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Boosting the hydrogen transition
in the Atlantic Area ports

Deliverable D3.1.1
HYDEA Community - 2025

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GLOSSARY OF ABBREVIATIONS

APVIGO	Port Authority of Vigo
AGHPC	Atlantic Green Hydrogen Ports Corridor
AHGDC	Atlantic Hydrogen Governance and Deployment Corridor
FG	Focus Group
FGs	Focus Groups
GHG	Greenhouse Gas
H ₂ MedH ₂	Hydrogen Mediterranean CorridorHydrogen
HYDEAH ₂ Med	Hydrogen Ecosystem for the Decarbonisation of the Atlantic AreaHydrogen Mediterranean Corridor
KPIHYDEA	Key Performance IndicatorHydrogen Ecosystem for the Decarbonisation of the Atlantic Area
SMEKPI	Small and Medium-sized EnterpriseKey Performance Indicator
SME	Small and Medium-sized Enterprise

EXECUTIVE SUMMARY

Throughout 2025, the HYDEA Community has consolidated its role as a cross-border platform for cooperation and knowledge exchange, promoting the integration of hydrogen as an energy vector in the ports of the Atlantic Area.

This deliverable summarises the main actions carried out during the year, which have focused on the implementation of the first three Focus Groups (FGs), the consolidation of the adapted Delphi methodology, and the achievement of tangible results in terms of participation and collaboration among Community members.

Main achievements under 2025:

- **Implementation of the first three Focus Groups:** The Community successfully organised and executed FG1 (Hydrogen Storage and Distribution), FG2 (Hydrogen Production), and FG3 (Hydrogen Strategy in Ports). These groups gathered experts from Spain, Portugal, France, and Ireland to analyse challenges, share experiences, and identify collaborative pathways across the hydrogen value chain in port environments.
- **Methodological consolidation:** The adapted Delphi methodology was fully applied, providing a structured, participatory, and evidence-based framework for expert consultation, consensus-building, and the formulation of strategic insights.
- **Community coordination and monitoring:** Regular coordination meetings were held under the leadership of the Port Authority of Vigo, ensuring methodological alignment, efficient planning, and continuous monitoring of project indicators across all Focus Groups.
- **Identification of collaboration opportunities:** The discussions and analyses carried out within the Focus Groups led to the identification of 23 collaboration opportunities. These opportunities are the aggregated outcomes of FG1, FG2 and FG3, and cover complementary areas across the hydrogen value chain, including infrastructure, logistics, technological innovation, policy harmonisation, and cross-border hydrogen corridors.
- **Growth of the HYDEA Community:** as of December 2025, 93 participants have been registered as members of the HYDEA Community, either through the HYDEA Community web platform or following direct invitations and stakeholder mapping carried out by project partners to support participation in the HYDEA Focus Groups. The Community brings together representatives from the public, private, and academic sectors across the Atlantic Area. This figure places the Community very close to the project target of 100 members, confirming a strong and sustained growth trend.

Outlook for 2026: Building on the results achieved during 2025, the next period will focus on completing the remaining Focus Groups (FG4–FG6) addressing hydrogen uses, with the objective of identifying additional collaboration opportunities and further consolidating the HYDEA Community as a structured platform for cooperation and knowledge exchange.

This deliverable marks the transition from the initial implementation phase to one of consolidation in terms of results and impact, confirming the HYDEA Community as a relevant and strategic reference for cooperation and knowledge generation related to hydrogen in Atlantic Area ports.

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1 Context

1.1 The HYDEA Community

The HYDEA Community is a cross-border initiative created to promote the adoption of hydrogen as an energy vector in the ports of the Atlantic Area. Its main objective is to integrate key actors from the public, private and academic sectors, promoting collaboration, knowledge exchange and the development of joint strategies that facilitate energy transition and decarbonisation of ports.

The HYDEA Community acts as a reference space for the identification of innovation opportunities, the creation of synergies between stakeholders and the generation of strategic proposals that support the integration of hydrogen in port ecosystems.

This community has as fundamental pillars the following:

- **Promotion and awareness:** Disseminate the benefits of hydrogen and its applications within ports, raising awareness about its potential for decarbonisation, energy security and sustainable development in the region, among key actors.
- **Transnational collaboration:** To promote cooperation among local, regional and national entities from different countries, facilitating the exchange of experiences, best practices and technical knowledge to accelerate energy transition in the ports of the Atlantic Area.
- **Tangible results:** Develop strategic insights, identify collaboration opportunities and consolidate a network of stakeholders committed to advancing cooperation related to hydrogen in the port sector, ensuring the generation of measurable impacts and providing expert feedback to support other HYDEA project activities and outputs.

Thanks to this structured and participatory vision, the HYDEA Community is positioned as an ecosystem to drive the transition to hydrogen, facilitating the integration of innovative solutions and strengthening the competitiveness and sustainability of the ports of the Atlantic Area.

2 Tasks performed

During the period corresponding to the year 2025, several activities have been implemented to strengthen and further develop the HYDEA Community, consolidating it as a cross-border platform for collaboration on hydrogen-related activities in Atlantic ports.

The main actions carried out during this period focused on the coordination, facilitation, and monitoring of the Community's Focus Groups (FGs), which serve as the core mechanism for dialogue and knowledge exchange among stakeholders.

Throughout 2025, three Focus Groups were successfully organised and implemented, addressing key topics across the hydrogen value chain:

- FG1 – Hydrogen Storage and Distribution.
- FG2 – Hydrogen Production
- FG3 – Hydrogen Strategy in Ports

These thematic sessions gathered experts from the public, private, and academic sectors to discuss challenges, opportunities, and policy recommendations for accelerating the hydrogen transition in Atlantic ports.

All activities were carried out following a structured, participatory, and evidence-based approach, aligned with the adapted Delphi methodology defined for the Community. This process ensured the systematic collection of expert input, the identification of collaboration opportunities, and the formulation of practical recommendations to support informed decision-making on hydrogen solutions in port environments.

The progress achieved in 2025 is summarised below, detailing the main actions implemented and the key results obtained in each case.

2.1 Monitoring of the Focus Group meetings created within the HYDEA Community to ensure compliance with the project's objectives and indicators

During 2025, the HYDEA Community has focused on the consolidation and monitoring of its FGs which act as key instruments to ensure progress towards the objectives and indicators established in the project.

The implementation of these groups has enabled the systematic identification of challenges, opportunities, and collaboration areas within the hydrogen value chain, while fostering the participation of experts and stakeholders from the Atlantic Area.

2.1.1 Focus Group implementation and follow-up

The year 2025 marked a significant step forward in the operational phase of the HYDEA Community. Three Focus Groups were organised and successfully completed, covering strategic areas of the hydrogen value chain:

- **FG1 – Hydrogen Storage & Distribution**, coordinated by the University of Galway (February–April 2025);
- **FG2 – Hydrogen Production**, coordinated by ITG (May–July 2025);
- **FG3 – Hydrogen Strategy in Ports**, coordinated by the Port of Brest (October–December 2025).

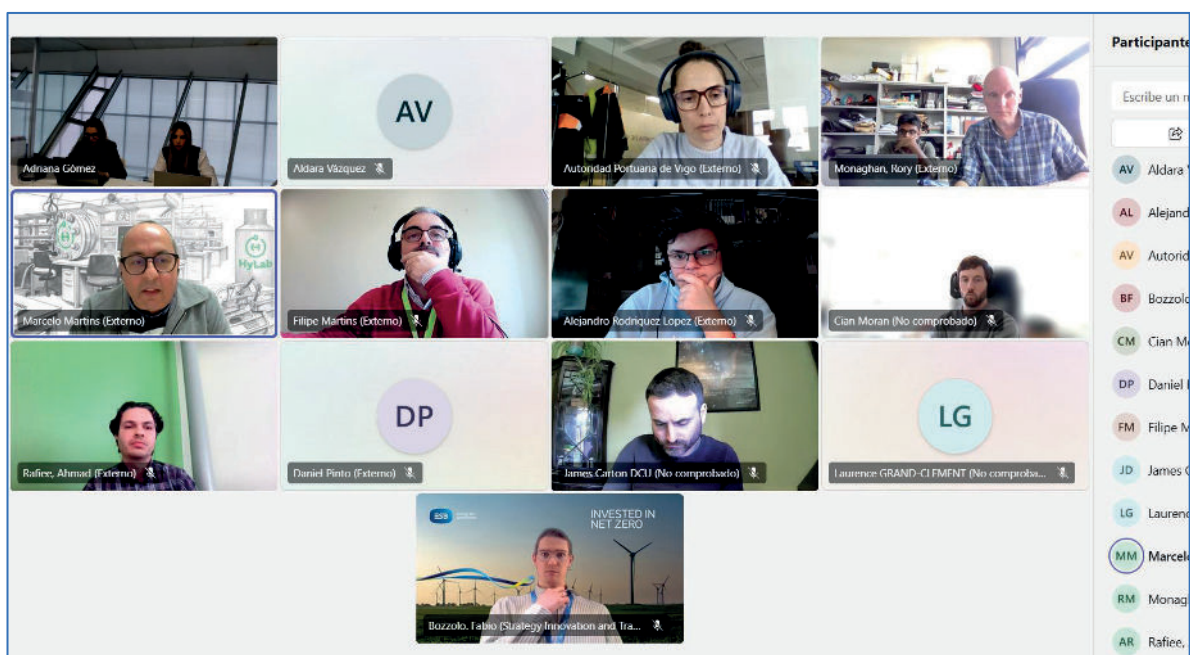


Figure 1. Screenshot of the FG1 – Hydrogen Storage & Distribution.

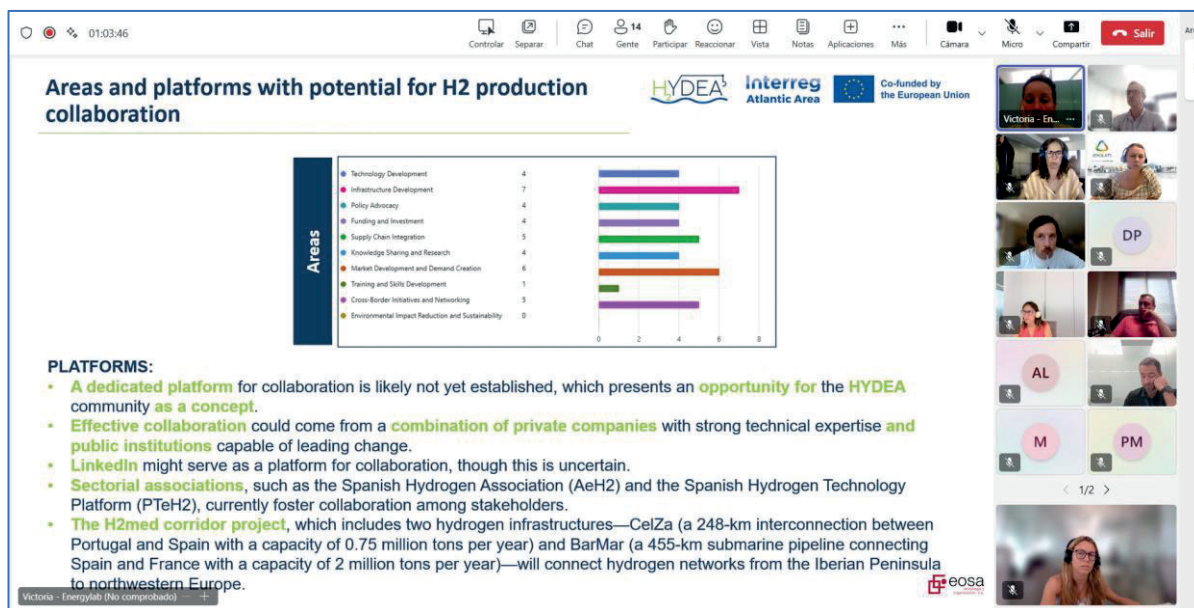


Figure 2. Screenshot of the FG2 – Hydrogen Production.

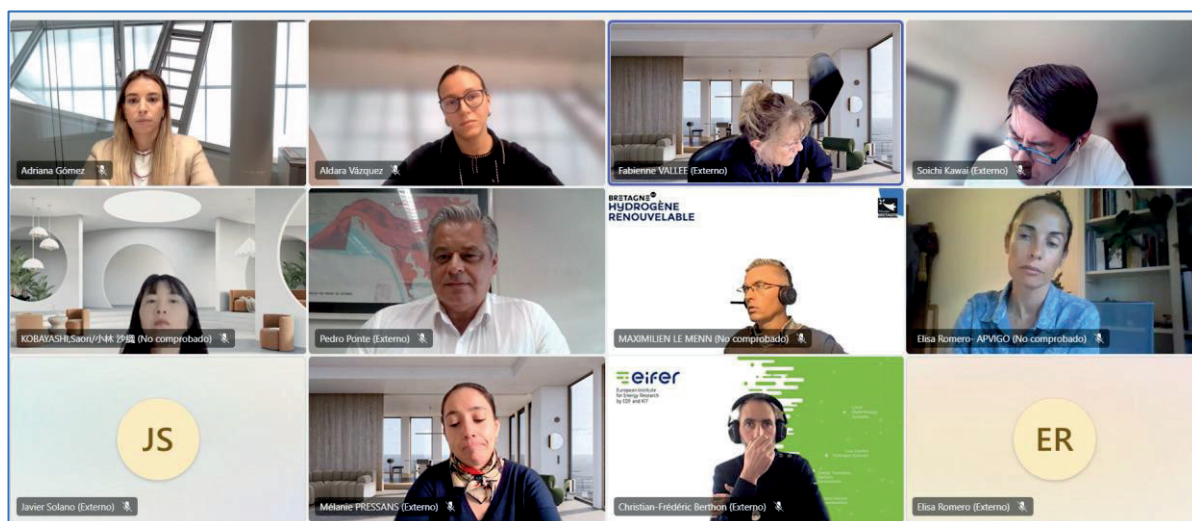


Figure 3. Screenshot of the FG3 – Hydrogen Strategy in Ports.

Each Focus Group followed the **adapted Delphi methodology** defined for the Community, consisting of three main phases:

1. An **introductory meeting**, where the thematic scope and objectives were defined, and partners shared their expectations and suggestions for the priority topics to be addressed throughout the Focus Group discussions;
2. A **structured questionnaire**, distributed among the experts to collect individual insights;
3. A **final meeting**, aimed at reviewing results, achieving consensus, and identifying potential collaboration opportunities.

4- Delphi Methodology

Phases of the process:



Método Delphi adaptado:



- **Primera reunión introductoria:** Se organiza una primera reunión para definir el contexto y los temas específicos del FG de H2 Production.
- **Cuestionario estructurado:** Después de la primera reunión, los expertos reciben un cuestionario para recoger opiniones detalladas sobre los temas tratados.
- **Segunda reunión de feedback:** En esta reunión final se presentan los resultados del cuestionario, lo que permite a los expertos ajustar sus opiniones y llegar a conclusiones y recomendaciones consensuadas.

Figure 4. Slide from the presentation of the first meetings between Port Authority of Vigo and the FGs coordinators explaining the methodology to be followed.

This structured approach has guaranteed comparability between groups, the consistency of outputs, and a continuous alignment with HYDEA's strategic indicators — particularly the achievement of an active network of 100 members and the identification of at least 15 collaboration opportunities.

2.1.2 Main outcomes of the Focus Group discussions

The Focus Groups provided an effective platform for experts to address key barriers, propose practical solutions, and identify joint actions for the hydrogen transition in Atlantic ports.

Main highlights include:

- **FG1 – Hydrogen Storage & Distribution:** Experts analysed technical and regulatory challenges such as storage limitations, infrastructure costs, and safety requirements. They underlined the need for coherent regulatory frameworks, cross-border coordination, and public-private partnerships to scale hydrogen logistics. Opportunities for collaboration were identified around Atlantic hydrogen corridors, geological storage pilots, and the creation of shared knowledge platforms.
- **FG2 – Hydrogen Production:** Discussions centred on the intermittency of renewable sources, market uncertainty, and fragmented legislation. Participants highlighted the Atlantic region's strong potential for offshore and coastal hydrogen production, supported by abundant renewable resources. Recommendations included promoting demonstration projects, stable policy frameworks, and investment mechanisms to foster large-scale production.
- **FG3 – Hydrogen Strategy in Ports:** The group focused on defining strategic pathways for hydrogen integration within port ecosystems, aligning regional and national plans to achieve

coherent decarbonisation goals. Experts emphasized the role of ports as central hubs for hydrogen logistics, the need for unified governance models, and the importance of inter-port collaboration to ensure interoperability and efficiency across the Atlantic Area. The discussion also highlighted the limitations of project-based, time-bound funding schemes, stressing the need for more stable, accessible and long-term funding mechanisms to ensure the continuity, implementation and scaling-up of hydrogen initiatives beyond individual project lifecycles.



Figure 5. Screenshot of the FG1's minutes showing the main outcomes.

Funding Opportunities for Hydrogen Production projects at the National and EU-levels

During the FG2 2nd meeting, experts identified several funding opportunities for hydrogen production across different countries. In **Spain**, notable **programs include** H2 Pioneros, Cadena de Valor, Valles del Hidrógeno, PERTE ERA, MOVES Proyectos Singulares II, **the H2 Valleys Program**, Misiones, **Ports 4.0**, and HAZITEK. Portugal's key funding sources include EN-H2, the Plano de Recuperação e Resiliência (PRR), and PNEC2030. In France, support is provided through a hydrogen production support mechanism focused on operational expenditures (OPEX). Ireland did not provide a response regarding available funding opportunities.

Several European Union funding opportunities have also been identified to support hydrogen production and market development. These include Important Projects of Common European Interest (IPCEIs), Horizon Europe, the European Hydrogen Bank, the Innovation Fund, European Bank Auctions, Net Zero Calls, and the Connecting Europe Facility (CEF). Additionally, initiatives like the EU Hydrogen Valleys, the Clean Hydrogen Partnership, and the Recovery and Resilience Facility (RRF) play key roles. The Facility to Support the Development of the Hydrogen Market operates under the European Hydrogen Bank, while the European Institute of Innovation and Technology (EIT) fosters innovation. The **RefuelEU Plan** and **NextGenerationEU** also provide important frameworks and funding mechanisms to accelerate the hydrogen economy across Europe.

Funding Opportunities at the national level

SP	PT	FR	IE
- H2 Pioneros (Pioneer H2 projects call, IDAE) - Cadena de Valor (Value Chain call, IDAE) - Valles del Hidrógeno - PERTE ERA - MOVES Proyectos Singulares II - IPCEI H2Use - H2 Valleys Program - Misiones (Missions call, CDTI) - Ports 4.0 - HAZITEK	- EN H2 - PRR (Plano de Recuperação e Resiliência) - PNEC2030	Hydrogen production support mechanism (OPEX)	N/A

Figure 7. Funding Opportunities for Hydrogen Production projects at the National level as compiled through the Expert's Questionnaire and presented in the 2nd FG2 meeting.

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Funding Opportunities at the EU level

- IPCEIs (Important Projects of Common European Interest)
- Horizon Europe
- European Hydrogen Bank
- Innovation Fund
- European Bank Auctions
- Net Zero Calls
- Connecting Europe Facility (CEF)
- EU Hydrogen Valleys
- Clean Hydrogen Partnership
- Recovery and Resilience Facility (RRF)
- Facility to Support the Development of the Hydrogen Market
 - Under European Hydrogen Bank
- EIT (European Institute of Innovation and Technology)
- RefuelEU Plan
 - Under NextGenerationEU



Figure 8. Funding Opportunities for Hydrogen Production projects at the EU level as compiled through the Expert's Questionnaire and presented in the 2nd FG2 meeting.

EU Funding: Is it Project-based?

- Mixed reviews → **Project-based funding as an opportunity and a limitation**

Opportunities:

- Milestone-based funding ensures continuity and risk control
- Small-scale pilots speed deployment and build expertise
- Diverse funding calls support targeted innovation and market growth

Limitations:

- Requires continuous, significant funding
- Risk of disruption if funding stops
- Complex processes slow progress
- Funding concentrated among few players



Figure 9. EU funding as project-based: opportunities and challenges identified by the experts in the questionnaire and presented in the 2nd FG2 meeting.

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Figure 6. Screenshot of the FG2's minutes showing the main outcomes.

EU Funding: Is it Project-based?

- Mixed reviews → **Project-based funding as an opportunity and a limitation**

Opportunities:

- Supports early innovation and risk reduction
- Enables local, flexible hydrogen solutions
- Promotes learning-by-doing through pilots
- Positions ports as key drivers of hydrogen adoption

Limitations:

- Short-term funding limits long-term continuity
- Favors large industrial players over ports
- Complex procedures discourage smaller actors
- Creates isolated "island" with limited impact



Figure 7. "EU funding as project-based: opportunities and limitations."

Areas and platforms with potential for H2 strategy collaboration



PLATFORMS:

- HYDEA Community and similar Interreg projects (e.g., RQINE) are seen as the most effective current frameworks for Atlantic hydrogen cooperation.
- Atlantic Ports Network (under the Atlantic Strategy Committee), the Atlantic Hydrogen Alliance (A2A), and the European Hydrogen Backbone (EHB) serve as key coordination spaces connecting ports, industries, and policymakers.
- Clean Hydrogen Partnership supports R&D collaboration at EU level but requires stronger linkage to port stakeholders.
- National and regional hydrogen associations (e.g., A4H2, Portuguese Hydrogen Association) act as facilitators for dialogue between public authorities and industry.
- Coordination among initiatives remains fragmented — a unified Atlantic Hydrogen Platform could align regional efforts under a shared strategic vision and promote interoperable port projects.
- EMSA (European Maritime Safety Agency) can play a key role in harmonizing safety and regulatory standards across Atlantic ports.

Figure 8. "Areas and platforms with potential for H2 strategy collaboration."

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Collaborative projects to advance green hydrogen deployment in Atlantic ports

- Atlantic Green Hydrogen Ports Corridor (AGHPC):** Joint initiative connecting key Atlantic ports through shared hydrogen production, storage, and bunkering infrastructure. Includes interoperable refueling systems, common safety standards, and digital monitoring of emissions reductions.
- Atlantic Hydrogen Governance & Deployment Corridor (AHGDC):** Multilevel collaboration framework linking ports, energy operators, research institutions, and regulators to harmonize safety, certification, and licensing standards across the Atlantic Area.
- Network of maritime H₂ stations and fleet of hydrogen-powered vessels:** Development of refueling infrastructure and demonstration projects for short-sea shipping and port service vessels.
- Pilot projects for port operations fleets:** Deployment of H₂ propulsion systems to replace diesel in port machinery, trucks, and auxiliary vessels — promoting zero-emission logistics.
- Port-scale hydrogen generation and storage pilots:** Implementation of modular and replicable H₂ production and storage units for daily port operations, enabling scalability and replication across Atlantic ports.
- Atlantic clean energy marine hub:** Establishment of integrated bunkering and refueling nodes for low-carbon and renewable fuels, connecting hydrogen corridors across the Atlantic.
- Digital collaboration platform for hydrogen stakeholders:** Creation of an online hub to facilitate communication, knowledge sharing, and partnership development among ports, industries, and policymakers.

Figure 9. "Collaborative projects proposed by experts."

The final block of the meeting addressed funding sources, collaboration opportunities, and the development of the Atlantic hydrogen roadmap. Experts elaborated on the need for coordinated applications for EU calls (particularly CEF, Innovation Fund, Hydrogen Bank instruments, Horizon Europe and IPCEIs) given the increasing competitiveness and decreasing availability of European funds.

Participants stressed that **collaboration across ports is essential**, especially for large-scale and corridor-based projects. The HYDEA Community itself was identified as a potential platform to structure joint initiatives, while experts also referred to Atlantic Area networks, hydrogen alliances, and partnerships with North Sea ports as key avenues for cooperation.

The meeting concluded with a discussion led by Brest Port on the **next steps for the Hydrogen Strategy Roadmap**, which will be drafted collectively over the coming months. Coordinators suggested maintaining regular monthly meetings to progressively build the roadmap, ensuring that each port contributes its own strategic vision, specialization profile, and timeline. The roadmap will integrate investment needs, milestones, required regulatory developments, collaboration pathways, technological readiness expectations, and corridor design principles.

In this context, **Kawasaki Heavy Industries** shared its experience as an industrial actor already involved in the development and operation of liquefied hydrogen (LH₂) maritime supply chains, including long-distance transport and port-related infrastructure. Kawasaki highlighted the importance of moving from high-level strategic visions toward more detailed and realistic roadmaps, supported by concrete investment plans, phased deployment strategies, and clearly identified end users. Their contribution underlined the value of learning from operational pilot projects and international demonstrations, particularly to support regulatory confidence, infrastructure planning, and the prioritisation of port investments. Kawasaki expressed its willingness to continue contributing its technical and operational

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Figure 7. Screenshot of the FG3's minutes showing the main outcomes.

2.1.3 Monitoring and coordination

Continuous coordination among Focus Group coordinators and project partners has ensured methodological coherence and progress tracking.

Regular internal meetings and communication were held to:

- Plan the calendar of activities and validate agendas and questionnaires;
- Monitor participation and feedback across the three FGs;
- Review indicators linked to community expansion and collaboration outcomes;
- Align conclusions with the HYDEA Community's overall objectives.

RE: HYDEA: FG3 H2 STRATEGY IN PORTS

AV
 Para
 CC

ma. 21/10/2025 18:39

Dear Fabienne,

Thank you very much for sharing the presentation with us. After reviewing it, we believe it is well aligned with the FG3 objectives.

That said, we would like to suggest a few adjustments for your consideration:

- **Slide 5 – FGs Overview:** This slide may not need to be shown during the session.
- **Slides 12 and 13:** We agree with your assessment that it might be too early to present these slides. They could instead be shared as part of the conclusions during the second and final FG3 meeting.

We would also like to kindly remind you that the focus group is scheduled for 1 hour. Therefore, the introduction of both participants and the HYDEA project should be kept brief. We encourage you to dedicate the majority of the session to the discussion questions, as they will be key in fostering engagement.

Thank you in advance.

Kind regards,

estrategia y
 organización, s.a.

European Projects & Affairs Consultant

RE: HYDEA Focus Group on Hydrogen Production: Minutes and Questionnaire

ER
 Para
 CC

mi. 18/06/2025 9:03

Seguimiento. Comienza el miércoles, 18 de junio de 2025. Vence el miércoles, 18 de junio de 2025.

Buenos días Elisa y Victoria,

Finalmente hemos recibido **11 respuestas en el cuestionario**, además de la contribución de Caroline Mével (Ekium), quien nos ha hecho llegar sus respuestas en formato Word debido a problemas técnicos.

4. Which of the following nation-states are you based in?

Nation-State	Count
Spain	6
France	2
Portugal	2
Ireland	1
Otras	0

3. What is your expertise working within the green hydrogen value chain?

Expertise	Count
Hydrogen Solutions Development	2
Hydrogen Solutions Implementation	3
Hydrogen Solutions Research	3
Offshore Renewables	1
Development of Port Infrastructure	1
Otras	1

Si os parece bien, con estas respuestas y a lo largo de esta semana prepararemos una presentación resumen con los principales resultados del cuestionario, que os enviaremos para que EnergyLab pueda utilizarla en la segunda y última reunión del Focus Group. Esta presentación facilitará el debate y permitirá avanzar hacia colaboraciones más concretas.

Además, queríamos consultaros vuestra disponibilidad para celebrar esta segunda reunión durante la semana del **30 de junio al 4 de julio**. Con vuestras propuestas, enviáramos un Doodle a los expertos

Figure 8. Screenshot of exchanges of emails for the coordination of the FGs.

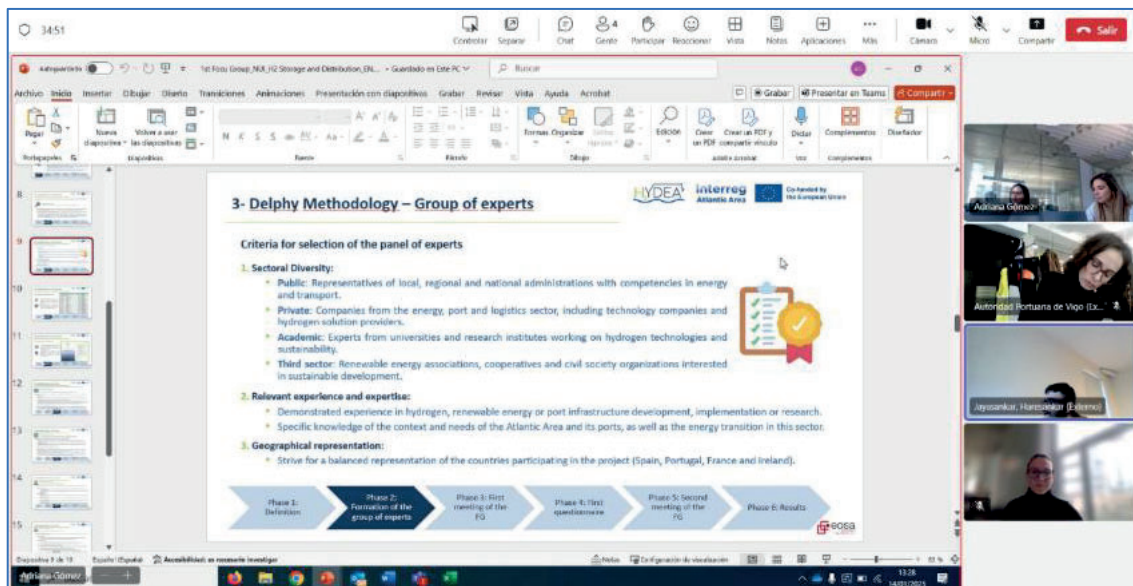


Figure 9. Screenshot of internal meetings with FGs coordinators.

The monitoring process confirmed steady growth in participation and active engagement from stakeholders across the four partner countries. The outcomes of the Focus Groups directly contribute to the project's capitalisation objectives, ensuring measurable progress towards the defined indicators of community engagement, knowledge generation, and collaboration opportunities.

2.2 Organisation and functioning of the Focus Group led by the Port of Vigo

The Port Authority of Vigo (APVIGO) leads the overall coordination of the FGs of the HYDEA Community. This role covers the methodological alignment, calendar planning, support to the thematic coordinators, and the follow-up of outputs to ensure that all groups contribute consistently to the project's objectives and indicators.

2.2.1 Coordination role and objectives

APVIGO coordination ensures that every FG:

- Operates under a common, adapted Delphi approach (introductory meeting → expert questionnaire → feedback/final meeting), enabling structured participation, comparability of results and evidence-based conclusions.
- Follows an agreed calendar and set of templates (agendas, minutes, questionnaires, results summaries) for coherent delivery across groups.
- Tracks Community indicators (growth of the network and identification of collaboration opportunities) and aligns outputs with HYDEA's capitalisation goals.

2.2.2 Planning, facilitation and follow-up across FGs (2025)

In 2025, APVIGO coordinated the implementation of three FGs, ensuring methodological consistency and timely execution:

- FG1 – Hydrogen Storage & Distribution (coordinator: University of Galway): 1st meeting on 27/02/2025; final meeting on 09/04/2025; meetings conducted online.
- FG2 – Hydrogen Production (coordinator: ITG): 1st meeting on 23/05/2025; final meeting on 03/07/2025; meetings conducted online.
- FG3 – Hydrogen Strategy in Ports (coordinator: Port of Brest): 1st meeting on 22/10/2025; final meeting on 01/12/2025; meetings conducted online.

Across these groups, APVIGO's coordination covered:

- Agenda validation and materials readiness with FG coordinators, ensuring clarity of objectives and questions prior to each meeting.
- Questionnaire standardisation (Likert scales + open questions) to capture expert input systematically and enable comparative analysis in the feedback sessions.
- Minutes and outputs consistency (structure, key takeaways, policy/funding blocks, sharing with partners for validation, and collaboration leads) to facilitate synthesis at Community level.
- Calendar monitoring to keep the Delphi phases on track and secure participation across countries.
- Targeted follow-up with partners to reinforce participation from underrepresented Atlantic Area regions, ensuring balanced geographical representation and improving response rates throughout the Focus Group and Delphi consultation processes.





Figure 10. Screenshot of questionnaires, presentations for focus groups, and meeting minutes.

2.2.3 Outcomes of coordination in 2025

APVIGO's coordination enabled the three FGs to deliver comparable, actionable outputs:

- Challenges / opportunities identified per topic (e.g., storage limitations, safety/regulatory aspects, cost and market signals in FG1; intermittency, market uncertainty and policy fragmentation in FG2; port-level strategy building and governance alignment in FG3).
- Policy and investment recommendations (e.g., stable frameworks, staged demonstrations, public-private cooperation, and targeted State Aid/IPCEI-type support where relevant).
- Funding maps (national/EU) and collaboration avenues (corridors, shared infrastructure, knowledge platforms) to advance cross-border action in the Atlantic Area.

Greatest Challenges hindering H2 Production

Spain	Portugal	France	Ireland	Atlantic Area
- Offtake market underdeveloped due to lack of incentives - Incentives focus on CAPEX, not long-term profitability - Permitting process is slow, often taking 2-3+ years - High costs - Unclear hydrogen role causes uncertainty and scattered efforts - No clear regulations for blending renewable hydrogen into gas pipelines - EU rules demand local, time-matched renewable electricity for green hydrogen production	- Inconsistent funding and legal framework for scaling up and implementing technologies - Insufficient exploitation of synergies with renewable energies - Technological convergence over hydrogen production - Implementation of large-scale projects - Green H2 off-taking	- Limited demand beyond heavy industry - Small-scale local production not yet economically viable - Imported hydrogen threatens local production, raising supply trust issues - Delays from funding and regulations - High costs and slow investment - Renewable intermittency and grid issues - Infrastructure gaps - 2025 Hydrogen Strategy: Reduced 2050 targets and excludes short-to-medium-term maritime imports	- Low hydrogen demand, few pilots - Renewables growth stalled (planning, grid, politics) - Lack of subsidies and political support	- Inconsistent funding and legal framework for scaling up - Limited synergy exploitation with renewable energies - Technological convergence in hydrogen production needed - Competition between production sites in the AA - Logistics challenges - Underdeveloped offtake market due to lack of incentives - Lack of political support - EU rules require local, time-matched renewable electricity for green hydrogen - AA has fewer renewable sources than southern regions - Integration of offshore energy with harbor grids is necessary - AA distant from main hydrogen pipelines (European Hydrogen Backbone) - Off takers concentrated in Rhine Valley and NE Spain, creating demand uncertainty

Policy Recommendations to improve Technical Feasibility of Challenges

- **Ensure sufficient funding and resource mobilization** to support the complex, high-risk setup of offshore artificial islands, including expertise, manpower, and port resources.
- **Fund large-scale demonstration projects in multiple regions** (including the Atlantic area) to gather operational data, validate technologies, and reduce investment risks (e.g., expand support for projects like HOPE).
- **Invest in critical offshore infrastructure**, such as hydrogen pipelines connecting production platforms to mainland networks, and port facilities for hydrogen import/export.
- **Promote technology development in offshore power generation**, offshore hydrogen production (including seawater electrolysis), and offshore hydrogen transport pipelines.
- **Integrate bioresources for hydrogen production** at the same level as renewable fuels of non-biological origin (RFNBOs), and establish a traceability system for renewable origin certification.
- **Address connectivity and operation & maintenance (O&M) challenges** by developing dedicated EU guidelines and support mechanisms.
- **Engage with environmental and local stakeholders** to manage conflicts and ensure social acceptance within EU policy frameworks.
- **Set clear boundaries and criteria** to evaluate where and when **offshore hydrogen production islands** would be beneficial and feasible, prioritizing targeted applications.

Figure 11. Challenges / opportunities identified and Policy and investment recommendations.

opportunity ID	FG	TOPIC	THEMATIC AREA	AREA
CO-01	FG1	H2 STORAGE AND DISTRIBUTION	Infrastructure & hubs	Geological hydrogen storage
CO-02	FG1	H2 STORAGE AND DISTRIBUTION	Logistics & corridors	Atlantic hydrogen corridors
CO-03	FG1	H2 STORAGE AND DISTRIBUTION	Infrastructure & hubs	Port integrated hydrogen infrastructure
CO-04	FG1	H2 STORAGE AND DISTRIBUTION	Production & supply	Methanol as hydrogen carrier
CO-05	FG1	H2 STORAGE AND DISTRIBUTION	Digital platforms & knowledge sharing	Knowledge platforms and demonstrators
CO-06	FG1	H2 STORAGE AND DISTRIBUTION	Governance, strategy & coordination	Replication of European hydrogen initiatives
CO-07	FG1	H2 STORAGE AND DISTRIBUTION	Maritime mobility & port operations	Maritime hydrogen logistics
CO-08	FG2	H2 PRODUCTION	Governance, strategy & coordination	Interregional hydrogen partnerships
CO-09	FG2	H2 PRODUCTION	Maritime mobility & port operations	Dual-fuel and hydrogen maritime fleets
CO-10	FG2	H2 PRODUCTION	Digital platforms & knowledge sharing	Green hydrogen feasibility studies
CO-11	FG2	H2 PRODUCTION	Governance, strategy & coordination	Hydrogen production pathways coordination
CO-12	FG2	H2 PRODUCTION	Digital platforms & knowledge sharing	Atlantic hydrogen marketplace
CO-13	FG2	H2 PRODUCTION	Infrastructure & hubs	Atlantic hydrogen hubs and valleys
CO-14	FG2	H2 PRODUCTION	Logistics & corridors	Regional hydrogen supply chains
CO-15	FG2	H2 PRODUCTION	Production & supply	Local green hydrogen production
CO-16	FG2	H2 PRODUCTION	Logistics & corridors	H2Med corridor extension
CO-17	FG3	H2 STRATEGY IN PORTS	Infrastructure & hubs	Atlantic green hydrogen ports corridor
CO-18	FG3	H2 STRATEGY IN PORTS	Governance, strategy & coordination	Hydrogen governance frameworks
CO-19	FG3	H2 STRATEGY IN PORTS	Maritime mobility & port operations	Maritime hydrogen refuelling networks
CO-20	FG3	H2 STRATEGY IN PORTS	Maritime mobility & port operations	Hydrogen-powered port fleets
CO-21	FG3	H2 STRATEGY IN PORTS	Infrastructure & hubs	Port-scale hydrogen generation & storage
CO-22	FG3	H2 STRATEGY IN PORTS	Maritime mobility & port operations	Clean energy marine hubs
CO-23	FG3	H2 STRATEGY IN PORTS	Digital platforms & knowledge sharing	Digital collaboration platform

Figure 12. Extract of the internal collaboration identification matrix used as the verification source for the project KPI on collaboration opportunities.

These results feed directly into HYDEA's Community-level targets (network consolidation and collaboration pipeline), as defined in the FGs methodology and coordination materials.

2.3 Drafting of minutes of the coordination meetings held within the HYDEA Community

Throughout 2025, the Port Authority of Vigo has continued to lead the coordination of the HYDEA Community's activities, ensuring the proper organisation, follow-up, and documentation of all meetings held in the framework of the FGs and Community governance.

A structured documentation process has been maintained to guarantee the traceability of actions, transparency in decision-making, and effective monitoring of project progress in line with the objectives established in Work Package 3 – *Capitalisation of Results*.

2.3.1 Objective and scope of the coordination meetings

The coordination meetings were convened with the primary purpose of ensuring:

- Alignment of methodologies and schedules across the six FGs;
- Monitoring of indicators, particularly those related to the expansion of the HYDEA Community and the identification of collaboration opportunities;
- Exchange of experiences between FG coordinators, enabling shared learning and harmonisation of approaches

These meetings served as a management and technical forum where coordinators reviewed progress, discussed methodological adjustments, and ensured the coherent development of all community activities.

2.3.2 Documentation and drafting of minutes

To guarantee consistent and comparable documentation across meetings, APVIGO established a common structure for the preparation of minutes, which included:

- Meeting identification details: date, time, format (online or in-person), organiser, and participants;
- Agenda and discussion points: structured around the project's key activities, including progress on each Focus Group, upcoming milestones, and coordination with communication actions;
- Summary of decisions and agreements: specifying responsibilities, deadlines, and follow-up actions;
- Annexes and supporting materials: presentations, attendance lists, updated schedules shared during the session and questionnaire links.

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This process ensured that all partners had a clear and updated record of the discussions and decisions taken, facilitating coherent implementation across all Focus Groups.

2.3.3 Impact on project management

The systematic drafting of minutes and related documentation has been essential to maintain a high level of coordination and accountability within the HYDEA Community.

It has enabled the APVIGO to monitor the overall progress of FG implementation, guarantee that deadlines were met and ensure that all partners had a shared understanding of decisions taken.

This documentation practice reinforces the governance of the Community and contributes directly to the quality assurance and evaluation mechanisms required by the Interreg Atlantic Area Programme.

2.4 Identification of collaboration opportunities among the members of the HYDEA Community

One of the key objectives of the HYDEA Community is to foster tangible cooperation among its members, facilitating the identification of collaboration opportunities related to hydrogen technologies and the decarbonisation of Atlantic ports.

In 2025, significant progress was achieved in this regard through the activities of the three Focus Groups (FG1–FG3) and the continuous networking actions coordinated by the Port Authority of Vigo.

The collaboration opportunities presented in Sections 2.4.1.1 to 2.4.1.3 represent the concrete outcomes of the FG process carried out within the HYDEA Community. Each opportunity described below corresponds to a distinct collaboration opportunity identified through the thematic discussions of FG1, FG2 and FG3. Taken together, they constitute the basis for the project indicator on collaboration opportunities, which is quantitatively verified through the internal tracking matrix maintained by the partnership.

2.4.1 Collaboration opportunities identified in 2025

The collaboration opportunities identified through the Focus Groups address a wide range of strategic and operational dimensions related to the deployment of hydrogen in Atlantic ports, including infrastructure development, hydrogen production pathways, logistics and corridors, governance and regulatory alignment, maritime applications, and digital collaboration mechanisms.

In this context, FGs define the thematic scope of discussions, while thematic areas are used as a transversal classification to structure and analyse the identified collaboration opportunities.

For analytical purposes, these collaboration opportunities have been structured into six thematic areas: infrastructure and hubs; production and supply; logistics and corridors; governance, strategy and coordination; digital platforms and knowledge sharing; and maritime mobility and port operations. Based on the results of FG1 (Hydrogen Storage & Distribution), FG2 (Hydrogen Production) and FG3 (Hydrogen Strategy in Ports), a total of 23 distinct collaboration opportunities were identified and are presented below.

2.4.1.1 From FG1 – Hydrogen Storage & Distribution

1. **Geological and underground storage:** Launch of a *Hydrogen Geological Storage Demonstrator* and assessment of shared underground storage sites near ports, interconnected through pipelines or railways.
2. **Atlantic hydrogen corridors and pipelines:** Development of an *Atlantic Hydrogen Corridor* connecting renewable hubs and port terminals (Portugal, Spain, France) via dedicated hydrogen transport networks for gaseous and liquefied H₂.
3. **Port integration and shared infrastructure:** Implementation of the *H₂PortHub* model integrating offshore renewables with port-based production and shared distribution infrastructure across Iberian and French ports.
4. **Methanol as a hydrogen carrier:** Creation of a *Green Methanol Storage & Distribution Network* (Leixões, Vigo, Brest) focusing on CO₂ capture, safety, and logistics.
5. **Knowledge sharing and demonstration:** Establishment of a showcase platform to connect projects, suppliers, and technologies, including the potential adaptation of existing projects (e.g., OPHARM2) as demonstrators.
6. **Industry-led initiatives and best practices:** Reference and replication of large-scale European initiatives such as *North2* and *Rh2Ine*, adapting their models to the Atlantic context.
7. **Maritime-focused collaboration:** Joint *Short Sea Shipping & Port Cooperation* initiative to develop export/import, storage, and distribution channels for hydrogen-based maritime transport and industry.

2.4.1.2 From FG2 – Hydrogen Production

1. **Advancement of the North2 initiative:** Strengthening interregional partnerships to scale hydrogen production and integrate port-based applications.
2. **Maritime operations using dual-fuel technologies:** Development of pilot fleets using hydrogen and dual-fuel combustion to decarbonise shipping across the Atlantic.
3. **Pilot case studies for green hydrogen feasibility:** Demonstration projects to validate the technical and economic viability of green hydrogen solutions across industries.
4. **Strategic collaboration on hydrogen production pathways:** Joint decision-making platforms to coordinate approaches to renewable-powered electrolysis, pink hydrogen, and technology priorities.
5. **Atlantic marketplace platform:** Creation of a digital network connecting project developers and technology providers to identify demonstration and investment opportunities.

6. **Atlantic hydrogen hub/valley:** Promotion of an integrated hydrogen valley connecting major ports (Sines, Algeciras, Huelva, Vigo, A Coruña) to aggregate infrastructure and demand.
7. **Regional hydrogen supply chain:** Development of a coordinated hydrogen logistics system linking industrial users and producers in Atlantic ports to form an integrated regional market.
8. **Implementation of local green hydrogen production facilities:** Deployment of hydrogen generation plants across multiple Atlantic ports working synergistically towards a unified import/export strategy.
9. **Extension of the H₂Med Corridor:** Strengthening interconnections between Iberian and Northwestern European hydrogen networks as complementary infrastructure to support Atlantic Area competitiveness.

2.4.1.3 From FG3 – Hydrogen in Ports

1. **Atlantic Green Hydrogen Ports Corridor (AGHPC):** Joint initiative connecting key Atlantic ports through shared hydrogen production, storage, and bunkering infrastructure. This collaboration would promote interoperable refuelling systems, common safety standards, and the use of digital tools to monitor emissions reductions and operational performance across ports.
2. **Atlantic Hydrogen Governance & Deployment Corridor (AHGDC):** Establishment of a multilevel collaboration framework linking port authorities, energy operators, research institutions, and regulatory bodies to harmonise safety, certification, and licensing standards for hydrogen deployment across the Atlantic Area.
3. **Network of maritime H₂ stations and hydrogen-powered vessels:** Development of a coordinated network of maritime hydrogen refuelling stations, combined with demonstration projects for short-sea shipping and port service vessels, supporting the transition to zero-emission maritime transport.
4. **Pilot projects for port operations fleets:** Deployment of hydrogen propulsion and energy systems to replace diesel in port machinery, trucks, and auxiliary vessels, contributing to the decarbonisation of port logistics and daily operations.
5. **Port-scale hydrogen generation and storage pilots:** Implementation of modular, scalable, and replicable hydrogen production and storage units within ports, designed to supply daily port activities and facilitate replication across different Atlantic ports.
6. **Atlantic clean energy marine hubs:** Creation of integrated bunkering and refuelling nodes for hydrogen and other low-carbon and renewable fuels, acting as strategic connection points between Atlantic hydrogen corridors and maritime transport routes.
7. **Digital collaboration platform for hydrogen stakeholders:** Development of an online platform to facilitate communication, knowledge sharing, and partnership building among ports, industry actors, research institutions, and policymakers involved in hydrogen deployment.

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Figure 144. Extract of the HYDEA Community participant register .

2.4.2 Overall results achieved in 2025

The progress made during 2025 reflects the consolidation of the HYDEA Community as an active and dynamic cooperation platform.

Through the three Focus Groups implemented during the year, the Community has achieved tangible and measurable outcomes aligned with its strategic indicators:

- A total of **93 participants** is now officially registered through the HYDEA Community web platform, representing a diverse network of stakeholders from the public, private, and academic sectors across Spain, Portugal, France, and Ireland. This result demonstrates that the Community has practically reached the quantitative objective defined in the project indicators, with further growth expected in the next implementation period.
- **23 collaboration opportunities** have been identified and validated, exceeding the initial project target of 15. These initiatives span the entire hydrogen value chain, from production and storage to distribution, logistics, and port integration.

This progress demonstrates the growing engagement and maturity of the HYDEA Community. The expansion of its network and the establishment of concrete collaboration opportunities provide a strong foundation for future actions planned in 2026, including the continuation of the FGs and the identification of additional collaboration opportunities within the HYDEA Community.

3 Conclusion

The work carried out during 2025 within the framework of the HYDEA Community represents a significant step forward in the consolidation of a structured and effective collaboration process for the development of hydrogen in the ports of the Atlantic Area.

Building upon the foundations established in 2024, this period has been marked by the implementation of the first three FGs, which have provided tangible results and valuable insights into the technological, economic, and regulatory dimensions of the hydrogen value chain.

In continuity with the activities carried out in 2025, the work planned for 2026 will focus on the organisation of the remaining Focus Groups addressing hydrogen uses, namely marine mobility, transport and infrastructure, and hydrogen final industrial and other end-uses, with the objective of identifying additional collaboration opportunities within the HYDEA Community.

The activities implemented have made it possible to:

- Strengthen the operational framework of the HYDEA Community through the successful execution of three thematic FGs, ensuring coverage of key strategic areas (storage and distribution, production and port strategy);
- Consolidate the use of the adapted Delphi methodology, establishing a structured and participatory approach that facilitates expert consensus and the generation of actionable recommendations;
- Enhance coordination and monitoring mechanisms, enabling the systematic follow-up of activities, indicators, and collaboration results;
- Achieve measurable impact, with 93 registered participants on the HYDEA Community web platform and 23 collaboration opportunities identified among members, surpassing the project's initial target;
- Promote transnational cooperation across Spain, Portugal, France, and Ireland, reinforcing the Atlantic Area's capacity to develop joint hydrogen strategies and collaboration opportunities.

These achievements confirm that the HYDEA Community has evolved from a conceptual network into an operational cooperation platform, capable of connecting stakeholders, generating knowledge, and catalysing collaborative projects across the Atlantic hydrogen ecosystem.

The progress made during 2025 lays a solid foundation for the next phase of work in 2026, which will focus on the continuation of the remaining Focus Groups, and the consolidation of the portfolio of collaboration opportunities identified through the HYDEA Community.

The deliverable therefore reflects not only the consolidation of the HYDEA Community's structure and methodology but also its growing role as a reference network for innovation and decarbonisation in Atlantic ports, contributing directly to the objectives of the Interreg Atlantic Area Programme and the European hydrogen transition agenda.

4 Annexes

The annexes listed below are referenced for completeness. Their detailed content, including meeting minutes, attendance lists, the complete list of HYDEA Community participants and the full collaboration identification matrix, is not included in this public version of the deliverable. This supporting documentation has been submitted separately through the project's reporting and justification platform and is maintained internally by the partnership in accordance with applicable data protection regulations.

- 4.1 Minutes of the first FG1 meeting**
- 4.2 Minutes of the second FG1 meeting**
- 4.3 Minutes of the first FG2 meeting**
- 4.4 Minutes of the second FG2 meeting**
- 4.5 Minutes of the first FG3 meeting**
- 4.6 Minutes of the second FG3 meeting**
- 4.7 List of HYDEA Community participants**
- 4.8 List of HYDEA Community collaborations opportunities**

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