this progress into greater deployment, industrial scale and European market leadership.

3. An institutional public-private partnerships is essential to bridge innovation and investment

Building on successful R&I and demonstration, a Partnership can help projects progress towards commercial investment and FID, including by connecting Horizon Europe funded R&I with other targeted instruments (from future programmes such as ECF, CEF etc) that improve project maturity and help mobilise other sources of public and private finance.

4. Public-private partnerships can connect and mobilise the wider ecosystem

Scaling hydrogen requires coordinated action across infrastructure, markets, industry, investment and different levels of government. An institutionalised public-private partnership can provide an important additional connecting layer with dedicated activities, aligning actors and initiatives around shared priorities and helping the wider ecosystem deliver.

5. R&I and deployment need to advance together

The move towards industrialisation and market deployment should go hand in hand with continued R&I. Supporting strategic technologies while accelerating demonstration, deployment and system-level innovation will maintain the technology pipeline needed for Europe's longer-term competitiveness.

The opportunity is now to build on Europe's R&I strengths and **evolve the current Partnership to further connect innovation, deployment and investment** — turning technology leadership into industrial scale and competitiveness, and ultimately market leadership. Without a strong public-private partnership, Europe would risk losing the coordination, industry engagement and common direction needed to connect these efforts and maximise the impact of public and private investment.

The objective is not simply to maintain Europe's position in hydrogen R&I, but to **turn its technological strengths into a competitive, resilient and sustainable industrial base** — capable of creating value, investment and jobs in Europe as the global hydrogen economy develops.

A dynamic institutionalised public-private collaboration remains essential to bring together research, industry and policymakers and to coordinate R&I efforts on hydrogen in order to secure Europe's long-term competitiveness and to untap its potential as a decarbonisation vector

From research to regional ecosystems — the Clean Hydrogen Partnership has proven its value. As the sector evolves, the partnership must evolve with it

The Clean Hydrogen Partnership has proven its value in driving clean hydrogen innovation. By pooling public and private resources, it has helped advance R&I, reduce technology risks, build ecosystems, mobilise investment and align innovation with wider European strategic priorities. This model has been instrumental in moving technologies from research to demonstration and laying the foundations of Europe's clean hydrogen sector.

But as the sector matures, the nature of the challenge is changing. **Competitiveness increasingly depends not only on technology performance, but on the ability to deploy solutions at scale.** Projects need to become bankable, demand and revenue certainty need to develop, infrastructure needs to progress alongside production and end use, and successful projects need to reach FID and attract the capital required for industrial scale-up.

This creates **a new challenge at the interface between public support and private investment.** Successful R&I and demonstration do not automatically translate into commercial deployment. The bottleneck is therefore shifting: **while continued R&I remains essential, greater attention is needed on industrial scale-up, infrastructure, de-risking, project maturity, demand creation, bankability and investment mobilisation.**

A stable and institutionalised public-private partnership provides the sector with an established framework to steer and coordinate this transition against defined, meaningful targets, bringing together public authorities, industry and research and adapting priorities as technologies, industrial needs and market conditions evolve. **The same capacity to bring together public authorities, industry and research that has successfully supported innovation can now be used to further connect R&I with deployment, financing and market development.** A future partnership can therefore build on what has worked and delivered, while expanding its role in supporting derivatives' technologies and projects to cross the gap from demonstration to investment and scale.

The next Partnership phase is therefore not about moving away from R&I, but about extending the pathway it has created — from innovation and demonstration towards deployment, bankability, and industrial scale. This evolution will be critical if Europe is to turn its technological strengths into lasting industrial competitiveness.

From R&I leadership to industrial scale: what has been achieved and where further action and focus is needed

Achievements

Europe has built a strong technological and innovation base for clean hydrogen, to which the Clean Hydrogen JU has made a key contribution. Through sustained R&I and demonstration support, **the JU has helped advance key hydrogen technologies, improve performance and reduce technology costs, while strengthening sustainability as a source of European competitiveness**. This includes reducing the use of critical raw materials, improving resource efficiency and advancing more sustainable technology solutions, helping to reduce strategic dependencies and strengthen the resilience of European value chains. Support for integrated demonstrations and Hydrogen Valleys has also helped validate technologies in real-world environments, generate learning-by-doing and develop local hydrogen ecosystems, while increasing attention to storage, distribution and infrastructure needs.

Beyond technology development, the JU has helped de-risk projects and mobilise private investment, supported European SMEs and manufacturers, and delivered pre-normative research and technical evidence underpinning standards, certification, safety requirements and regulation. Together, these efforts have helped establish a strong European technology base, projects pipeline and ecosystem on which the next phase of the hydrogen economy can build.

Building a competitive, resilient European Hydrogen industry and ecosystem

Despite the efforts and successes to date, **the key challenge is to continue working on translating this strong R&I and technology base into competitive and sustainable deployment at industrial scale.**⁵

While technology costs have fallen, hydrogen competitiveness increasingly depends on wider market and system conditions, including electricity prices, infrastructure and the development of sufficient demand. Strengthening these conditions will be important to make fuller use of Europe's growing manufacturing capacity and help more projects reach FID and attract private investment.

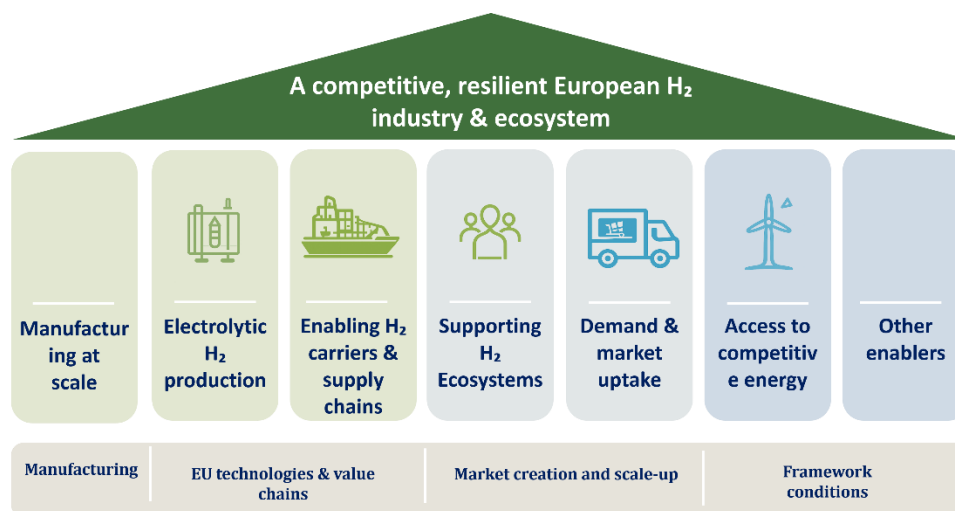
At the same time, developing environmentally sustainable technologies and reducing Europe's dependence on critical supply chains from abroad need to remain at the heart of Europe's competitiveness strategy. Further reducing dependencies on critical raw materials, improving recycling and circularity, securing resilient supply chains, and ensuring access to renewable and low-carbon energy can reduce external dependencies while strengthening the competitive position of European technologies.

Continued pre-normative research will also be important to support harmonised standards, certification and safety frameworks, alongside faster permitting and greater regulatory predictability. **The priority is therefore to bridge the gap from innovation to market: continuing R&I while placing greater emphasis on manufacturing scale-up, demand creation, project bankability, access to finance, and integrated infrastructure deployment.**

⁵ Study on "European Hydrogen Competitiveness and the Role of Innovation", https://www.clean-hydrogen.europa.eu/media/publications/final-report-study-european-hydrogen-competitiveness-and-role-innovation_en

This will be **essential to turn Europe's technology leadership and strong project pipeline into a competitive, resilient and sustainable European hydrogen economy.**

In addressing the remaining challenges identified above, a number of priority innovation areas (or themes), representing where targeted R&I efforts can deliver the highest impact on competitiveness are shown below.



The innovation areas identified above cannot be seen as isolated topics, but can be structured along four main dimensions that are directly relevant from an industrial perspective.

Addressing the remaining challenges identified above requires a **focused set of priority areas where R&I, combined with action to support industrialisation and market uptake, can have the greatest impact on Europe's competitiveness.**

The priorities identified above should not be considered in isolation. From an industrial perspective, they can be organised around **four closely interconnected dimensions.**

First, scaling up manufacturing. Moving from technology development to industrial-scale production is essential to reduce costs, increase production capacity and enable deployment at scale. This is particularly important for electrolyzers, where further industrialisation, automation and standardisation can help strengthen the competitiveness of European manufacturing.

Second, strengthening Europe's technology base across the value chain. Europe's capabilities extend well beyond electrolyzers. The analysis points to particular strengths in the midstream part of the hydrogen value chain, including storage, distribution and hydrogen carriers. Maintaining and further developing capabilities across these strategic technologies will be important to preserve European technological leadership and retain value within Europe as the market develops.

Third, accelerating market creation and scale-up. Technology innovation alone will not create a competitive hydrogen economy without sufficient demand and deployment. Developing hydrogen ecosystems and end-use applications can help aggregate demand, connect production with users, de-risk investment and create the conditions for technologies to move from demonstration to commercial scale.

Fourth, creating the enabling conditions for competitiveness. The ability of European hydrogen technologies to compete will also depend on the wider environment in which they are deployed. Access to competitive renewable energy, adequate infrastructure, effective and predictable regulation, skills and other system-level enablers will be critical to reducing costs and facilitating investment and scale-up.

Across all four dimensions, **reducing strategic dependencies and strengthening sustainability and resilience should be cross-cutting objectives.** This means reducing reliance on critical raw materials and imported components, strengthening circularity and resource efficiency, securing resilient infrastructure and supply chains, and reducing exposure to external energy dependencies.

Taken together, these priorities should contribute to **three mutually reinforcing objectives: strengthening Europe's industrial capacity, reducing strategic dependencies and increasing the resilience of European hydrogen value chains.** Achieving these objectives will require progress across all four dimensions in parallel: technology leadership will need manufacturing capacity; manufacturing will need markets and demand; and deployment will depend on the infrastructure, energy and regulatory conditions that make investment viable.

The objective is therefore not simply to maintain Europe's position in hydrogen R&I, but to turn its technological strengths into a competitive, resilient and sustainable industrial base — capable of creating value, investment and jobs in Europe as the global hydrogen economy develops.

Scaling Europe's hydrogen SMEs and start-ups

Small and medium-sized enterprises are central to Europe's hydrogen sector. Many develop specialised components, materials, software and systems, or pursue new business models that larger organisations may be slower to explore. Yet these companies often struggle to move from a promising technology to a bankable industrial proposition. They need facilities to test their solutions, partners who can integrate them into larger systems, and evidence that can attract customers and investors.

The JU has played a critical role in addressing this commercialisation gap by placing SMEs and start-ups within European consortia alongside major industrial companies, research organisations, and end users. This gives smaller firms access to knowledge, demonstration environments and potential customers, while the competitive selection process and performance of funded projects can add credibility when they subsequently approach investors.

The results suggest that public research and innovation funding can unlock far larger amounts of private capital. Since 2008, the JU has supported more than **440 SMEs** – around a quarter of all beneficiaries – with grants totalling **EUR 517 million**. Eighty-four supported SMEs subsequently raised EUR 5.18 billion in public and private funding, equivalent to around 12 times the Partnership funding committed to those companies.

440+ <i>SME beneficiaries supported</i>	EUR 517 m <i>grant funding to SMEs</i>	84 <i>SMEs raising follow-on finance</i>	EUR 5.18 bn <i>private financing raised</i>
12× <i>reported leverage effect</i>	EUR 61.8 m <i>average raised per company</i>	Pan-European <i>geographical SME footprint</i>	Hydrogen Startup Hub <i>in preparation</i>

Companies supported include [Sunfire](#), [ITM Power](#), [Lhyfe](#), [McPhy](#), [Nel Hydrogen](#), [Ceres](#), [Hysetco](#), [Enapter](#), [Elcogen](#) and [Hydrogenious](#). Their development illustrates the wider scale-up pathway: **partnership projects validate technologies and create industrial partnerships; private capital supports expansion; and larger European instruments**, including [Important Projects of Common European Interest](#), can help move proven solutions towards substantial industrial deployment.

A Hydrogen Startup Hub is now in preparation within the current JU to reinforce this pipeline. Its proposed role is to help **translate research results into investable start-ups, connect hydrogen innovators with investors and corporate partners, and develop stronger European innovation corridors**, complementing the work of the European Innovation Council with a sector-driven approach. The initiative reinforces the Partnership's ability to bridge the second valley of death faced by enterprises on their way to market and sets the scene for scaling up that can be supported by other instruments. It reflects a broader lesson from the Partnership's experience: generating knowledge is not enough. Supporting SMEs is central to retaining European innovation and translating research investment into scalable companies, industrial capacity and employment.

Strengthening and redefining Europe's hydrogen competitiveness requires coordinated governance and actionable synergies across actors and levels

The challenges facing Europe's hydrogen sector span R&I, infrastructure, market development and industrial scale-up. They cannot be addressed by any single actor, funding instrument or level of government. Europe already has many of the necessary delivery mechanisms in place — across EU institutions, Member States, regions, Hydrogen Valleys, research and industry. **The priority is therefore not to create additional structures, but to better align existing efforts around common objectives and ensure that they reinforce each other.**

A strong institutionalised public-private partnership is essential to connect these different parts of the ecosystem and provide a common strategic direction. By bringing together public authorities, industry and the research community, the Partnership can translate technology and market needs into shared competitiveness priorities, inform and align funding decisions, strengthen coordination across European programmes and initiatives, and monitor progress and the impact of public investment.

The Partnership does not need to deliver every policy or funding instrument itself. Its added value lies in **making the wider European hydrogen ecosystem work as a coherent whole** — connecting actors, priorities and funding instruments so that each contributes where it can deliver the greatest impact towards shared European competitiveness objectives.

Achieving this requires more than informal coordination. It requires a stable, Treaty-based partnership with the mandate, governance and long-term commitment needed to bring all public and private actors together at European, national and regional levels. Such an institutional framework provides the continuity and accountability needed to align priorities, mobilise investment and turn coordination into action. **A Treaty-based public-private partnership is therefore not an additional layer in the ecosystem; it is the structure that enables the different parts of that ecosystem to work together effectively and at scale.**

Because it is established as a Public-Private Partnership bringing together the European Commission, industry and the research community, **the Clean Hydrogen Partnership has developed the capacity to mobilise stakeholders across the full, complex and multi-sectoral hydrogen value chain and beyond its Members.** This mobilisation capacity is an important part of the Partnership's added value and is closely linked to its institutional structure and its ability to maintain an overview of the sector over time.

The Partnership has demonstrated this capacity through its day-to-day governance and stakeholder engagement. Its advisory bodies, the Stakeholders Group (SG) and the States Representatives Group (SRG), provide established platforms for structured dialogue with other partnerships, relevant associations, Member States, Regions and other relevant stakeholders. This is complemented by systematic work on synergies with other European initiatives and funding programmes, supported by a dedicated **Synergies Strategy**⁶ and annual action plans. These mechanisms **enable the Partnership not only to consult stakeholders, but to**

⁶ Synergies Strategy - 2026 and beyond, https://www.clean-hydrogen.europa.eu/media/publications/synergies-strategy-2026-and-beyond_en

identify complementarities, coordinate activities and ensure that developments in different parts of the hydrogen ecosystem are taken into account when defining R&I priorities.

This mobilisation capacity is particularly evident in the development of the forthcoming **Strategic Research and Innovation Priorities (SRIP)**, a **broader strategic exercise to identify European hydrogen R&I priorities over the coming decades**. This foresight exercise brings together a broad community of stakeholders, including the Member States, the European Commission, major industrial players, SMEs, research organisations, sectoral associations, other European Partnerships, and wider representatives of the hydrogen ecosystem. Their active participation provides a direct link between technological developments, industrial realities, and research needs, helping ensure that European R&I priorities for the next 20 years are relevant to the evolving market.

This exercise goes beyond listing technologies or research topics. It seeks to understand how priorities evolve along the R&I continuum, from research and technology development through demonstration and towards deployment and market uptake, and to relate technological priorities to the needs of different end-use sectors and emerging market opportunities. It therefore provides a **basis for determining where European R&I investment can have the greatest strategic impact**, which actors and capabilities need to be supported, and how available resources can be directed towards a coherent development pathway.

The Clean Hydrogen JU is entrusted with developing the SET Plan's Strategic Research and Innovation Agenda (SRIA) for hydrogen.

The Clean Hydrogen JU has been recently **entrusted to develop the Strategic Research and Innovation Agenda (SRIA) of the SET Plan's Hydrogen Working Group**, demonstrating its capacity to bring together the European and national dimensions of hydrogen R&I. This role is particularly important in a sector where significant public and private investments are being made at European, national and regional levels and where coordination is essential to avoid fragmentation and maximise impact.

This work is being developed around a **tripartite core: the European Commission, Member States and the private sector, including both industry and research**, with the Clean Hydrogen Partnership providing the structure and facilitation necessary to bring these perspectives together. The Partnership's ability to convene these actors, combine their expertise and maintain an overarching view of the sector is a significant institutional asset, that allows strategic priorities to be developed collectively rather than separately by individual stakeholder groups or funding instruments, bringing a genuine EU added value.

This tripartite coordination function is particularly relevant for the next multi-financial framework. As hydrogen technologies move from R&I towards demonstration, scale-up and deployment, the distinction between research priorities, industrial needs, infrastructure requirements, skills, regulation and investment becomes increasingly interdependent. A dedicated institutional structure is therefore needed to ensure that these dimensions continue to inform one another and that the European R&I agenda remains connected to the realities of the market, reach greater technical and financial maturity, building a stronger pipeline of investment-ready projects that can subsequently access other public funding sources and, increasingly, attract private capital. In this way, **the partnership can help bridge the gap between innovation and investment, while ensuring that its sector-specific expertise is used where it can add most value.**

A dedicated, Treaty-based European public-private partnership, connecting European, national and regional levels, is essential to mobilise private investment at the speed and scale Europe needs

Since the establishment of the Fuel Cells and Hydrogen Joint Undertaking (FCH JU) in 2008, **a total of 433 research and innovation (R&I) projects have been funded across the hydrogen value chain**. These projects represent total **investments of EUR 4.4 billion, including EUR 2 billion in funding from the European Union**. The remaining EUR 2.4 billion comes from private and public sector co-financing, including public co-funding schemes, primarily national and regional programmes.

Out of the EUR 2.4 billion co-funding leveraged by the Clean Hydrogen Partnership, EUR 1.2 billion has been provided by the private sector. This includes **contributions from private-sector members of the Clean Hydrogen Partnership as well as from other companies and organisations active in the hydrogen sector that participate in Partnership-funded projects without being members of the Partnership**.

The above represents a leverage factor of 1.22 (in grants) across all Framework Programmes, from FP7 until and including the 2025 Call for Proposals under Horizon Europe. This means that **for every euro contributed by the European Union to the Clean Hydrogen Partnership, an additional EUR 1.22 has been mobilised through additional funding by project beneficiaries, in particular from the private sector**.

If we focus only at the implementation of Horizon Europe to date, **the Clean Hydrogen JU recorded the highest leverage factor among all Joint Undertakings, at 1.75**. This shows the programme's strong capacity to mobilise additional public and private investment and to amplify the impact of EU funding in support of clean hydrogen research, innovation and deployment.

The leverage effect is particularly strong for Hydrogen Valleys. Their deployment received a major boost from the additional **EUR 200 million in EU funding** allocated by the European Commission to the Clean Hydrogen JU in 2022 in the context of the REPowerEU Plan. Across the Hydrogen Valleys portfolio, **every EUR 1 of JU funding has been associated with almost EUR 5 in total project investment**, combining EU support with national and regional public funding and private investment.

From R&I to deployment at scale — the role of Hydrogen Valleys.

The Clean Hydrogen Partnership is uniquely positioned to play a key role in addressing project-development gaps, strengthening the pipeline towards FID, and helping position projects to access larger-scale CAPEX and OPEX support schemes

The experience of the Clean Hydrogen JU demonstrates the strong leverage potential of targeted public funding. To date, the Clean Hydrogen JU has supported 27 Hydrogen Valley projects across 23 European countries, representing more than EUR 1.6 billion in total investment, backed by EUR 338 million in JU funding. This means that every EUR 1 of JU funding has been associated with almost EUR 5 in total investment, bringing together additional national and regional public funding and private investment.

This illustrates the catalytic role that targeted EU funding can play in mobilising additional resources and bringing projects to scale. In a still emerging clean hydrogen market, this leverage effect is particularly important: EU support can help de-risk projects, crowd in national and regional funding and mobilise private capital, multiplying the impact of each euro invested and accelerating the deployment of clean hydrogen projects across Europe

This role will become even more important in the context of the future **European Competitiveness Fund (ECF)**, which is intended to **strengthen the connection between research, innovation, industrial deployment and manufacturing**. The ECF is intended to be tightly connected to the new Horizon Europe programme, allowing for a seamless investment journey from research to market. The Clean Hydrogen Partnership, with the Hydrogen Valleys and other demonstration projects, is providing an important pipeline of validated, integrated projects capable of progressing from demonstration to investment and deployment.

And **support for Hydrogen Valleys should go hand in hand with continued R&I at lower TRLs**. These are not separate priorities, but **complementary elements of the pathway from innovation to market**. **R&I remains essential to develop the next generation of technologies**, improve performance and reduce costs, **while Hydrogen Valleys provide the environment in which these solutions can be integrated into real-world systems**, demonstrate their viability and progress toward wider deployment. Supporting both is therefore necessary to maintain a strong pipeline of innovative technologies while creating the conditions for these technologies to reach the market and contribute to scaling-up the European hydrogen economy.

A Treaty-based public-private partnership remains essential to develop complementary instruments in a true collaboration between project developers, financing institutions and public bodies. As an example, the provision of technical assistance (support to **DEVEX**) is seen as a right instrument to **create an investable pipeline of projects**. The Partnership close interaction with industry, public authorities and the research community, provides the technical and market understanding needed to identify project barriers and tailor support to the specific challenges facing hydrogen projects. This can **help promising projects reach greater technical and financial maturity, building a stronger pipeline of investment-ready projects that can subsequently access other public funding sources and, increasingly, attract private capital**. In this way, **the partnership can help bridge the gap between innovation and investment, while ensuring its sector-specific expertise is used where it adds most value**.

Bottom-up development of Europe's Hydrogen Economy through Hydrogen Valleys

Hydrogen Valleys provide the territorial dimension **through which technologies developed through R&I starting at low technology readiness level (TRL) can be integrated into real-world systems, connecting**

production, infrastructure (storage and distribution) and multiple end uses while creating local and regional value chains, bringing together public authorities and regional stakeholders within an integrated ecosystem. They therefore act as a bridge between R&I and deployment: they test high-TRL technologies in an integrated environment, develop business cases, identify infrastructure and regulatory needs, create demand and connect technology providers with users, investors and public authorities. The high-TRL dominance shows the portfolio of hydrogen solutions as already shifted from lab to demonstration.

Hydrogen Valleys are essential to building a European hydrogen economy from the bottom up. By bringing renewable hydrogen production closer to demand, they can foster local hydrogen markets, aggregate demand, and make better use of locally available renewable energy, including variable renewable generation. These local and regional ecosystems can progressively grow and interconnect through the emerging European hydrogen infrastructure, forming the building blocks of a wider and more integrated European hydrogen market. This is evidenced by the fact that Europe now has more than 600 MW of operational electrolysis capacity, out of which 400 MW are already operational in Valleys⁷. Accelerating their deployment is therefore critical. While the Clean Hydrogen Partnership has already supported a large portfolio of Hydrogen Valley demonstrations, **further efforts are needed to move towards broader deployment across Europe and to keep maturing projects through final investment decisions all the way to commercial operation.**

Given the current global conditions, as is also the case for other clean energy projects, **Hydrogen Valleys are increasingly constrained by commercial viability and execution readiness. But this can be addressed by dedicated and targeted funding instruments** aiming at bringing more Valleys from concept to implementation, addressing remaining funding gaps, leveraging private investment, and enabling successful models to be replicated and scaled across regions. The issue remains that binding offtake commitments remain absent across an important number of the project pipeline and the levelised cost of hydrogen exceeds offtaker willingness-to-pay for many projects. This is the so-called offtake and production gap.

Furthermore, there are **project quality challenges**. The Clean Hydrogen Partnership is addressing this through its **dedicated Project Development Assistance programme**, but some projects may still pursue competitive deployment instruments (Capex & Opex) before they are investment-ready.

Finally, **the landscape of funding remains complex**. Projects require grant and non-grant finance combinations across different project phases, which no single instrument can assemble.

Other dimensions, including **regulatory uncertainty and infrastructure dependence**, remain valid challenges but are to be addressed by other policy instruments.

Recent project bids indicate that production costs far above earlier expectations are creating a gap between production cost and willingness-to-pay and that OPEX support is required to bridge it. Against this backdrop, **public funding remains indispensable** – a large majority of Hydrogen Valleys still rely on it, primarily through national and EU programmes. **Still, funding awards do not ensure deployment** — withdrawals and terminations expose persistent readiness and commitment gaps – although this situation is common to other clean energy projects. For instance, the EU Hydrogen Bank auction 2024 saw multiple withdrawals of initially awarded projects, creating significant unspent funding.

⁷Report on the State of the Clean Hydrogen Valleys Sector 2026 https://h2v.eu/sites/default/files/2026-07/2026.05883_01_ENN.pdf

Unlocking more hydrogen projects and enabling them to reach FID requires addressing both the business-case gap and the project-readiness gap. It also requires coordinated action by policymakers, working together with project developers and investors . Public funding has an important role to play, but support needs to be targeted at the specific barriers projects face across their development journey.

On the **business-case side**, projects need **more predictable and scalable financial instruments, particularly OPEX** support such as Contracts for Difference and double-sided auctions. These mechanisms can reduce revenue uncertainty, support bankable offtake arrangements, and improve the commercial case for investment.

At the same time, funding needs to address the project-readiness gap. Many promising projects struggle to progress through the high-risk development phase before FID – the “Valley of Death.” **Greater DEVEX support and pre-FID financing are therefore needed to mature projects, reduce development risk, and build a stronger pipeline of investment-ready projects that can ultimately absorb larger-scale CAPEX and OPEX deployment support funds.**

As a public-private partnership implemented through a Joint Undertaking, **the Clean Hydrogen Partnership is in a unique position** to bring together market insight, technical expertise, ecosystem integration (public and private at EU, national and regional levels), European reach and portfolio-wide knowledge within the stable, long-term strategic framework required. This combination of capabilities can help DEVEX funding and, to some extent, earlier CAPEX and OPEX needs to be designed and deployed effectively, addressing key market and project-development gaps, strengthening the pipeline towards FID, and helping position projects to access larger-scale CAPEX and OPEX support schemes. This builds on the current support the Clean Hydrogen Partnership is providing via its Project Development Assistance programme and the demonstration of Hydrogen Valleys via its annual Call for Proposals.

The Clean Hydrogen JU is a knowledge and sector intelligence hub for Europe's hydrogen ecosystem, providing critical expertise across key cross-cutting areas.

The Partnership has developed an increasingly important knowledge-management and sector-intelligence function. The European Hydrogen Observatory, project and technology monitoring, programme reviews, the Projects Dashboard, collaboration with the JRC and other knowledge platforms provide a common evidence base for the sector.

The stated objective is to develop the **Clean Hydrogen JU into a European hydrogen knowledge hub**, supporting both hydrogen value-chain actors and evidence-based EU policy implementation. This function is particularly valuable in a rapidly evolving sector where technology performance, costs, infrastructure, markets, skills, regulation and investment conditions change continuously. It allows lessons from individual projects and regions to be captured and fed back into strategic programming, thereby creating a learning cycle between R&I, demonstration, deployment and policy.

The Partnership's contribution also extends beyond technology and investment to the enabling conditions for a competitive European hydrogen ecosystem. **Skills and public awareness are a critical example. The deployment and industrialisation of hydrogen technologies require engineers, technicians, operators, safety professionals, researchers, educators, regulators and other specialised profiles.** The Clean Hydrogen Partnership has therefore supported over 20 projects focusing on skills, including the European Hydrogen Academy, designed to consolidate fragmented education and training activities into a European network. The Academy aims to build networks of more than 100 universities and 500 schools, establish physical training laboratories and provide hydrogen education and training at different levels. A continued partnership is needed to ensure that skills development remains connected to the evolving technological priorities and labour-market needs identified through the R&I and industrial portfolio, rather than becoming a separate, disconnected activity.

Similarly, pre-normative research and safety, are not peripheral activities but essential conditions for the deployment and competitiveness of hydrogen technologies. Hydrogen is developing in areas where standards, testing methodologies, safety knowledge and regulatory frameworks are still evolving. The Partnership's pre-normative research has generated experimental evidence, methodologies and recommendations that feed into European and international standards across production, storage, transport and end use. Its current portfolio includes 13 pre-normative research projects, supported by coordination with the European Commission's Joint Research Centre and the Regulations, Codes and Standards Strategy Coordination Task Force. The same applies to safety. Through activities including the European Hydrogen Safety Panel and knowledge platforms such as the Hydrogen Incidents and Accidents Database, the Partnership supports the accumulation and dissemination of safety knowledge across the sector.

Sustainability and circularity illustrate another area where expertise and a long-term portfolio perspective are essential. As hydrogen technologies scale up, competitiveness will increasingly depend not only on cost and performance but also on resource efficiency, critical raw materials, water use, environmental impacts, recyclability and end-of-life management. The European Hydrogen Sustainability and Circularity Panel has been established precisely to integrate these considerations at programme and project level, covering the full life cycle of hydrogen technologies and including environmental, economic and social dimensions. This type of cross-cutting expertise is most effective when embedded within an institution able to influence successive calls, monitor results and translate lessons learned into future priorities..

Conclusion

This document shows that the added value of a partnership on hydrogen lies precisely in its ability to **connect and coordinate the different elements of the hydrogen ecosystem over time**: technology development with demonstration; demonstration with investment; European priorities with regional implementation; R&I with standards and safety; technology development with skills; and individual project results with sector-wide knowledge.

An **institutionalised partnership is essential to this role** because it provides a permanent governance structure bringing together the European Commission, industry and the research community, while enabling structured interaction with Member States, regions and the wider stakeholder community. It provides strategic continuity, accountability and a long-term portfolio perspective, allowing priorities to evolve with technological and market developments while preserving institutional knowledge and stakeholder engagement.

For the next MFF, the objective should therefore be not simply to continue funding hydrogen R&I, but to **maintain and strengthen the European capacity to coordinate the entire innovation-to-investment ecosystem**. A dedicated Hydrogen and derivatives Joint Undertaking would provide the institutional backbone for this approach, helping to reduce fragmentation between EU, national and regional instruments, leverage private investment, accelerate market uptake, strengthen European industrial competitiveness and ensure that hydrogen contributes effectively to Europe's strategic autonomy, decarbonisation and long-term economic resilience.