AeH2
SPANISH HYDROGEN ASSOCIATION

CENSUS of PROJECTS ANALYSIS

AeH2 2026



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Global Analysis

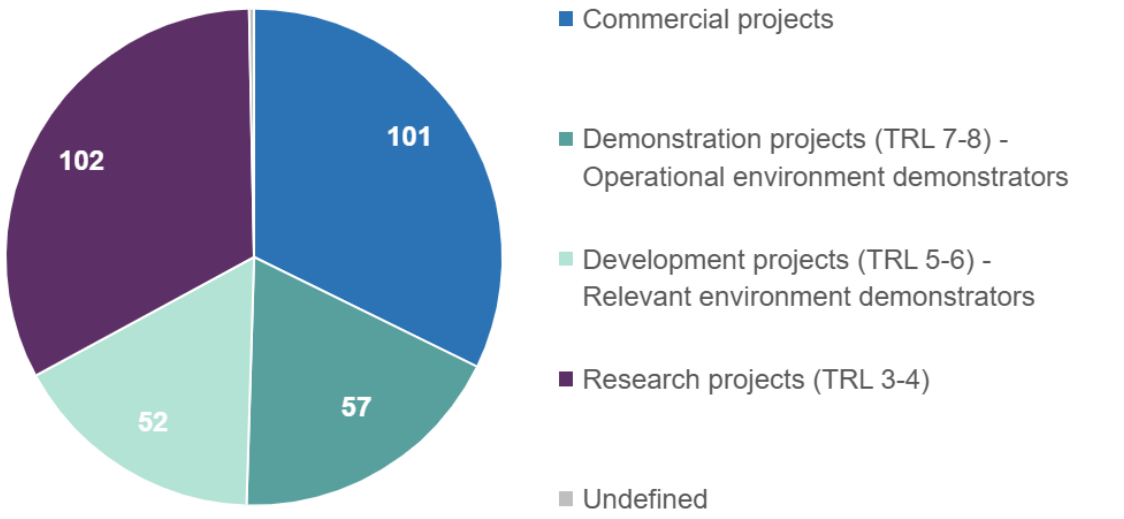
The information presented in this document has been compiled from data provided by AeH2 members regarding the projects they are developing, as part of the 2026 update of the AeH2 Project Census.

Before proceeding with the analysis, it is important to note that, in this fourth edition of the Census members have once again been offered, through the data collection form, the option to include information marked as "confidential". Such data is not displayed on the Interactive Map available on the website, but has been reviewed, processed, and aggregated by AeH2's Technical Department in the analyses carried out, always ensuring the confidentiality of the information provided by the members.

The 2026 update of the AeH2 Project Census has recorded **312 projects**, with the participation of **67 AeH2 members**.

To keep the Interactive Map up to date, displaying only projects that are ongoing or have been completed during the current year, research and demonstration projects completed before 1 January 2026, have been removed from the map and included in Annex II of this report.

The Census covers research projects (TRL 3–4), demonstration projects in relevant environments (TRL 5–6), demonstration projects in real-world environments (TRL 7–8), and commercial projects. The distribution of projects registered in the 2026 Census by TRL range is as follows:



NOTE: *In those cases where a project indicates multiple TRL ranges, the higher level is taken as the reference for the analysis. This may occur, for example, when a project evolves from an initial level of technological maturity toward a more advanced one, or when it combines a mature technology with an innovative component still under development.*

The **total budget or estimated overall investment** reported by the projects in the 2026 Census **exceeds €25,000 million,** of which, to date**, more than €3,000 million comes from public funding**. The split between private investment and public funding varies considerably depending on the TRL range, and it will therefore also be analysed separately in the following sections.

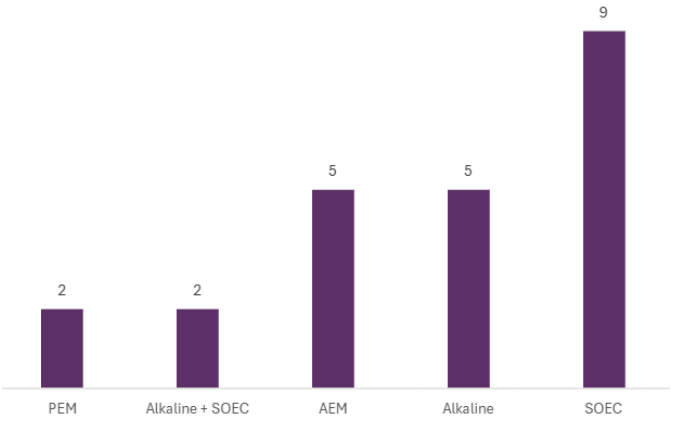
Research projects (TRL 3-4)

This section provides a detailed analysis of the **124 research projects** submitted by 24 AeH2 members, including research and technology centers, foundations, universities, and companies engaged in low-TRL R&D activities.

This demonstrates the strong technological development capacity and high research potential, as well as the diversity of entities in Spain focused on these strategic technologies.

The most frequently researched step of the value chain is hydrogen production, with a total of 37 projects, 28 of which focus exclusively on production; the remaining projects combine production with other steps of the value chain. Notably, there is significant joint research on production and use, with 12 projects (this could be, for example, research on materials or processes applicable to both electrolysers and fuel cells).

Among the research projects dedicated to hydrogen production, those focused on electrolysis stand out (innovative materials, alternative treatments, and the use of seawater or wastewater, among others). A total of 23 projects focus on this production method, covering all four electrolysis technologies, with solid oxide (SOEC) standing out with 9 active projects.

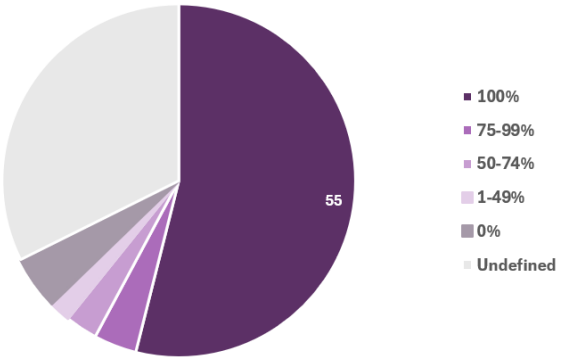


NOTE: Several production projects do not specify the technology or mark that information as confidential.

Projects investigating other hydrogen production technologies have also been registered, such as steam reforming, biological production, gasification or photoelectrolysis.

The next most researched link in the value chain is hydrogen uses, with a total of 23 projects reporting activity in this area (14 of them exclusively, and the rest in joint research with other links in the value chain). The applications investigated are highly varied, with industrial uses (10), the production of derivatives (8) and mobility (7) standing out. Other projects also investigate portable applications or the residential use of hydrogen. Several of these projects cover more than one use.

The total investment reported by these research projects amounts to more than €125 million, with a high proportion of public funding (more than €90 million). Of the 102 projects, 62 receive public funding covering at least 50% of their budget (55 of them being beneficiaries of a grant covering 100%). This is indicative of the Administration's commitment to R&D in hydrogen technologies.



Number of research projects by percentage of public funding received.

Funding Entity	Number of projects	Finance (M€)
Ministry of Science, Innovation and Universities / ***AEI (State Investigation Agency)***	24	5,4
Ministry of Science, Innovation and Universities / ***CDTI***	4	11,2
Clean Hydrogen Partnership	21	50,5
IDAE	6	6,5
Others	40	>18

Looking at the origin of the funding, the Ministry of Science, Innovation and Universities has mobilised the largest amount of investment, through various bodies and funding lines. The State Research Agency (AEI) has funded a large number of projects, although these are comparatively smaller in terms of total investment, while the largest projects receive their grants from the Centre for Technological Development and Innovation (CDTI). European funds from the Clean Hydrogen Partnership (CHP) also stand out. In addition, funds dedicated to low-TRL research by the autonomous communities are significant, such as the Basque Country through the Hazitek and Elkartek programmes, Catalonia, Extremadura, the Valencian Community, the Community of Madrid and the Chartered Community of Navarre.

Demonstrator projects (TRL 5-8)

In this new edition of the AeH2 Census of Projects, 109 demonstration projects have been registered. 52 of them test the technology in a relevant environment (for example, pilot plants simulating real operating conditions), while the other 57 do so in their operational environment. These projects have been submitted by 37 AeH2 members, 55 demonstrator projects have been registered by research centers and universities (16 entities) and 54 from companies (21 entities).

In this TRL range, we observe many demonstration projects already in operation (49) and under construction (30). Most demonstrator projects focus on hydrogen uses (being the most explored step of the value for this TRL range), with 36 projects dedicated exclusively to this area. Another 39 projects involve joint demonstrations of hydrogen use along with at least one other step of the hydrogen value chain, such as production or storage.

	Number of projects		Number of projects		Number of projects		Number of projects
Industrial	14	**Producción derivados**	13	**Mobility**	18	**Residential Uses**	8
Process Heat	7	*Ammonia*	10	*FCEVs*	7		
Power to Power	4	*Methanol*	3	*Buses/Trucks*	8		
Steel	4	*eSAF*	1	*Ships*	6		
*Others**	7	*Methane*	1	*Aircraft*	3		
				Train	2		

** Other industrial uses include use in the ceramics, cement, aluminum and glass industries, among others.*
NOTE: *several demonstrator projects have more than one application (within the same or different sectors).*

Demonstrator projects for hydrogen production technologies come next: 15 focus exclusively on production, while a further 33 also encompass other stages of the value chain, principally storage and end uses. Most of these projects concentrate on alkaline electrolysis (12) and proton exchange membrane (PEM) electrolysis (8). Demonstrators have also been identified for anion exchange membrane (AEM) technology (4 currently operational, with a further 2 due to be commissioned within the next three years) and for solid oxide electrolysis (SOEC; 2 operational, with a further 4 scheduled for commissioning within the same period). As these are primarily demonstration initiatives, their electrolysis capacity is generally modest, although a number reach several MW.

On the other hand, 7 demonstrator projects have been registered for production technologies that are alternatives to electrolysis, such as steam reforming, autothermal reforming, gasification and methane pyrolysis, using a variety of feedstocks including biomass, biogas and forestry residues.

This level of technological maturity includes the "H2Med" and "Hydrogen Backbone Network" (*Red Troncal de Hidrógeno*) projects, given their first-of-a-kind nature; their total estimated budget exceeds €6,000 million. It is worth noting here that the Ministry for the Ecological Transition and the Demographic Challenge (MITERD) has recently begun processing the first segments of the Hydrogen Backbone Network, representing an investment of €389 million. The first sections are:

- **Huelva–Aznalcázar**: 59 km in length, with an investment of €95.7 million.
- **Caspe–Tivissa:** 75 km in length, with an investment of €98.6 million.
- **Tivissa–Tarragona Industrial Estate:** 62 km in length, with an investment of €126.5 million.
- **Muskiz–Arrigorriaga:** 38 km in length, with an investment of €68 million.

In the second list of PCI projects, the European Commission has confirmed the inclusion of the **Alcázar de San Juan–Montesa** section—approximately 275 km in length—as a PCI project within the overall current backbone network.

Additionally, in Spain, work continues on the long-term projects to extend the hydrogen backbone network, with its expansion to **Galicia, the Andalusian Hydrogen Valley down to Algeciras**, the meshing of the **Transverse Axis in Castilla-La Mancha**, and the northern closure linking the Vía de la Plata with the Ebro Valley via the interconnection from **Zamora to Haro**. To date, all these projects have been submitted as candidates for the third list of hydrogen PCI projects.

"CYLH2VALLEY" is also included in this TRL range, with an approximate budget of more than €400 million (considering all of the projects developed within the framework of this Valley).

If we exclude these three projects, whose budget is considerably higher than the average for the rest of the demonstrators, the estimated budget for this category approaches €310M, with public funding of over €250M.

Funding Entity	Number of projects	Finance (M€)
Ministry of Science, Innovation and Universities/**AEI (State Investigation Agency)**	12	12,38
Ministry of Science, Innovation and Universities/ **CDTI**	8	14,83
Clean Hydrogen Partnership	10	36,06
IDAE (Institute for the Diversification and Saving of Energy)	**16**	**53,79**
Others	39	140,94

In this case, we observe that the funding sources for the demonstrator projects are very diverse, although we can indeed distinguish between four predominant entities. Among them, the Centre for the Development of Technology and Innovation (CDTI) stands out, with its "Missions" programme being particularly relevant. The Institute for Energy Diversification and Saving (IDAE) is also prominent, with its Value Chain programme across its various calls.

Some Autonomous Communities included under "Others", such as Catalonia, the Foral Community of Navarre, and the Valencian Community, have subsidised hydrogen technology demonstrator projects through various regional grants.

Commercial Projects

A total of **101 commercial projects** have been registered, submitted by **32 members** to the AeH2 2026 Project Census.

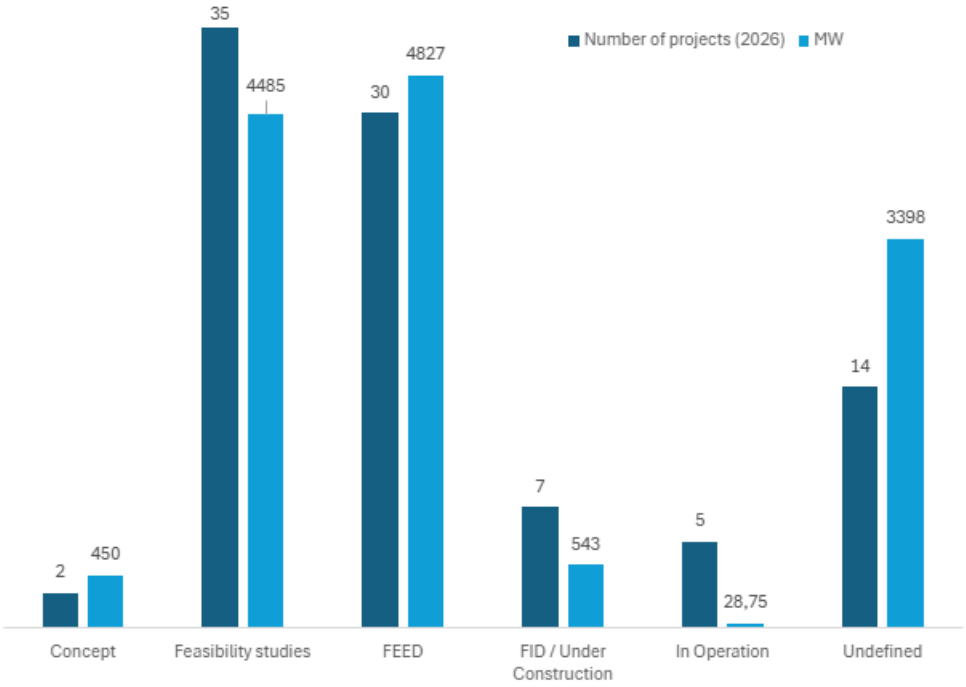
Almost all of these projects include hydrogen production via electrolysis, and many of them combine it with other steps of the value chain (such as storage, transport/distribution, or end use of hydrogen). A total of 53 projects jointly address both hydrogen production and use, these are either “integrated projects” in which production and use occur at the same site, or “hydrogen valley” projects, where production and use are in close proximity.

***NOTE**: The 2026 Project Census includes a small group of commercial projects without associated electrolysis capacity (8). To facilitate comparison among projects of the same type, the charts and conclusions presented below consider only commercial projects with registered electrolysis capacity.*

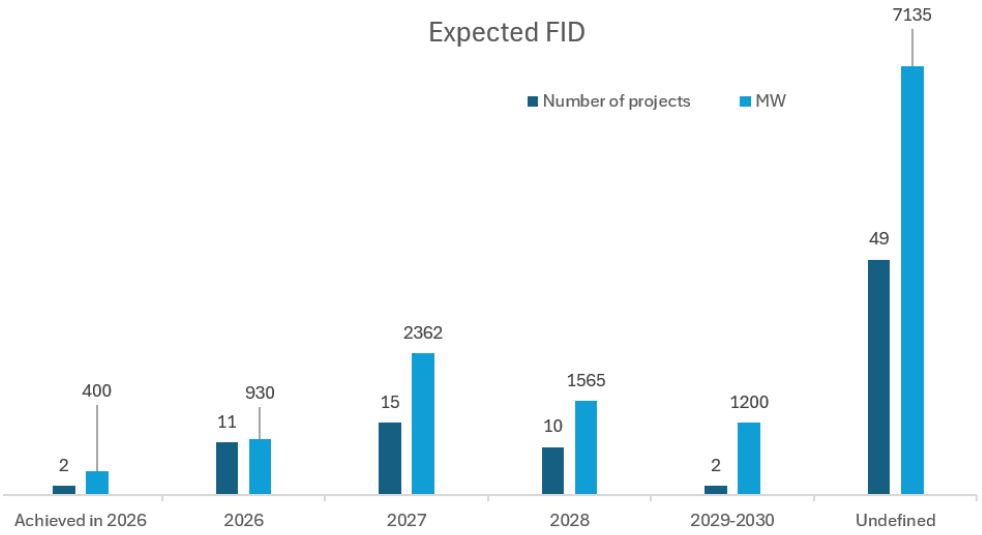
If fully implemented, these projects would amount to up to 13,7 GW of installed electrolysis capacity and an estimated annual hydrogen production of 1.4 million tonnes.

However, we must bear in mind that a large number of these projects—approximately 55%—are in the preliminary stages of their development (concept, feasibility study, or undefined). The chart shows that a significant number of projects have progressed to the FEED stage (Front-End Engineering Design, which corresponds to extended basic engineering or preliminary design), accounting for around 32%.

In this phase, key aspects of the project are finalised, equipment suppliers are identified, negotiations with off-takers continue with the aim of securing purchase commitments, construction phases and associated timelines are defined, and costs are refined. This is a critical stage prior to taking the FID (Final Investment Decision) and developing detailed engineering. Finally, it can be seen that commercial-scale projects are already in operation, while others have passed the FID and initiated the construction phase, making up the remaining 13%.



This indicates that while there is a strong appetite and interest within the sector for developing commercial projects, these will take some time, as most of the proposed projects are still in the preliminary stages of development. To enable them to be developed properly, it will be necessary to eliminate or reduce the barriers currently being experienced by project developers that are hindering their implementation (see Annex I).



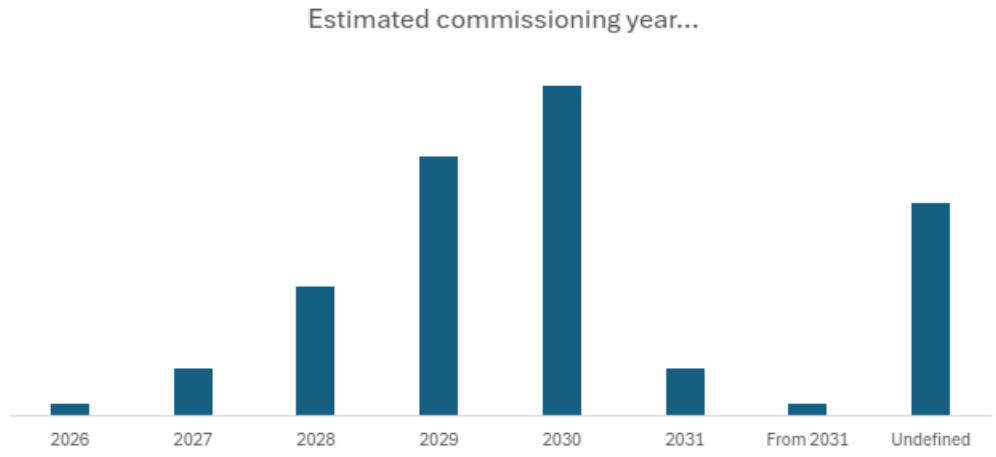
NOTE: Projects that had already reached FID in 2025 or earlier are not reflected in this chart.

So far this year, two projects with a combined capacity of 400 MW have already reached FID, while the rest continue to progress towards this stage. In particular, 11 projects, which would total 930 MW of installed electrolysis capacity, have expressed their interest in reaching FID in the coming months, a milestone that will largely depend on regulatory and legislative progress during this period.

On the other hand, the chart suggests that 2027 could be an especially significant year in terms of projects scheduled to reach FID and their associated electrolysis capacity. Specifically, 15 projects with a combined electrolysis capacity of 2,362 MW are expected to reach this milestone.

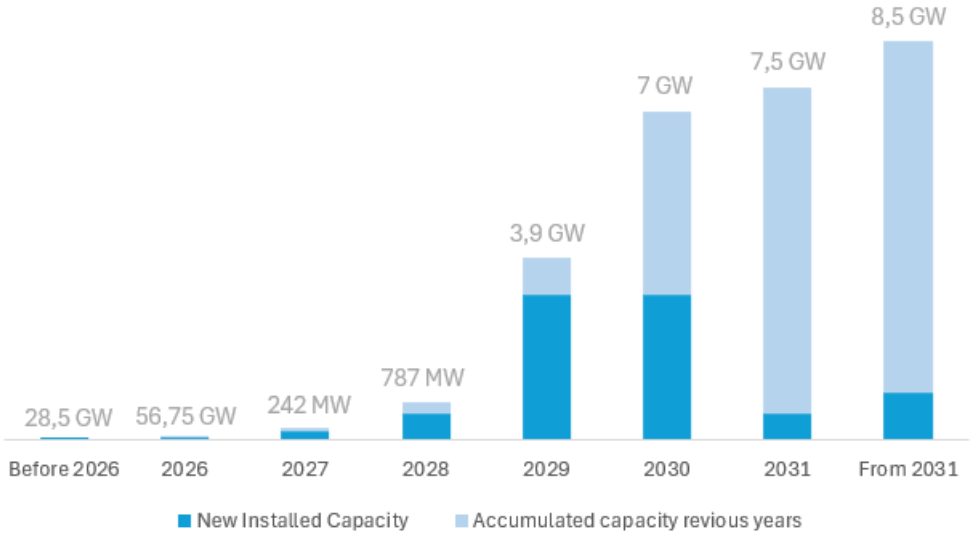
Many other projects (49, equivalent to around 7 GW of installed electrolysis capacity) do not indicate their expected FID date, either because it is not known with exactitude or due to the highly sensitive nature of this data.

Developers estimate that it takes between 1 and 4 years to construct the projects (from FID to commissioning). This estimate varies considerably depending on the type and scale of the project.



According to the data provided by the members, one new project is expected to come into operation throughout 2026, and a further 15 are expected to do so during 2027 and 2028. By 2030, a total of 70 projects would have been commissioned, also taking into account those already currently in operation.

Translating this timeline for the expected commissioning of the projects into installed electrolysis capacity, we would obtain the following chart:



NOTE: *The remaining projects, up to a total of 13,7 GW of installed electrolysis capacity, have not indicated their estimated commissioning date.*

The chart shows that the cumulative electrolysis capacity of the projects included in the Census, which members expect to commission by 2030 or earlier, no longer exceeds the ambitious 12 GW target set out in the 2024 update of the National Energy and Climate Plan (NECP), submitted to the European Commission in 2024. The 7 GW of electrolysis capacity projected for 2030 in the chart, based on our members' forecasts, falls midway between the 4 GW target set out in the Hydrogen Roadmap, published in 2020, and the 12 GW target established in the updated NECP. To maximise the electrolysis capacity that can be installed, urgent action will be essential to reduce or remove the barriers currently identified by project developers. These barriers are set out in Annex I.

	Number of projects	MW of electrolysis
Only renewable with direct connection	1	25
Only renewable PPA	17	2024
Renewable with direct connection + renewable PPA	**45**	**4455**
Renewable with direct connection + Grid connection (mixed)	1	500
Others	9	3070

The Census also gathers information on the electricity sourcing strategy for operating the electrolyzers. In this case, both in terms of number of projects and associated MW, the preferred option is the development of renewables directly connected to the plant, complemented by renewable PPAs (Power Purchase Agreements) to increase the number of operating hours of the equipment.

Project developers were also asked whether they planned to deploy renewable energy generation capacity in connection with their projects and, if so, the anticipated capacity in MW and the type of renewable energy technology to be used. According to the responses received, 43 projects plan to deploy solar photovoltaic capacity only, one project plans to develop wind power capacity exclusively, and a further eight projects intend to deploy both wind and solar photovoltaic generation facilities to meet their electricity needs. Based on the aggregate estimates provided by the developers of these projects, the associated renewable energy capacity could reach 1.1 GW of wind power and up to 10.4 GW of solar photovoltaic capacity.

However, as highlighted throughout this report, it is important to bear in mind that a significant proportion of these projects are still at an early stage of development. If only projects that have reached the Front-End Engineering Design (FEED) stage or have even achieved a Final Investment Decision (FID) are considered, the associated renewable energy capacity would amount to more than 900 MW of wind power and 2.6 GW of solar photovoltaic capacity.

In addition, a total of 36 projects indicate that they plan to incorporate batteries, which would provide a total storage capacity of 9.6 GWh.

Regarding the electrolysis technology that these projects expect to use, alkaline electrolysis stands out in terms of associated MW and PEM technology in terms of number of projects. Other projects propose combining several electrolysis technologies and many others have not yet defined the technology they will use, as they are at preliminary stages and are working with engineering firms to determine the most suitable configuration for their project.

	Number of projects	MW of electrolysis
Only Alkaline	26	4290
Only PEM	39	2099
Alkaline, PEM, SOEC	5	2910

A total of 20 projects include hydrogen storage systems in tanks (such as compressed gas) associated with the project. Both the storage capacity, in tonnes, and the storage pressure, in bar, vary depending on the type of project.

	Number of Projects	MW electrólisis
Only via a hydrogen pipeline	9	1977
Only *blending*	5	1440
Combined Solutions*	11	3082

** Includes both combinations of the above and combinations with liquid hydrogen, liquid carriers and/or injection into the gas grid following methanation.*

With regard to hydrogen transport and distribution, most projects have yet to define this aspect, as they are still at preliminary stages, awaiting regulatory developments and infrastructure deployment before assessing the optimal transport model for their project.

Several projects that had planned to use *blending* as their only means of transporting hydrogen are being affected by the regulatory uncertainty introduced by the possible revision of *Implementing Regulation 2022/996* by the European Commission. This announcement proposes to state explicitly that the *blending* of hydrogen into the natural gas grid, without physical separation of the hydrogen at destination (*deblending*), would not count towards the RFNBO targets, which would mean that this hydrogen could not receive Guarantees of Origin (GoOs) or Proofs of Sustainability (PoS). If this were included in the text of IR 2022/996, it would become mandatory from its approval and would formalise what the Commission put forward in the *"Guidelines on the targets for the consumption of renewable fuels of non-biological origin in the industry and transport sectors established in Articles 22a, 22b and 25 of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413"* published in 2024.

Furthermore, analysing the infrastructure deployment associated with commercial projects, a total of 46 projects plan to deploy dedicated hydrogen pipelines as part of the project. In some cases, these pipelines would be used to connect their production site with their point of consumption on a private basis, while other projects plan to deploy pipelines to connect their production with the hydrogen backbone network or with the natural gas grid (*blending*). Most of these projects are still assessing the number of kilometres required; however, those that have already provided estimates at this stage of data collection would involve the deployment of more than 400 km of new pipelines.

In parallel, a further 12 hydrogen production projects plan to deploy hydrogen refuelling stations (HRS - *Hydrogen Refuelling Station*) associated with their facilities. To these must be added those refuelling stations with no associated electrolysis capacity. Taking both types of facility into account, a total of more than 80 HRS are planned by 2030.

This deployment would put Spain in line, at least in terms of the number of hydrogen refuelling stations, with the requirements set out in Regulation (EU) 2023/1804, known as AFIR (*Alternative Fuels Infrastructure Regulation*).

Specifically, the Regulation establishes that Member States must ensure minimum coverage of refuelling infrastructure for alternative fuels. In Spain's case, this translates into the need to have, by 31 December 2030 at the latest, at least 78 publicly accessible hydrogen refuelling stations, with a supply capacity of at least one tonne of hydrogen per day and at least one dispenser at 700 bar. These stations must be distributed so that the distance between them does not exceed 200 km along the TEN-T core network and must also be available in every urban node. It is in the AFIR requirements that the compliance problem would lie since, as the draft National Policy

Framework (NPF) for the deployment of alternative fuels infrastructure shows, none of the HRS currently in service in Spain would meet all the requirements.

In addition, it is important to accompany the deployment of refuelling infrastructure with measures that promote the uptake of vehicles that use it, as well as mechanisms that incentivise these hydrogen refuelling stations to be supplied with renewable hydrogen.

Analysing the uses proposed by these commercial projects, it is most common for them to diversify the end uses of the hydrogen they plan to produce and to have a broad portfolio of potential applications or consumer sectors for their product. Furthermore, the data collected do not indicate the weight of each end use in the MW of electrolysis installed per project, which makes it difficult to draw conclusions on the uses of hydrogen in these commercial projects.

Projects with a single expected use/application	Number of projects	MW electrólisis
Industrial, refineries	2	75
Mobility, buses/trucks	20	607
Derivatives production, ammonia	6	977
Producción de derivados, eSAF	4	1225
Derivatives production, methanol	9	1470

However, some projects have also been registered that indicate a single use/application for the hydrogen produced. In this case, the end use that stands out by number of projects is mobility for buses/trucks, although these are comparatively smaller projects than those proposed to produce derivatives, which have a high electrolysis capacity associated with each project.

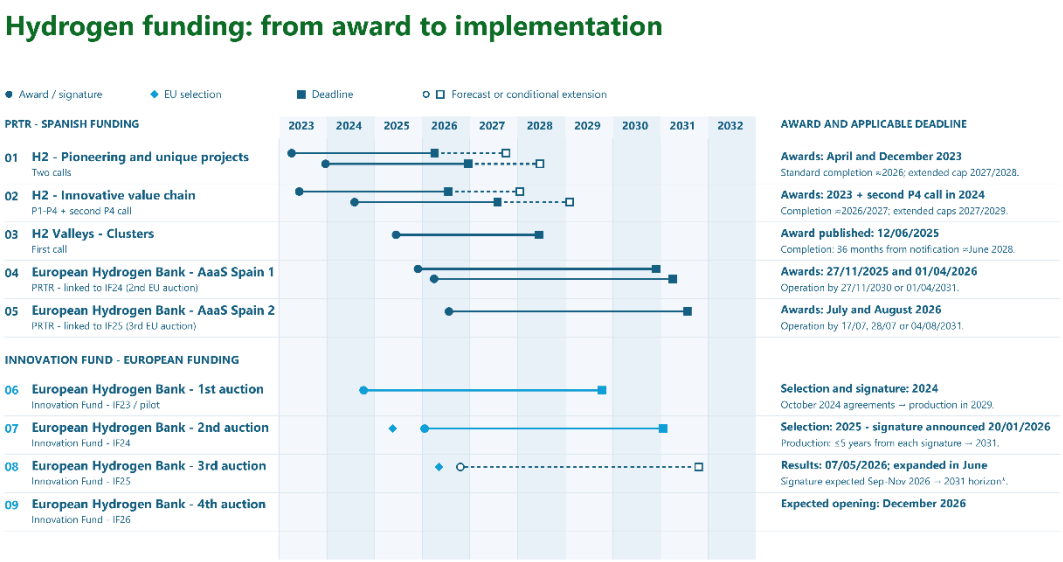
Developers of commercial projects have also provided information on estimated job creation (direct and indirect) at present and in 2030. All the projects that provide employment data at present are either under construction or at FEED (a stage at which considerable resources are devoted to project development), and the sum of their estimates comes to approximately 750 direct jobs (and a similar number of indirect jobs).

Looking ahead to 2030, a total of 40 projects have provided employment estimates (including projects currently at preliminary stages of development), amounting to close to 10,000 direct jobs (and another 10,000 indirect jobs). By 2030 most of these projects expect to be in operation, so these jobs would correspond to the operation and maintenance of the projects and could be stable over the long term. Some projects indicate that their construction phase, planned for the coming years and before 2030, would also generate thousands of direct and indirect jobs, although these would be temporary and linked to the duration of that phase.

The 101 commercial projects would represent a total budget of more than €17,000 million, of which some €2,500 million would come from public funding to date. It is important to stress that, as indicated at the beginning of the section, most of these projects are at preliminary stages of development and may still refine their budget estimates.

In the case of commercial projects, the sources of this public funding are highly diverse and include: European funds (*CEF*, *Innovation Fund*, *IPCEI*, funds mobilised by the *Clean Hydrogen Partnership* and OPEX support from the European Hydrogen Bank) and national funds (notably the PpERTE funds, the IDAE Pioneros call, the European Hydrogen Bank Auction as a Service (AaaS) mechanism in its two calls and the IDAE Hydrogen Valleys Programme).

Several of the commercial projects in the Census are at decisive stages for obtaining the funds allocated to them or for justifying the funds they have already received, as shown in the following infographic:



* The 2031 time horizon for IF25 *is conditional on the signing of Grant Agreements in 2026.*
NOTE*: the data published by IDAE and the European Commission have been used to prepare this infographic. The calls associated with Component 9 and the addendum to the PRTR funds are shown as "Spanish funding" because they have been managed at national level by IDAE, although the origin of the funds is European (NextGenerationEU funds, channelled through the Recovery and Resilience Facility).*

The infographic above shows the timelines of the national support programmes, with the exception of the IPCEIs Hy2Tech, Hy2Use and Hy2Move, as well as the European programmes specific to hydrogen and its derivatives. These three IPCEIs present circumstances, as the aid is awarded through direct award procedures to the participating Spanish projects once they have been authorised at European level, and each initiative has its own timetable. Thus, European approval of Hy2Tech took place in July 2022, that of Hy2Use in September 2022 and that of Hy2Move in May 2024; however, the national regulation of the aid and its processing took place at later and differing dates. Consequently, their implementation and commissioning periods do not follow a uniform timeline that would allow them to be shown on the same basis as the rest of the programmes.

Most of the programmes shown have funded commercial projects, although some lines, such as Singular and Pioneering Projects and Value Chain, have also supported initiatives at earlier stages of technological development (lower TRLs).

Comparison with previous years

In 2026 there has been a decrease in the total number of projects recorded in the Census. This reduction is due, on the one hand, to the removal of research and demonstration projects that have already been completed (included in Annex II) and, on the other, to the withdrawal of certain commercial initiatives. In the latter case, the decrease is concentrated mainly in projects that were at early stages of development, in a context of economic and regulatory uncertainty that is shaping the evolution of the sector.

	2024	2025	2026
Commercial	167	145	101
Demonstrador (TRL 7-8) – demonstration in a real environment	50	61	57
Development (TRL 5-6) – demonstration in a relevant environment	55	64	52
Research (TRL 3-4)	80	124	102
Undefined	9	5	1
Total	**361**	**399**	**312**

Research Projects (TRL 3-4)

- In research projects there has been a net decrease of 22 projects, mainly due to the transfer of completed projects to Annex II.
- Hydrogen production remains the predominant line of research, with electrolysis projects standing out and, in particular, research into solid oxide technologies (SOEC).
- Public funding has remained at levels similar to those recorded in last year's Census, confirming the continuity of the support aimed at boosting hydrogen R&D at European, national and regional level. It is also observed that both the projects that have moved to Annex II and the new projects added to the Census generally show similar funding patterns, from the same bodies and for comparable amounts.

  NOTE: *not all the public funding comes from calls resolved in the last year. New projects that obtained funding in calls for support from previous years have been added to the 2026 Census..*

Demonstration Projects (TRL 5-8)

- In demonstrator projects there has been a net decrease of 16 projects, mainly due to the transfer to Annex II of completed projects, principally demonstrators in a relevant environment (TRL 5-6).
- Compared with the data recorded in the 2025 Census, there is a decrease in the number of demonstrator projects in operation, from 71 to 49, which also corresponds to demonstrators that have been completed and moved to Annex II. By contrast, the number of projects under construction has increased, from 22 to 30, and these are expected to enter operation in the coming years.
- Hydrogen use remains the most recurrent stage of the value chain in demonstrator projects.
- As in the case of research projects, public funding remains at levels similar to those recorded in the 2025 Census, with the departure of some projects to Annex II offset by the addition of new initiatives in the 2026 update. This trend confirms the interest in maintaining public investment, at European, national and regional level, in demonstrator projects, which are essential for advancing the maturity and validation of hydrogen technologies.

  NOTE: *not all of the public funding comes from calls resolved in the last year. New projects that obtained funding in calls for support from previous years have been added to the 2026 Census.*

Commercial Projects

- In the commercial projects segment there has been a net decrease of 44 projects, concentrated mainly at preliminary stages of development. This trend is consistent with the dynamics of a developing sector subject to constant technological, economic and regulatory change.

Electrolysis capacity		2024	2025	2026
In operation	MW	27,5	28,75	28,75
FID	MW	55	153	543
Cumulative 2030	GW	13,6	13,3	7
Total in Census	GW	23	20	13,7

- The table above shows some of the key values associated with the electrolysis capacity charts included in the different editions of the Census. Complementing this table with the charts in the Commercial projects section of this 2026 edition, we can observe that:Commercial Projects
    - No new project has entered operation to date, although one project, with a capacity of 25 MW, is expected to enter operation before the end of 2026.
    - Two projects have reached FID, adding a further 400 MW to the projects under construction.
    - At all the other project development stages there is a general decrease in both the number of projects and installed electrolysis capacity, as also in the projects that did not indicate their development stage (marked as “Undefined” in the charts).
    - Installed electrolysis capacity in 2030, based on the commissioning forecasts of the projects in the Census, has fallen below the ambitious target of 12 GW set in the PNIEC update submitted to the European Commission in 2024.

  Overall, this trend reflects the natural selection process that the sector is going through, in which the most mature projects with the best prospects continue to advance, although they remain heavily constrained by the barriers they face, which are detailed in Annex I.
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- The 2025 Census identified 52 projects, with a combined capacity of more than 6 GW, that expected to reach FID between the end of 2025 and during 2026. According to the 2026 Census update, two of these projects, with a combined capacity of 400 MW, have already reached this milestone, while another eleven, totalling 930 MW, still expect to do so before the end of 2026. In addition, projects with a capacity of 1.5 GW have postponed their FID relative to the date estimated in 2025 and the rest have been withdrawn from the Census.
- These delays in FID are also reflected in the charts of estimated commissioning dates. The main reasons for the delays in FID (and, consequently, in the estimated date of entry

into operation) and/or the cancellation of projects are set out in Annex I.**¡Error! No se encuentra el origen de la referencia.**

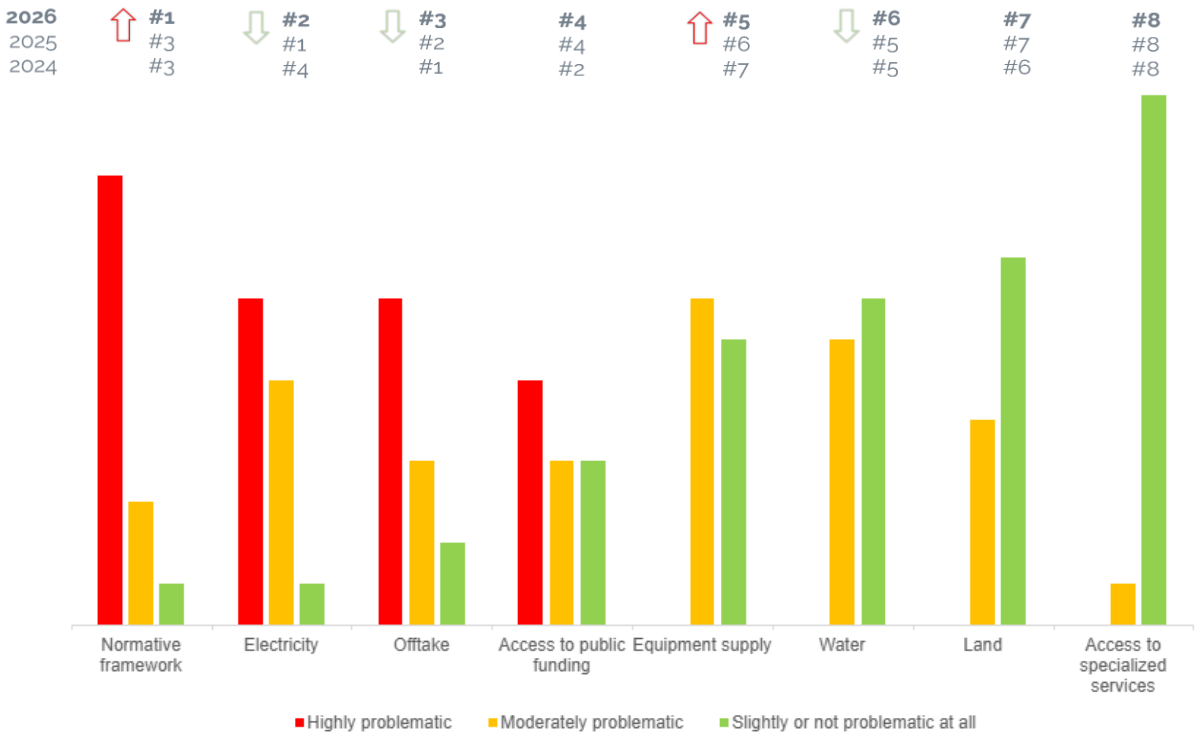
- Public funding for commercial renewable hydrogen projects has fallen slightly compared with the previous year, despite the arrival of new support not present in the previous report, such as the second call of the European Hydrogen Bank's Auction as a Service (AaaS). This is due to the difficulties that some projects funded in the first calls for commercial projects, such as Singular and Pioneering Projects or Value Chain, have had in materialising. It is therefore essential to resolve the obstacles that affect the viability of the funded projects (see Annex I), in order to ensure that public support translates into effective investment.**¡Error! No se encuentra el origen de la referencia.**
  It is also important to ensure continuity in the funding of commercial projects, now that all the PRTR funds have been awarded, which is necessary for the sector to reach its full potential and for us to meet decarbonisation targets.

Annex I - Barriers to the Development of Commercial Hydrogen and Derivatives Projects in Spain

As part of this report, we consulted the AeH2 members that submitted commercial projects to the Project Census, on the main barriers they currently face in developing their projects and the degree of difficulty these represent ("Very problematic", "Moderately problematic" or "Slightly or not at all problematic"), as well as more detail on the challenges experienced in each of these areas and suggestions for improvement.

This tool is very useful for assessing how progress, delays or topical news in each of the different areas translate into the evolution of the projects.

Representing graphically the ratings given by project developers, we obtain the following distribution:



Whereas the evolution of this chart in 2025 compared with 2024 showed a general decrease in the perceived severity of the various barriers, in 2026 the perceived level of severity has risen again, especially in the first half of the chart.

"Regulatory framework" becomes the main barrier perceived by commercial project developers in 2026 (in 2024 and 2025 it ranked third). The remaining barriers are displaced by this change but keep their order of priority, with the exception of "Equipment supply", which now gives rise to greater concern than access to "Water", although the perceived severity of the two barriers is fairly similar. It can also be seen that, over the years, the "Equipment supply" barrier has been rising in importance (from seventh place in the 2024 Census to its current fifth place). The specific details of the main barriers identified for each thematic area, together with suggestions for improvement, are presented below.

Members who are commercial project developers were asked whether any of the projects they are developing had experienced delays or cancellations in the past year. Virtually all the entities taking part in this section reported delays and/or cancellations in one or more of their projects. This is consistent with the fall in the number of commercial projects in the Census, as well as with the reduction in the installed electrolysis capacity expected for 2026. The Association continues to convey the urgency of addressing, and seeking solutions to, the barriers identified by the developers of hydrogen and derivatives projects, set out in this Annex, by the competent administrations and bodies in order to meet national and European targets.

Although Spain has completed the transposition of the RFNBO consumption targets for the transport sector under the Renewable Energy Directive (RED III) with Royal Decree 611/2026, of 22 July 2026, promoting the decarbonisation of the transport sector and encouraging renewable fuels, the delay of more than a year in this transposition has adversely affected several projects in the Census, which were blocked until the publication of this Royal Decree and the clarification of the consumption obligations.

To this factor is added the regulatory uncertainty arising from the possible revision of Implementing Regulation 2022/996 by the European Commission, which proposes to state explicitly that the *blending* of hydrogen into the natural gas grid, without physical separation of the hydrogen at destination (*deblending*), would not count towards the RFNBO targets, which would mean that this hydrogen could not receive Guarantees of Origin (GoOs) or Proofs of Sustainability (PoS). If this were included in the text of IR 2022/996, it would become mandatory from its approval and would formalise what the Commission put forward in the "Guidelines on the targets for the consumption of renewable fuels of non-biological origin in the industry and transport sectors *established in Articles 22a, 22b and 25 of Directive (EU) 2018/2001 on the promotion of the use of energy from renewable sources, as amended by Directive (EU) 2023/2413* " published in 2024. This measure would adversely affect a large number of projects in the Census whose strategy for the transport and distribution of the hydrogen produced was based on *blending*.

Other reasons for delays and cancellations of projects in the Census, experienced over the past year, include problems with grid connection (and uncertainty regarding the planning of new grid capacity), obtaining water, uncertainty over demand for hydrogen derivatives, delays in obtaining permits and authorisations, and delays in the construction of the projects themselves. Taken together, these factors are causing projects to be halted or cancelled and are jeopardising the pace needed to meet national and European renewable hydrogen deployment targets.

Since the publication of the last report, the Ministry for the Ecological Transition and the Demographic Challenge has established a direct channel of communication through which the sector can express its concerns and suggestions on the main regulatory aspects still to be defined: the Renewable Hydrogen Advisory Group (hereinafter GAH2R). Within the framework of the GAH2R, monthly single-topic meetings are held in which the various associations involved in the hydrogen sector are able to convey to MITERD the main concerns and suggestions of their members. Most of the issues addressed in the Barriers section have been conveyed in the various single-topic sessions and will continue to be raised in the sessions to be held in future.

The main challenges and suggestions for improvement identified are set out below, in descending order of priority according to the developers' perception; in many cases the main barriers and/or suggestions for improvement remain the same as those identified in last year's

report, although this year they have been expanded and developed in the light of the sector's progress over the past year (in green) and new challenges reported by members (especially in the thematic areas identified as most problematic).

Regulatory framework

The current regulatory framework for the development of hydrogen and derivatives projects in Spain has been rated as the most problematic area.

Context of regulatory developments since the publication of the last report, as well as ongoing legislation and pending decisions:

On 22 July 2026, Royal Decree 611/2026, promoting the decarbonisation of the transport sector and encouraging renewable fuels, was published. It sets RFNBO consumption targets in transport and advances the transposition of the Renewable Energy Directive (RED III). However, implementing provisions remain pending, such as those of the Renewable Fuels Certification System (SICCRE), the definition of penalties (linked to the update of the Hydrocarbons Act, part of the transposition of the Gas and Hydrogen Package, which is still pending) and other ministerial orders needed to specify certain aspects of the future hydrogen market. Completing this framework is essential to provide legal certainty, boost national demand and facilitate the signing of long-term purchase agreements.

The European Commission officially announced on 22 April 2026, in the *AccelerateEU – Energy Union: Affordable and Secure Energy through Accelerated Action*, its intention to bring forward the review of Delegated Regulation (EU) 2023/1184, initially planned for 2028, to the second quarter of 2026, with the aim of introducing specific adjustments to the criteria that determine when hydrogen can be considered renewable (RFNBO), including the requirements for additionality and temporal and geographical correlation of electricity. This review aims to address swiftly and surgically the difficulties these criteria pose for the economic viability and development of renewable hydrogen and derivatives production projects. The timetable was subsequently pushed back to autumn 2026. However, both the final scope of the changes and the specific publication date remain pending. At the date of publication of this report, the review has not yet been published.

The European Gas and Hydrogen Package, approved in 2024, comprises Directive (EU) 2024/1788 and Regulation (EU) 2024/1789, which update the rules of the internal gas market and introduce a specific regulatory framework for hydrogen infrastructure and markets. An integral part of this transposition will be the update of the Hydrocarbons Act to include and recognise hydrogen as an energy carrier with its own characteristics and to establish a specific framework for its production, transport and marketing. This reform would overcome the limitations arising from the application of rules designed primarily for natural gas and would favour the development of a stable and functional hydrogen market. Member States were required to transpose Directive (EU) 2024/1788 into national law by 5 August 2026. However, given the failure of most countries to complete transposition, on 25 September 2026 the European Commission announced the opening of infringement procedures and the sending of letters of formal notice to 26 Member States, including Spain. The countries concerned have two months to respond, complete the transposition and notify the measures adopted. These delays prolong regulatory uncertainty regarding market organisation, the development of hydrogen

networks and the conditions of access to infrastructure, making investment planning and decision-making in the sector more difficult.

The Net-Zero Framework, promoted by the International Maritime Organization (IMO), is a relevant element in guiding investment decisions in renewable hydrogen projects and their derivatives intended for maritime transport. The framework, technically approved in April 2025, provides for a global standard for marine fuels and a pricing mechanism for greenhouse gas emissions. However, the extraordinary session scheduled for October 2025, at which it was due to be formally adopted, was postponed for one year owing to a lack of consensus among Member States. Adoption has been postponed to a new extraordinary session scheduled for 4 December 2026, subject to confirmation by the Marine Environment Protection Committee. This delay prolongs uncertainty over future decarbonisation obligations for maritime transport and over demand for low-emission fuels, which may make it harder to assess the competitiveness of renewable hydrogen and its derivatives and delay final investment decisions in projects aimed at this market.

Development of the NPF under the AFIR Regulation. On 14 September 2026, MITERD and the Ministry of Transport and Sustainable Mobility (MITMS) presented the draft NPF for the deployment of alternative fuels infrastructure, in compliance with AFIR. The document, subject to public consultation until 2 October 2026, defines measures to develop this infrastructure in road, rail, maritime and air transport. It will be important that its final approval translates into specific targets and support measures for the deployment of hydrogen refuelling infrastructure, so as to facilitate the adoption of these fuels and provide certainty for investment in production and distribution.

Uncertainty over the post-2030 European renewable energy framework (RED IV). In September 2026, a draft of the European Commission's impact assessment on the future revision of the Renewable Energy Directive, known as RED IV, was leaked. Among the options analysed is a possible replacement of the specific binding national RFNBO targets with more flexible goals and indicative targets at European level. Although this is a working document and not a final legislative proposal, this direction creates uncertainty over the continuity of the regulatory mechanisms intended to drive demand for renewable hydrogen after 2030. AeH2 and Hydrogen sent letters to the Commission requesting that binding RFNBO consumption targets be maintained beyond 2030. Future regulation will be decisive in providing long-term visibility, facilitating the signing of *offtake* contracts and supporting investment decisions in new projects.

Some of the challenges identified by our members are:

Regulatory development

- The partial transposition of the Renewable Energy Directive (RED III) into Spanish law and the introduction of mandatory RFNBO quotas in the transport sector, with a flexible pathway and increasing targets up to 2040, have been welcomed by the sector. However, implementing provisions remain pending, such as those relating to the Renewable Fuels Certification System (SICCRE) and the ministerial orders needed to specify certain aspects of the future hydrogen market, which are a source of concern for members. To assess the economic viability of projects, it is essential to have regulatory clarity on RFNBO consumption obligations, possible penalties for

non-compliance and the definition of long-term binding targets, which would allow demand and future revenues to be estimated with greater certainty.

- The pending transposition of the Gas and Hydrogen Package into Spanish law, in particular Directive (EU) 2024/1788, is creating uncertainty over the final design of the hydrogen market, the access and operating regime of the future backbone network, and the associated tariff and financing mechanisms. The absence of a clear framework harmonised with European legislation makes it harder to structure projects financially and contractually, and to plan in a coordinated way the infrastructure that is essential to project development.
- The review of the Delegated Acts continues to affect project development, as the design conditions of many projects would be affected by changes in the additionality and hourly correlation requirements from 2030.
- The delay in the adoption of the IMO *Net-Zero Framework* creates uncertainty over future demand for low-emission marine fuels, making final investment decisions in the sector more difficult.
- The draft NPF does not define a specific action plan to close the gap between the targets for deploying alternative fuels infrastructure and the actual starting situation described in the document itself.
- The leak of the impact assessment prepared by the European Commission in the context of developing the new renewable energy directive (RED IV) is causing concern among some members, as it introduces uncertainty over whether the RFNBO sub-targets will remain in force after 2030.

Permitting

- Administrative processes for hydrogen projects remain long and complex, largely because of the lack of experience of the competent administrations and bodies, and because of the parallel development of legislation affecting hydrogen and derivatives projects.
- The absence of a one-stop shop and the limited coordination between administrations lead to inconsistent criteria, differing local interpretations and significant delays in obtaining permits and authorisations, slowing down project development.

RFNBO criteria restrictions and certification

Although AeH2 recognises the importance of ensuring regulatory stability that supports the development of the hydrogen economy, removing uncertainties that paralyse investment, some members identify barriers in current legislation that could put their projects at risk, such as, for example:

- The proposed hourly temporal correlation as an RFNBO requirement from 2030 poses significant operational and economic challenges. Its application could significantly limit the operating hours of electrolysers, reducing operational efficiency and compromising the economic viability of projects. In addition, the supply of PPAs matching these conditions would be limited. This is particularly

critical in non-standard electricity systems such as that of the Canary Islands, where there are no spot markets that would allow such correlation.

- The time limit on the use of non-biogenic CO_2 (2041) in the production of RFNBO (derivatives) established in the current framework, and the method for calculating greenhouse gas emission reductions (which makes it unfeasible to achieve a reduction of more than 70% with non-biogenic CO_2), affect the viability of carbon capture projects and the use of CO_2 in renewable fuels. The failure to consider low-carbon fuels hinders long-lifespan industrial decarbonisation projects, affecting sectors such as cement and chemicals.
- The certification system based on mass balance may be difficult to implement and could prove restrictive for this developing sector.

It is particularly important that any change to the Delegated Acts affecting the RFNBO criteria and the corresponding certification be made as quickly and clearly as possible, seeking to minimise the uncertainty that paralyses investment and the progress of projects towards commissioning. If this proposal for changes is put to public consultation, the Association will take part by gathering its members' concerns and suggestions, in order to represent their interests on this critical issue for the sector's development.

Some suggestions for improving the regulatory framework identified by members are:

Acceleration of the transposition of RED III

- It is urgent to complete the full transposition of RED III and to define penalties for non-compliance, in order to accelerate the closing of long-term hydrogen purchase agreements.

Acceleration of the transposition of the Gas and Hydrogen Package

- A specific regulatory framework is needed for the development of hydrogen transport and distribution infrastructure, including its integration into existing gas networks.
- Accelerating the adaptation of Directive (EU) 2024/1788 to the Spanish framework through a clear and predictable timetable will be key, accompanied by a transitional regulatory regime that allows progress in the planning and development of the backbone network.
- Define in advance the principles of tariff-setting and network access, strengthen inter-ministerial coordination and the role of the CNMC as regulatory authority, and improve understanding of the requirements through the publication of guidance and provisional technical criteria.
- Encourage private-sector participation in the drafting of legislation and in the consultation period to ensure that the resulting framework is workable, competitive and aligned with the reality of projects under development.

Simplification and acceleration of procedures

- Reduce permitting times for renewable energy projects and facilitate faster procedures, aligning with the deadlines set out in European legislation (a maximum of two years in general, or one year if located in a "renewables acceleration area", as defined in RED III).
- Declaring projects and associated infrastructure to be of general interest would speed up deployment and shorten permitting times.
- Create centralised permitting and approval processes for strategic projects, giving priority to PCI (*Projects of Common Interest*) and STEP (*Strategic Technologies for Europe Platform*) projects, which would increase legal certainty, shorten timescales and facilitate access to funding.
- Promote good practice, as in the case of Andalusia, with a guide to the permitting of hydrogen facilities, which serves as a reference for other regions in Spain.

Electricity

Access to the electricity supply needed for hydrogen production, and the cost of electricity, have been identified by members as the second most significant issue in this edition. Some challenges related to this point are:

Limited grid capacity and congestion

- The electricity grid connection points (transmission and distribution) are saturated, which prevents new projects from connecting or delays their development.
- Capacity allocation tenders create uncertainty, encourage speculative competition and can delay the development of mature or strategic projects. And, although some points have already been opened to new access applications, the slowness of the administrative process continues to create uncertainty over the technical feasibility and implementation timescales of projects.

Two key regulatory measures to improve access to the electricity grid have made progress since the publication of the previous report:

- ✓ Introduction of flexible grid access permits. By Resolution of 31 July 2026, published in the Official State Gazette (BOE) on 11 August, the CNMC approved the regulatory framework for flexible access permits for demand facilities. These permits make it easier to connect new facilities at points where no firm capacity is available, under certain conditions. Their application will be progressive and will depend on the planned timescales and the availability of the necessary technical tools.
- ✓ Electricity transmission grid planning 2025-2030. The proposal is still being processed and provides for investment of more than €17,000 million, after incorporating the submissions received during the public consultation process. MITERD announced this figure on 16 September 2026 in the Congress of Deputies. The planning aims to reinforce the grid to meet new demand and integrate the energy transition, including the development of renewable hydrogen, with 13.1 GW of new transmission grid capacity to serve electrolysers. As of October 2026, the 2025-2030 electricity transmission grid planning is still awaiting final approval

and the corresponding strategic environmental statement. Once the latter has been obtained, the Plan must be submitted to the Congress of Deputies (or, where appropriate, to the Standing Committee) before approval by the Council of Ministers. However, the calling of a general election for 29 November could delay its processing and final approval.

High costs

- Connection tariffs, tolls, network usage charges and the price of electricity, together with their long-term uncertainty, have a direct impact on LCOH, increasing production costs and hindering the strategic planning of projects.
- The guarantees and securities required to secure capacity increase upfront costs and represent a critical financial brake. This particularly affects small project developers because it ties up capital that they cannot use to develop further projects.

Regulatory restrictions

- Hourly correlation and additionality are requirements set out in the EU delegated acts for hydrogen to be recognized as RFNBO (Renewable Fuels of Non-Biological Origin). These criteria limit flexibility when signing PPAs, by restricting electrolyzer operating hours and therefore project profitability. In addition, competition for similar PPAs among hydrogen projects places them at a disadvantage compared to other electricity consumers, who are not subject to such constraints.
- The five-year expiration of grid access and connection permits adds further uncertainty, significantly limiting project flexibility, especially when delays arise from external factors such as public funding decisions or water use authorizations.
- The lack of recognition of electrolyzers as strategic consumers capable of providing flexibility to the power system remains an issue. Several AeH2 members believe that the regulatory framework should explicitly acknowledge and enable electrolyzers that are technically capable of participating in balancing and ancillary service markets, provided they meet the operational requirements set by the system operator.

Some suggestions for improvement in this area could be:

Prioritisation and preferential access to the grid

- Recognise strategic projects such as PCI, STEP or CEF (*Connecting Europe Facility*), among others, and guarantee them preferential access to the grid, with accelerated processing and adapted technical conditions, given their nature as projects of particular relevance to the energy transition and of common interest.
- Consider dispatch priority for renewable electricity linked to hydrogen PPAs in order to minimise the impact of the hourly temporal correlation required by the Delegated Acts on the origin of electricity for RFNBO hydrogen production.

New instruments and tariffs

- Create reduced grid access tariffs for electrolysers, recognising their strategic role and facilitating economic viability.
- Simplify the guarantees required to secure capacity access.
- Consider incorporating decentralised batteries into projects to facilitate compliance with the Delegated Acts, ensuring that the energy feeding those batteries is renewable and, therefore, that the hydrogen produced is RFNBO.

National planning and coordination

- Align the planning of substations and capacity tenders with strategic hydrogen projects and their timelines.

Flexibility in permits and extensions

- Establish mechanisms to extend connection permits, where justified, when projects are affected by delays caused by external factors (for example: delays in the award of public funding, water concessions…).

Congestion management and tenders

- Consider giving priority of grid access to the most mature projects with the greatest impact. That is, those with the greatest impact on emissions reduction, the greatest job creation, a more realistic construction and operation timeline, a secured *offtaker*…

Offtakers

Securing *offtake* in commercial projects remains one of the main barriers identified by members. Some challenges related to this point are:

Lack of firm and binding demand

- The lack of long-term *offtake* contracts is a barrier to the economic viability and financing of renewable hydrogen projects. There is currently a mismatch between the contractual terms needed to guarantee the financial viability of projects and what *offtakers* are willing to accept. While hydrogen or derivatives production projects and the associated logistics infrastructure require supply contracts of at least 10 years in order to be bankable, potential *offtakers* tend to limit their commitments to a maximum of 2-3 years. This reluctance is largely due to uncertainty over the evolution of prices and the future competitiveness of renewable hydrogen, to a great extent because of regulation and technological development, since consumers do not wish to commit in the long term to prices that could cease to be competitive against other alternatives. This lack of certainty over future demand and revenue makes it difficult to sign long-term contracts and, consequently, to finance and develop projects.
- The definition of binding targets, consumption obligations or sector mandates is necessary to consolidate demand, reducing market uncertainty and delays in investment.

Knowledge gap and technical expertise

- Most *offtakers* have limited knowledge of the supply models, logistical implications, traceability and regulatory requirements associated with renewable hydrogen and derivatives, which slows down contract negotiations.

Limited markt signals

- Indexes such as MIBGAS's IBHYX represent an important step forward for the market, as they provide a useful initial price reference. However, they do not yet reflect the real production, transport, and logistics costs of projects, which limits their usefulness when negotiating offtake agreements for concrete demand cases. The price of renewable hydrogen remains above what offtakers are currently willing to pay.

Some suggestions for improvement in this aspect could be:

Establish binding consumption targets through regulation

- Establish a clear, robust, and long-term regulatory framework that enables offtakers to adopt hydrogen with confidence.

Royal Decree 611/2026 sets targets for the penetration of renewable fuels, including RFNBO, in transport from 2027, with a decarbonisation pathway to 2040. This framework provides greater regulatory visibility to boost demand for renewable hydrogen in Spain. However, it will be key to ensure that the obligations established translate into sufficient and sustained demand that provides certainty for investment and favours the development of new projects.

Support Mechanisms

- Introduce market measures such as CfDs (*Contracts for Difference*) that cover the price difference for *offtakers* and facilitate long-term purchase commitments.
- Provide tax incentives, CAPEX subsidies for hydrogen vehicles or HRS infrastructure, demand aggregation in clusters and promotion of green public procurement (for example: public tenders for the renewal of urban bus fleets or municipal service contracts, such as cleaning or waste collection, requiring the use of zero-emission vehicles…) to encourage the adoption of hydrogen and reduce the initial economic barrier.

Improving transparency and price benchmarks

- Complement market indices such as IBHYX with more variables (for example: available infrastructure, demand profile...). In this way, benchmark values closer to reality can continue to be published, which will enable more market options.

Lead markets and incentives for Low-Carbon Products

- Public authorities have the opportunity to act as the anchor consumer that generates the pull effect that consolidates stable demand for hydrogen and its derivatives in various public uses, through the Green Public Procurement Plan 2026-2033. This role is key not only to absorbing initial volumes of renewable hydrogen production, but also to generating technical and economic certainty: by ensuring

predictable long-term revenues, the financial risk of projects is mitigated and economies of scale are facilitated. Some of the public uses in which the authorities could act as anchor consumer are: heavy and intensive road mobility (for example: quotas of hydrogen vehicles in public fleets); e-SAF, e-methanol and e-ammonia for maritime and air transport, both civil and military; heating/cooling and emergency power supply in public buildings; and promoting green fertilisers, steel and cement in tenders. AeH2 has defended this position by taking part in the public consultation process on the document.

- Promotion of *lead markets*, promoted by the European Commission in the future *Industrial Accelerator Act*, which give rise to specific markets for green industrial products (for example: fertilisers, polymers, sustainable steel…) produced with renewable hydrogen.

- Development of regulatory, price and fiscal signals that encourage end consumers to choose lower-footprint products while at the same time facilitating regulatory compliance for the manufacturers of those products, giving value to the additional benefits (environmental, job creation...) that these products bring.

- The Heavy-Duty Vehicle Working Group (Grupo de Trabajo Plan Auto Vehículo Pesado), promoted by the Ministry of Transport and Sustainable Mobility (MITMS) under the Plan Auto España 2030, represents an opportunity to boost decarbonised heavy-duty mobility with hydrogen, especially in trucks, buses and special vehicles, through incentives for the purchase of zero- and low-emission vehicles and the development of refuelling infrastructure. AeH2 takes part in this Working Group and has submitted proposals prepared in collaboration with members to promote decarbonised heavy-duty transport with hydrogen.

Access to public funding

Access to public funding has been identified as “Very problematic” by most members. The main challenges identified by members on this point are:

Support programmes and real needs

- Preparing competitive applications for funding calls requires a high level of resources and specialist expertise in areas such as technical, financial and regulatory matters. While these requirements make it possible to filter out the most mature and best-defined projects, they can also constitute a barrier to entry for smaller developers, limiting their ability to take part in such calls.

- The evaluation time and/or award time of some support programmes has been too long. Speed in these procedures is key to supporting the development of the sector. Tenders from contractors, equipment suppliers and other service providers are valid for a fixed period and, if the award/resolution of funding is slower than initially expected, this can lead to cost increases and/or project delays.

- Support programmes must take into account the continuous evolution of the hydrogen sector, in both the regulatory and technological spheres, and establish flexibility mechanisms that allow implementation deadlines and penalties for non-compliance to be adapted to its degree of maturity and development.

- Current auction mechanisms can encourage speculative behaviour and favour the award of funding to projects that ultimately are not implemented, thereby reducing the effectiveness of these instruments in driving the development of strategic projects.

High upfront financial requirements

- The need to submit bank guarantees, securities or *offtake* contracts, although it generally acts as a first filter for the most mature or best-conceived projects, limits access for small and medium-sized developers, meaning that only large companies can take part comfortably.

On the other hand, some of the suggestions for improvement put forward by members are the following:

Mature and strategic projects

- Assess the possibility of prioritising in funding those strategic projects that can demonstrate a secured *offtaker* and a well-defined development timeline.
- Recognise the strategic nature of projects included in initiatives such as the PCI lists or the STEP Platform, and facilitate their access to public funding.

Flexibility in Funding Criteria and Deadlines

- Adapt grant mechanisms to the reality of the sector, allowing greater advance payment of funds and extension of implementation deadlines to accommodate project delays, especially when they are affected by delays caused by external factors (for example: grid access, water concessions, regulatory delays…).
- Consider making the enforcement of the guarantee for a grant more flexible, or reducing the amount to be received, if a project's timeline has been compromised owing to external factors (for example: grid access, water concessions, regulatory delays…).

Incentives

- It is beginning to be observed how large grants awarded to mature projects have helped several of them reach final investment decision.
- Continue designing different support schemes that cover the different types of cost (CAPEX, OPEX or DEVEX), that reflect the reality of the sector and that allow all parties interested in developing hydrogen projects to take part, with strict but achievable criteria.
- It is proposed to back offtake support, such as CfDs, to ensure that the gap between the current price of renewable hydrogen and what consumers are willing to pay is covered.
- Include in new support schemes the possibility of directly subsidising hydrogen and derivatives logistics infrastructure and services.

- Study mechanisms to make national and European funding compatible in certain cases.
- Grant tax advantages to hydrogen production plants and infrastructure, to improve economic viability and attract investors, as well as to consumers of renewable hydrogen to stimulate demand.

The Clean Industrial Deal State Aid Framework (CISAF), introduces an exceptional period for State aid to decarbonisation projects from June 2025 to December 2030, allowing Member States to subsidise up to 50% of "*investments enabling the use of hydrogen*" up to a limit of €200 million per project. AeH2 will continue to encourage the Government, especially with a view to the preparation of new General State Budgets, to take advantage of this window of opportunity to boost the hydrogen sector, which is strategic for our country, and to avoid falling into a competitive disadvantage compared with other European countries.

Simplification of procedures

- Unify, as far as possible, the rules and procedures for applying to different national calls, establishing common templates and consistent criteria, reducing the administrative burden and thereby speeding up the resolution of grants.

Equipment supply

The supply of essential equipment (for example: electrolysers, transformers…) is not currently a problem; however, certain concerns are noted that may affect and constrain project development. The increase in concern about equipment supply compared with previous years is because some projects are moving on to more mature stages of development, at which more formal discussions with equipment suppliers begin. Some of the challenges identified are:

Limited capacity of European manufacturers and lower cost competitiveness

- Many manufacturers are at a stage of learning and technological maturation, particularly in the deployment of large-scale electrolysers. This situation may cause delays in project development and execution.
- The limited availability of European-made electrolysers and critical components (for example: transformers, compressors, valves and control systems), together with current regulatory requirements, especially those deriving from the NZIA (*Net-Zero Industry Act*), reduces developers' supply options when selecting suppliers. This makes investment and planning decisions more difficult and may cause delays in project development and execution.
- European-made equipment generally has higher costs and longer delivery times than that offered by Asian suppliers, especially those from China.

Logistics and supply chain risks

- Dependence on scarce raw materials, disruption to international logistics and the concentration of global demand strain the delivery capacity of certain equipment.

- Delays in the supply of key equipment (for example: electrolysers, transformers, compressors and control systems), together with tensions in the supply chains for certain materials and components, make it harder to meet planned deadlines and constrain investment planning. Likewise, these disruptions can lead to unforeseen increases in project costs.

Uncertainty in equipment performance

- Although the equipment has high levels of technological maturity, there is uncertainty over its performance and guarantees, as there is not yet a sufficient *track record* of large-scale projects.
- The operation and maintenance of this equipment may be affected by specific climatic conditions, such as corrosion caused by the salinity of the marine environment.
- The loss of performance and wear of certain equipment as operating hours increase are relevant factors for developers, who prioritise durability, reliability and operational continuity of the equipment over the pursuit of greater initial efficiency.

Some proposals for improvement in this respect suggested by members would be:

European strategic planning

- Increase and encourage the production of critical technologies (for example: electrolysers, transformers, fuel cells…) at European level.
- Align equipment production with the NZIA regulatory framework and the Critical Raw Materials Regulation to guarantee industrial autonomy and energy security in Europe.

Strengthening the supply chain, diversification and R&D

- Encourage competition and the strengthening of the ecosystem of European suppliers of key equipment in order to reduce dependence on non-European suppliers.
- Promote the availability of reliable equipment with robust guarantees.
- Support and encourage innovation in hydrogen production technologies to increase equipment efficiency and reduce dependence on critical raw materials.

Competitiveness

- Develop mechanisms to balance criteria of origin, quality and cost while maintaining the competitiveness of projects.
- Encourage support for European suppliers in order to close gaps compared with equipment from outside the European Union.

Risk mitigation

- Encourage transparency on equipment availability and delivery times, including clear contractual commitments from suppliers.

Water

Water is, together with electricity, the necessary input for electrolytic hydrogen production. In this case, it has been identified by most project developers as an area that is "Slightly or not at all problematic".

Some of the challenges identified by members in this area are:

Water location and availability

- Water availability depends on the project location, and is more critical in some locations where renewable generation is concentrated.
- The lack of new water concessions makes it necessary to resort to changing the use of existing concessions, which adds complexity, limits access and increases administrative processing times.

Administrative procedures

- Procedures before the River Basin Authorities (Confederaciones Hidrográficas) apply different criteria and timescales to evaluate applications. This situation is aggravated by the limited proactivity of the competent bodies and the lack of coordination between the various administrations, which makes it harder and slower to obtain the necessary authorisations.
- Some projects, despite being classed as strategic and contributing to decarbonisation targets, do not always receive priority treatment in administrative procedures.

Regulatory framework

- The absence of clear regulation on the use of reclaimed or reused water limits sustainable options for developing projects.
- Current regulation on discharges and environmental requirements does not adequately distinguish hydrogen plants from more polluting industries, generating unnecessary administrative burdens, which slows the progress of projects.
- The lack of guarantees on access to water, especially in the event of possible droughts, makes project planning and execution more difficult, and may limit their potential for expansion and scalability.

Some suggestions for improvement in this respect, proposed by members, are:

Specific and harmonised regulatory framework

- Establish clear rules for water concessions, including reclaimed water, with guarantees of quality, traceability and compatibility with renewable hydrogen certification.
- Consider differentiating discharge requirements for hydrogen plants from those for more polluting industries, simplifying procedures and administrative burdens.
- Consider prioritising strategic projects at the River Basin Authorities.

Integrated planning at national level

- Improve coordination between administrations to facilitate the processing of projects.
- Establish standardised and clear procedures at national level for applications for new concessions or changes of use.
- Encourage investment in water infrastructure to secure the necessary supply and mitigate competition with other sectors.

Use of sustainable alternatives

- Encourage the development of and research into electrolysis technologies with lower water quality requirements.
- Promote the use of reclaimed or reused water as a viable resource for electrolysers.
- Incentivise solutions that minimise the impact on conventional water resources and improve overall sustainability.

Public awareness-raising

- Encourage the dissemination of the actual water consumption of renewable hydrogen production projects.

Land

The land on which to site the hydrogen and/or derivatives production project is not a particularly contentious parameter for most members, who identify it as "Slightly or not at all problematic". However, both the renewable energy sources (RES) associated with project development and the size of the facilities themselves, especially in large-scale projects, require large areas of land for their implementation. The challenges that may be encountered in this respect are:

Permitting

- Most projects require large areas, generally on rural or industrial land. Change-of-use procedures, where necessary, are long and bureaucratically complex, which causes delays in implementation.
- The permitting process can vary significantly between autonomous communities, which creates uncertainty in project development. In addition, there are differences in criteria and insufficient availability of technical resources across the different levels of government (local, regional and national). This situation can lead to duplication, blockages and an increased administrative burden, causing delays in the processing and execution of projects.

Limited suitable land and competition with renewables

- Pressure to secure the best locations for renewable projects, along with the scarcity of appropriately sized plots near key infrastructure (e.g., electricity grid, water, pipelines, ports…), makes the technical and economic viability of many projects more difficult.

Suggestions for improvement proposed by members:

Specific regulatory framework for hydrogen projects

- Recognise hydrogen projects as strategic, establishing priority land access policies that facilitate their implementation and development.
- Establish a uniform regulatory framework for land-use planning and reclassification in all autonomous communities. Also consider allowing the installation of electrolysers on rural land without the need for reclassification, provided that certain environmental and reversibility criteria are met, in order to speed up authorisation processes.
- Develop a national decarbonisation strategy that integrates land, energy and water planning, identifies priority areas for the development of hydrogen projects and facilitates access to grids and key infrastructure.
- Define clear and swift protocols for the relocation of existing infrastructure, such as pipes, power lines and other critical facilities, with the aim of avoiding administrative blockages and delays that increase project costs.

Accelerated procedures

- Consider prioritizing projects with granted public funding through single-window procedures and inter-administrative coordination, reducing processing times and accelerating project commissioning, thus ensuring compliance with subsidy timelines.

Services

At present, most developers do not identify access to specialist services (for example: engineering services) as problematic. There are engineering, and operation and maintenance, services with international experience in large projects that could have similar characteristics to those developed in the sector, as well as qualified technical staff with sufficient capabilities to take on this type of project.

However, because this is an emerging sector, some members express certain concerns:

Lack of experience and operational references

- Although the ecosystem of EPCs (*Engineering, Procurement and Construction*) and O&Ms (*Operation and Maintenance*) with experience in the sector and/or similar projects is growing, the hydrogen sector is still under development, which limits practical experience in certain technologies and operating phases.
- System integration, specific regulations and operational safety (for example: separation distances, vents, flares…) are not yet sufficiently clear. This creates uncertainty in project risk management and may increase costs.

Availability

- Some members identify the risk of a temporary shortage of specialist engineering firms and qualified personnel for the development and maintenance of large-scale projects. This situation could be aggravated by the concentration of projects in

certain periods, owing to the deadlines associated with funding and the start of penalties for non-compliance.

- The availability of continuous technical support is another challenge, both during construction and in the operation and maintenance phases. The distance between specialist suppliers and projects under way can make periodic visits to the facilities difficult and affect the operational efficiency of projects. Furthermore, the initial scarcity of maintenance centres and specialist services for technologies (for example: electrolysers, compressors…) in the vicinity of plants may increase operating costs and lead to unplanned shutdowns and delays in activity.
- Delays in the supply of certain equipment can affect the planning and execution of engineering work, as they constrain the progress of the various project phases. This can cause delays in the commissioning phase and, consequently, in the start-up of the facilities.

Cost

- Technology licensors and engineering services require high investment owing to the uncertainty and lack of experience associated with hydrogen and derivatives projects, making it difficult to close contracts.

Some suggestions for improvement in this respect could be:

Encourage collaboration

- Promote collaboration with academic institutions and research centres that can contribute valuable technical knowledge and resources to projects.
- Encourage flexible contract structures that allow agility in hydrogen projects with high uncertainty.

Specialized training

- Encourage the creation and expansion of departments dedicated to hydrogen and derivatives in specialist service companies in order to increase the availability of supply in the future, when demand for this type of project is expected to rise.
- Promote national and/or European certification programmes or standards to harmonise design and operating criteria.

Annex II – Completed Research Projects and Demonstrators in Relevant Environments

As part of the update of the 2026 Project Census, the Spanish Hydrogen Association (AeH2) requested information from its members on research and demonstration projects completed before 1 January 2026. The purpose is to collect and present the most relevant information on these completed projects in order to create a repository that facilitates consultation and provides a comprehensive overview of the initiatives that have been developed.

The information collected has been organised in a summary table covering the following aspects of each project:

- **Project name:** identification of each initiative.
- **Technology Readiness Level (TRL):** indication of the level of development achieved by the project, displayed through a colour-coded system that facilitates visual identification.
- **Participating entities:** identification of the organisations involved, distinguishing between the lead entity and collaborating entities.
- **Project description:** summary of the main characteristics, objectives, and scope of the project.
- **Contact information:** where available, additional information is provided to facilitate follow-up or consultation of the project, such as its website and/or contact email address.

TRL 3-4 projects

AEMH2 - Investigación interdisciplinar de materiales y sistemas a pequeña escala para producir hidrógeno verde con tecnología AEM	TRL 3-4
DUCTOLUX S.L.	CIIAE - Centro Ibérico de Investigación en Almacenamiento Energético
The technological challenge of the project focuses on reducing the cost of the technology used in Anion Exchange Membrane Water Electrolysers (AEMWEs) for hydrogen production, while advancing their performance to a more mature stage. This requires laboratory-scale research and testing, including atomistic simulations based on Density Functional Theory (DFT) to elucidate the reaction mechanism, as well as small-scale demonstration units to validate the technology and increase its TRL from 2-3 to 4. Low- or zero-platinum-group-metal (PGM) electrodes and reduced critical raw material (CRM) content will be employed. The project results will advance the roadmap towards new, more competitive systems and components for renewable hydrogen production.	
More Information: - Website - Contact email: liliana.diaz@ciiae.org, rodrigo.garcia@ciiae.org, david.parra@ciiae.org	

Hy2DEC - Investigación de nuevas tecnologías de producción y uso de hidrógeno verde para la descarbonización de la industria intensiva española	TRL 3-4
ACERÍA DE ALAVA, S.A.	TÉCNICAS REUNIDAS, TORRECID, GECSA, GHI HORNOS, KERIONICS, ORCHESTRA. Otras entidades colaboradoras: IKERLAN, CEIT, ICIQ, TECNALIA, ITQ-CSIC, ICP-CSIC, INCAR-CSIC
The Hy2DEC project aims to investigate, develop and validate emerging technologies for the production and use of renewable hydrogen, as well as CO_2 capture technologies. It will also assess the integration of these technologies into energy-intensive industrial processes in Spain to accelerate their decarbonisation. Hy2DEC is structured around three main pillars: - Renewable hydrogen production through innovative technologies such as Anion Exchange Membrane (AEM) electrolysis and Protonic Ceramic Electrolysis Cells (PCEC). - Use of renewable hydrogen as a fuel for heat generation, reducing dependence on fossil fuels and lowering CO_2 emissions. - CO_2 capture technologies aimed at enabling carbon-neutral industrial processes.	
More Information: - Website - Contact email: *Ramón Pericet* rpericet@trsa.es	

H2-MOF - Membranas basadas en MOFs de nueva generación para su aplicación en tecnologías de H2: pilas de combustible y electrolizadores	TRL 3-4
Fundación IMDEA Energía	Universidad Carlos III de Madrid
H2-MOF is a coordinated project between IMDEA Energy's Advanced Porous Materials Unit and the SYPMAT research group at UC3M. Its objective is the development of novel proton-conducting hybrid membranes (PHMs) composed of phosphonate-based Metal-Organic Frameworks (MOFs) combined with cross-linked multiblock copolymers for application in electrochemical devices producing electricity (PEMFCs) and renewable hydrogen (PEMWEs). These PHMs are expected to combine the advantages of both components: cross-linked conductive multiblock copolymers provide mechanical stability and controlled hydration levels, while MOFs enhance ionic conductivity through their high water-retention capacity, even at elevated temperatures, thereby extending the membranes' operating temperature range.	
More Information: - Contact email: patricia.horcajada@energia.imdea.org	

Desarrollo de electrolizadores de alta temperatura SOEC	TRL 3-4
CENER	Universidad Complutense de Madrid, Universidad San Pablo-CEU, CSIC/Unizar - Instituto de Ciencia de Materiales de Aragón
The project encompasses the formulation of new materials, the design and manufacture of SOEC cells and stacks with different formulations and configurations, their characterisation, and the testing of prototypes connected to renewable energy sources. The initiative addresses all key stages of the R&D&I value chain: - Research into innovative materials. - Optimisation of materials for electrolysis devices. - Development of a commercially viable prototype. The project will also support the consolidation of specialised laboratories covering all critical aspects of SOEC technology development, providing industry and research stakeholders with the necessary infrastructure to develop advanced materials and prototype innovative solutions.	
More Information:	

ValidSOEC - Desarrollo de Electrolizadores de Óxido Sólido Avanzados: Validación del Sistema e Integración de Nuevos Materiales en Dispositivos Comercializables	TRL 3-4
CENER	

ValidSOEC aims to contribute to the development of reliable and durable SOEC prototypes through both experimental and theoretical approaches. The project will establish a platform for scaling up and comparing innovative material solutions previously validated at laboratory scale using commercially relevant cell dimensions.

Activities include:

- Experimental validation and benchmarking of commercial SOEC cells and stacks.
- Development of a multi-phase, multi-timescale SOEC simulation model covering different optimisation levels:
  - Cell level (electrode microstructure, operating conditions and fuel poisoning effects).
  - Stack level (geometry and thermal management).
  - System level (balance of plant and integration with renewable energy systems).

This approach will provide a comprehensive framework for the advancement of high-temperature electrolysis technologies.

More Information:

EfiSOEC - Investigación y análisis para el desarrollo de una tecnología SOEC propia para la generación de sistemas eficientes de producción de hidrógeno.	TRL 3-4
Repsol S.A.	Técnicas Reunidas, Tubacex, NX Tech, Zigor, Instituto de Investigación de la Energía de Cataluña (IREC), Centro Nacional del Hidrógeno (CNH2), Grupo de Diseño y Procesado Avanzado de Materiales de la Universidad de Castilla-La Mancha (DYPAM-UCLM), Tecnalia, IMDEA Energía, CIDETEC.
The EfiSOEC project aims to improve the durability and reliability of Solid Oxide Electrolysis Cells (SOECs) through the development of advanced characterisation and diagnostic methodologies. The project seeks to gain a deeper understanding of the degradation mechanisms that affect cell performance under operating conditions. The work combines advanced electrochemical analysis techniques, post-mortem materials characterisation and modelling tools to identify critical degradation pathways and optimise both cell design and operating strategies. The expected outcomes will support the development of longer-lasting and more efficient high-temperature electrolysis systems, contributing to the commercial deployment of SOEC technology for renewable hydrogen production.	
More Information: - Website. - Contact email: ana.martinez@repsol.com	

AIHRE - Análisis e impulso del hidrógeno renovable en la región POCTEP		TRL 3-4
CIDAUT	Corporación Tecnológica de Andalucía (CTA), las Universidades de Sevilla, Oporto y Évora, el Instituto Tecnológico de Galicia (ITG), el Instituto Politécnico de Portalegre (IPP), el Instituto de Ciencia e Innovación en Ingeniería Mecánica e Ingeniería Industrial (INEGI) y el Instituto Nacional de Técnica Aeroespacial (INTA).	

AIHRE will create a technological and business network to unlock the potential of renewable hydrogen production. Its activities will focus on specific regions of Spain and Portugal within the POCTEP area and will involve stakeholders from the quadruple helix, including the scientific and academic community, policymakers, companies from sectors such as energy and mobility, and end users, with the aim of fostering local and regional economic development.

The analysis and development of technologies for deploying renewable hydrogen-based value chains are at the core of the AIHRE project. This process will be carried out in several stages, ranging from the analysis of the current energy landscape to the development of prototypes and business models.

More Information:

- Website
- Contact email: info@aihre.eu; info@cidaut.es

H2ENRY		TRL 3-4
CIDAUT	AICIA, ENERGYLAB, ITE y LEITAT	

The H2ENRY Network focuses on strengthening the capabilities of the technology centres that are members of the consortium across the entire renewable hydrogen production chain. The initiative addresses innovative and low-energy-consumption technologies for renewable hydrogen generation through the utilisation of renewable energy sources and surplus energy, as well as its subsequent purification and chemical storage.

The project also incorporates digitalisation and diagnostic tools aimed at increasing process efficiency throughout the hydrogen value chain.

More Information:

- Website
- Contact email: h2enry@cidaut.es

H2METAMO		TRL 3-4
CIDAUT	Universidad de Burgos, Universidad de Valladolid, Universidad de León, Universidad de Salamanca and CARTIF	
Research into technologies, materials and processes that enable the small-scale production of hydrogen carriers, specifically ammonia and methane, from renewable hydrogen.		
More Information: - Website. - Contact email: info@cidaut.es		

TEDDY - Towards Energy Decarbonisation through Direct-biogas Solid Oxide Fuel Cell and Microalgae TechnologY		TRL 3-4
CIEMAT		
The TEDDY project is framed within the context of the circular economy and proposes a multidisciplinary research approach for the development of more efficient, economically viable and non-polluting energy conversion systems. The project is based on the synergistic combination of several emerging technologies, including high-temperature fuel cells, biofuels, CO_2 capture, solar energy utilisation, and wastewater treatment using microalgae. The project is aligned with the European Commission's objective of making Europe the first climate-neutral continent. It addresses climate change mitigation, water pollution control and, above all, the development of an energy conversion system based on waste streams, enabling the complete recovery and reuse of the CO_2 generated during the process.		
More Information: - Website. - Contact email: Araceli Fuerte Ruiz (araceli.fuerte@ciemat.es); Rita Ximena Valenzuela Balderrama (r.valenzuela@ciemat.es)		

PORHYDRO2		TRL 3-4
University Carlos III	CIEMAT	
Confidential Information.		
More Information: - Website. - Contact email: antonio.mchaparro@ciemat.es		

Banco de ensayo de permeabilidad de membranas (H2/O2/CO2)	TRL 3-4
CIIAE - Centro Ibérico de Investigación en Almacenamiento Energético	
The gas permeability test bench is a custom-designed system developed to measure the permeability of different gases through polymeric, porous, and other types of membranes. It enables the characterisation of a membrane's ability to allow gases to pass through under specific pressure, humidity, and temperature conditions. Applications: gas separation, ion-exchange membranes for electrolysers and fuel cells, and related technologies.	
More Information: - Contact email: liliana.diaz@ciiae.org	

HydrATS - Optimised Integration of After-Treatment Systems for the Reduction of NOx and Secondary Emissions in Hydrogen Engines	TRL 3-4
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
The objective of the project is to facilitate the use of hydrogen as a fuel for sustainable propulsion in land, maritime and aviation transport applications through the study and integration of exhaust gas after-treatment systems for hydrogen-powered engines, with particular attention to the reduction of NOx emissions and the prevention of secondary emissions such as H_2, N_2O and NH_3.	
More Information:	

ICTI FEAT - Manufacturing of High-Temperature SOEC Electrolysers	TRL 3-4
Centro Nacional del Hidrógeno (CNH2)	
The project aims to develop a semi-industrial production line for 2 kW SOEC electrolysis systems for high-temperature hydrogen generation, capable of operating in reversible mode while maintaining fuel-cell-mode electrochemical efficiencies equivalent to those achieved in electrolyser mode. The initiative covers all the necessary stages, from the initial design, manufacture and characterisation of solid oxide cell components to the integration of auxiliary systems with the stack and their subsequent operational demonstration In parallel, the facilities of the Centro Nacional del Hidrógeno (CNH2) in Puertollano (Ciudad Real) will be upgraded to support the implementation of these activities.	
More Information: - Website. - Contact email: *Roberto Campana*, roberto.campana@cnh2.es	

Strategic Actions in Castilla-La Mancha Based on Hydrogen to Transform the Current Energy Paradigm and Minimise Greenhouse Gas Emissions	TRL 3-4
Centro Nacional del Hidrógeno (CNH2) y Diputación de Cuenca.	UCLM, JCCM
The project focuses on the development of strategic hydrogen-based actions aimed at transforming the current energy paradigm and minimising greenhouse gas emissions. In Castilla-La Mancha, this initiative, within the green energy and hydrogen mission, is structured from a circular economy perspective, combining innovative solutions for green hydrogen production through low-temperature electrolysis with the energy recovery of waste streams from local industries and rejects from nearby municipal waste treatment facilities. The objectives of the initiative are aligned with the European Green Deal and Spain's Agenda 2030, promoting the energy transition, industrial decarbonisation, waste valorisation, climate neutrality, the deployment of renewable energy sources and the circular economy. The proposed solution includes the conversion of waste into biofuels through biological processes; the promotion and use of renewable energy for hydrogen production; CO_2 capture; biomethane conversion for hydrogen and CO_2 production; the utilisation and conversion of hydrogen and CO_2 into biomethane for storage, transport and subsequent use; and the development of new fuel cell devices capable of operating more efficiently and cleanly.	
More Information:	

UNDERGY		TRL 3-4
Petroleum	H2B2, Técnicas Reunidas, CSIC, CNH2, Technical Universidad de Madrid, Universidad de Salamanca, Universidad de Loyola y Tecnalia.	
The UNDERGY project aims to harness renewable energy by integrating renewable generation and high-capacity seasonal energy storage (on the order of TWh) within a smart grid through two main pillars: - Seasonal storage of renewable energy using green hydrogen. - Development of an efficient energy management system. The project promotes the utilisation of existing national gas and electricity infrastructure networks to support their transformation into a fully renewable distribution network. The deployment of hydrogen as a renewable energy carrier and its underground storage are still at an early stage, giving the project a strong innovative character.		
More Information:		

H2Biorefinery - Integration of Green Hydrogen Production in Biorefineries through Reforming with Integrated CO_2 Capture from Process By-products		TRL 3-4
INCAR - CSIC		
Hydrogen is highly demanded in biorefineries for the conversion of intermediates into final biofuels, and renewable hydrogen production is essential for the sustainable production of biofuels from biomass. The objective of this project is to integrate green hydrogen production into biorefineries through steam reforming with integrated CO_2 capture from biorefinery by-products. The project combines experimental process studies with energy analyses using simulation tools, enabling the identification of optimal operating conditions for different biorefinery case studies.		
More Information:		

SusValEn - Valorisation of Lignocellulosic Waste into Energy Carriers	TRL 3-4
INCAR-CSIC	AIMPLAS; INTASA; CETEMAS; UNIV. DE LA CORUÑA; IRIAF; ORGÁNICA DE SUSTRATOS
SusValEn proposes an interdisciplinary concept that goes beyond the current state of the art by replacing fossil fuels with biomass for the production of carbon-neutral hydrogen and biogas. In addition, the CO_2 generated during the process will be used to produce biomethanol, which can be utilised both as a fuel and as a chemical feedstock.	
More Information:	

INVECPRO - Industrial and Cross-cutting Research for a New Generation of High Value-Added Professional VECs	TRL 3-4
FAGOR ELECTRONICA, S.COOP.	CAR - Centro de Automática y Robótica (CSIC); ICV - Instituto de Cerámica y Vidrio
Through the Institute of Ceramics and Glass (ICV) and the Centre for Automation and Robotics (CAR), CSIC participates in the primary project focused on research into hydrogen fuel cell components and proof-of-concept activities.	
More Information: - Website. - Contact email: raul.deltoro@car.upm-csic.es	

ZteelCOp - Hydrogen metallurgy for decarboniZing the steel and COpper production industries		TRL 3-4
CENIM-CSIC	AcerlorMittal Basque Country Research Centre (AMBCRC), Barna Steel S.A. (CELSA group), Atlantic Copper S.L	
ZteelCOp aims to assess the potential of hydrogen as reducing and foaming agent in key metallurgical processes of the steel and copper production. This requires full understanding of two strategic aspects of the steel and copper process metallurgy to: - Comprehend the thermodynamic and kinetic aspects of hydrogen as reducing agent in key metallurgical production processes of the steel and copper industries. - Evaluate the impact of hydrogen utilization on the quality of the final steel and copper products, by-products and refractory wastes, and in the process efficiency. The generated fundamental knowledge will enable the design of new hydrogen-based routes that reduce the CO2 emissions with respect to the established production and by-product valorisation processes.		
More Information:		

MA2TEC - Advanced Functional Materials for the New Technological Transformation		TRL 3-4
Universidad de Valladolid	Universidad de Burgos, Universidad de Salamanca, CIDAUT	
Mechanical, fracture and fatigue characterisation tests will be carried out on both the materials under study and the final components. This will enable the determination of their properties and the development of a classification framework based on the structural requirements associated with each application. The project will also address the optimisation of materials for hydrogen technologies, including the replacement of conventional austenitic steels with high-strength duplex steels manufactured through Selective Laser Melting (SLM) for high-pressure applications. Advanced characterisation activities will be performed under operating conditions on duplex stainless steels produced by SLM.		
More Information: - Website.		

HAELOUS		TRL 3-4
SINTEF	Hydrogenics, UBFC, Tecnalia, Varanger Kraft, KES	
Hydrogen-aeolic energy with optimised electrolysers upstream of substation.		
More Information: - Website		

EKARRIH2		TRL 3-4
TECNALIA		
Key technologies for hydrogen transport through liquid hydrogen carriers.		
More Information: - Website.		

Green Hydrogen Generation System Based on Off-Grid Wind Energy and Industrial Effluent Reuse		TRL 3-4
Universidade Estadual do Ceará - UECE. Brasil	CIEMAT	
The State of Ceará (Brazil) offers favourable conditions for the production of green hydrogen. It is currently one of the country's largest producers of renewable electricity, which can be used for green hydrogen production. However, large-scale hydrogen production and distribution face technological and financial challenges related to transport and distribution infrastructure and freshwater supply. In this context, distributed green hydrogen production represents a complementary alternative. The project investigates: (i) the use of a micro wind turbine to power an electrolyser; and (ii) the replacement of energy-intensive seawater desalination processes with industrial effluents as a water source. This approach also provides additional environmental benefits through wastewater reuse. The main objective is the modelling, implementation and evaluation of a prototype for distributed green hydrogen production through the electrolysis of industrial effluents powered by off-grid wind energy.		
More Information: - Website. - Contact email: *Mona Lisa Moura de Oliveira* (mona.lisa@uece.br) y *Rita Valenzuela* (r.valenzuela@ciemat.es)		

PROH2BIO		TRL 3-4
Universidad de Navarra	Tecnalia, Innov Air Mobil, GS, Automated Robotics	
Hydrogen-electric hybrid propulsion and bio-inspired designs for sustainable air transport.		
More Information:		

Multimaterial Additive Manufacturing for Electrodes in Alkaline Electrolysers		TRL 3-4
CSIC		
The objective of this project is the development of sustainable pastes and inks for multi-material direct ink writing (DIW) of energy conversion devices. The project aims to develop highly diverse materials, including metallic inks, carbon-based inks and carbon materials loaded with sustainable catalysts. These materials must possess suitable rheological properties for printing while also delivering the desired functionality. The final goal is to develop printable electrodes incorporating electrocatalysts for water-splitting reactions (HER and OER) and fuel-cell reactions (HOR and ORR).		
More Information:		

Bifunctional Catalysts Based on Agro-industrial Waste for Advanced Oxygen Reduction and Evolution Electrodes		TRL 3-4
ICP-CSIC		
Agro-industrial waste is being used to produce composite materials consisting of nitrogen-doped carbon matrices and non-precious transition metals. These materials act as electrocatalysts in electrochemical reactions occurring at oxygen electrodes in hydrogen technologies, including the oxygen reduction reaction in fuel cells, the oxygen evolution reaction in water electrolysers, and both reactions simultaneously as bifunctional catalysts in reversible fuel cells.		
More Information: - Contact email: mmartinez@icp.csic.es		

e-BioMeOH - e-Biomethanol Production from CO_2 through Microbial Electrosynthesis (MES)		TRL 3-4
CENER (Centro Nacional de Energías Renovables)	NAITEC (Fundación I+D Automoción y Mecatrónica)	
The project aims to demonstrate the feasibility of producing e-biomethanol (e-BioMeOH) through microbial electrosynthesis (MES), also known as electro-fermentation, using CO_2 from different sources and renewable electricity. This technology seeks to improve the production of advanced electro-biofuels by combining biological (fermentation) and electrochemical processes under the Power-to-X (P2X) concept. The project focuses on developing a disruptive technology that is economically and energetically viable, achieves a negative CO_2 emission balance, and provides a high-energy-density liquid energy carrier, particularly as a hydrogen vector.		
More Information: - Website. - Contact email: *Nere Garmendia* ngarmendia@naitec.es		

MultiMaterials Eco-efficient 3D printing of MultiMaterials with photo- & electrochemical activity for water treatment and the green H2 generation. IND2022/IND-23603		TRL 3-4
COLFEED4Print	ICV-CSIC	
Desarrollar soluciones de impresión 3D ecoeficientes aplicadas a la generación de hidrógeno verde. Este proyecto busca impulsar la descarbonización de la industria y el transporte mediante tecnologías avanzadas de fabricación aditiva.		
More Information: - Website. - Contact email: pablo.ortega@olfeed.com		

H2MetAmo - Technologies, Materials and Processes for the Small-Scale Production of Renewable Hydrogen Carriers (Methane and Ammonia) for Distributed Utilisation in Castile and León	TRL 3-4
Universidad de Burgos	
Studies and services addressing hydrogen embrittlement in metallic materials: - Assessment of commonly used materials, including structural and chemical characterisation of existing materials under hydrogen pressure and temperature conditions. - Proposal and development of alternative materials, including the manufacture of test specimens. - Structural and chemical characterisation of the developed materials.	
More Information: - Website.	

HYSTEELS - Modelling Hydrogen Effects and Applications in Additively Manufactured Steels	TRL 3-4
Universidad de Burgos, Grupo GIE.	Universidad de Oviedo - Grupo Simumecamat
The HySteels project aims to advance knowledge of the interactions between hydrogen and microstructure in different types of steel by combining in-situ experimental tests that reproduce real hydrogen exposure conditions with numerical models capable of predicting hydrogen accumulation within materials as well as operational hydrogen embrittlement phenomena. The project will develop an innovative experimental methodology for in-situ testing based on electrochemical hydrogen charging, which could provide an equivalent alternative to costly high-pressure gaseous hydrogen testing. Numerical simulations will support the modelling of different hydrogen charging methods and all potential failure modes associated with hydrogen embrittlement.	
More Information: - Website.	

Me2Hi - Methanol Fuel Cell and Electrolyser Device for On-Demand Hydrogen Production in Remote Locations	TRL 3-4
Technical Universidad de Madrid	
The Me2Hi project aims to develop a portable technology capable of producing high-purity hydrogen exclusively from e-methanol and air for use in refuelling fuel cell systems with low daily demands for hydrogen in rural or isolated areas. This system, based on a direct methanol fuel cell (DMFC) and an aqueous solution methanol electrolyser (EC-MeOH), will integrate a CO2 capture system (SCCO2) to put this by-product into the value chain during hydrogen production, for example through CO2 recycling in the production of e-methanol.	
More Information:	

H2LEAK	TRL 3-4
TEAM ingeniería	Tamoin, Trafag, Tecnalia
Advanced leak management platform for the hydrogen industry.	
More Information: - Website.	

SHINEFLEET	TRL 3-4
TECNICAS REUNIDAS	FM Logistic, Avia Ingeniería, Carbotainer, Cikautxo, Idneo, Fractalia, Tecnalia, Instituto de Tecnología Química (UPV-CSIC), Universidad Complutense de Madrid, Universidad Autónoma de Madrid, CNH2, Eurecat
Hydrogen-based technological solutions for intelligent and sustainable mobility of autonomous heavy-duty fleets.	
More Information: - Website.	

EP4H2		TRL 3-4
TECNALIA		
Advanced electronic technologies for improving electrolyser performance, including power electronics, optimal control systems and grid integration solutions.		
More Information: - Website.		

PlanH2		TRL 3-4
TECNALIA	CIDETEC, UPV/EHU, ENERGIGUNE, PETRONOR INNOVACION, CLUSTER DE ENERGIA,TEKNIKER	
Key technologies to drive the hydrogen economy in the Basque Country through green hydrogen generation.		
More Information: - Website		

ALLTOGAS		TRL 3-4
CARTIF	CIEMAT, Universidad de Sevilla, Universidad de Valladolid, EMASESA, EDIFESA	
Biomass and waste as feedstocks for the coupled production of hydrogen and methane in the new industrial energy transition scenario.		
More Information: - Website		

HIDRURA		TRL 3-4
TECNALIA	CIDETEC, UPV/EHU, POLYMAT, PETRONOR INNOVACION, CLUSTER DE ENERGIA, TEKNIKER	
Innovative technologies for the competitive production of green hydrogen.		
More Information: - Website.		

ONTZHI		TRL 3-4
TECNALIA	UPV/EHU, CIDETEC, GAIKER, PETRONOR INNOVACION, MULTIVERSE COMPUTING, CLUSTER DE ENERGIA, TEKNIKER	
Key technologies for hydrogen storage and transportation.		
More Information: - Website.		

AVOGADRO		TRL 3-4
IBERDROLA	ABC, CAF, Cikautxo, Ingeteam, Lointek, Lumiker, TTTGroup	
Advanced renewable gaseous hydrogen refuelling system for mobility applications.		
More Information: - Website		

H-ACERO		TRL 3-4
SARRALLE		
POWERING GREEN STEEL		
More Information: - Website.		

BioEFuel		TRL 3-4
INERCO	AICIA	
Research into fuel production from biomass oxy-combustion CO_2 and green hydrogen.		
More Information: - Website. - Contact email: *José Antonio Peregrín Fernández*, japeregrin@inerco.com		

4AIRCRAFT		TRL 3-4
FHA	KOKURITSU DAIGAKU HOJIN HOKKAIDO DAIGAKU, HELSINGIN YLIOPISTO, UNIVERSITAET BIELEFELD, FUNDACION BCMATERIALS - BASQUE CENTRE FOR MATERIALS, APPLICATIONS AND NANOSTRUCTURES, UNIVERSITA DEGLI STUDI DI TORINO, AGENCIA ESTATAL CONSEJO SUPERIOR DEINVESTIGACIONES CIENTIFICAS, UNIVERSITEIT ANTWERPEN, UNIVERSIDADE DE SAO PAULO	
Production of sustainable aviation fuel through a cleaner and more sustainable direct conversion of CO_2 and H_2.		
More Information: - Website. - Contact email: *Vanesa Gil*, vgil@hidrogenoaragon.org		

H2SAREA		TRL 3-4
NORTEGAS	ABC Compresores, C.A.E., S.L. – FIDEGAS, H2SITE, Erreka Fastening Solutions, Orkli, Tecnalia, IKERLAN, CNH2	
Development of advanced technological solutions for the safe distribution of hydrogen through the natural gas network.		
More Information: - Website		

CICE2025		TRL 3-4
CIC ENERGIGUNE		
Computational tools for the discovery of novel molecules for energy storage processes.		
More Information: - Website		

SEGURH2		TRL 3-4
TECNALIA	IKOR Technology Centre, Universidad de Mondragón, UPV/EHU, Tekniker, BCAM	
Safe and reliable hydrogen environments.		
More Information: Website		

HYNNOVA		TRL 3-4
BOSLAN	ABC Compresores, Cikautxo, Erreka, Fluytec, H2SITE, IDEC, Innomat, Novargi, Saitec, Tamoin, Team Ingeniería, ABCTECH, CIKATEK, Cluster de Energía, Leartibai, Tecnalia, Bantec	
New advanced technological solutions for the modular design and efficient, safe management of large-scale renewable hydrogen production plants.		
More Information: - Website.		

ECOFOSS		TRL 3-4
Navantia Seanergies	Sener, Red Eléctrica Española, Ditrel, Ocean Ecostructures y Uptech Sensing	
The objective of ECOFOSS is to develop the design of a zero-emission high-voltage AC floating offshore wind substation, enabled by a hydrogen plant that will provide electrical power to auxiliary equipment during maintenance and emergency conditions. To achieve this, electrolysis and fuel-cell equipment will be tested at small scale and low power levels in a land-based demonstrator designed to simulate the motion of a floating platform. The demonstrator incorporates a hexapod, a platform capable of reproducing movement and acceleration along multiple axes, on which the main energy generation equipment, namely the fuel cell and electrolyser, will be installed to assess the impact of motion on equipment operation. New testing capabilities have been developed for this purpose, including a test bench that will supply the auxiliary systems and demonstrator equipment (cooling systems, management of inputs, products and by-products) while ensuring safety functions such as ventilation and fire suppression.		
More Information: - Website.		

OPTHYCS		TRL 3-4
ENAGAS	GRTGaz, TECNALIA, GERG, LUMIKER, FEBUS, FHA	
Optical fibre-based hydrogen leak detection and monitoring systems.		
More Information: - Website. - Contact email: *Pedro Casero*, pcasero@hidrogenoaragon.org		

GreenLiFTech		TRL 3-4
Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón	UNIVERSIDAD DEL PAÍS VASCO, BCMATERIALS	
Advancing efficient methanol production through the recycling of greenhouse gas emissions: component assessment, process design and validation.		
More Information: - Website. - Contact email: *Vanesa Gil*, vgil@hidrogenoaragon.org		

H2INTEGRA		TRL 3-4
PETRONOR		
Development of technological solutions for the optimal integration of hydrogen logistics with end-use applications.		
More Information: - Website		

ERABILH2_PLUS		TRL 3-4
IKERLAN	CEIT, CAF I+D, TECNALIA, UNIVERSIDAD DE MONDRAGON, SIDENOR I+D, UPV/EHU, TEKNIKER	
Advanced solutions for the deployment and utilisation of hydrogen in end-use applications, including mobility and industrial processes.		
More Information: - Website.		

Hydrogen4Mobility		TRL 3-4
EIT URBAN MOBILITY	Eurecat	
Study on the role of hydrogen in urban mobility.		
More Information: - Website. - Contact email: pedro.nadal@eurecat.org		

H2BASQUE		TRL 3-4
TECNALIA		
A Basque R&D initiative focused on developing advanced technologies and innovative components for the low-cost production of green hydrogen.		
More Information: - Website.		

H24NEWAGE		TRL 3-4
TECNALIA	Cartif, Circe, Ain	
Development of advanced technologies and their transfer to industry to strengthen the position of Spanish research centres and companies within the hydrogen value chain, particularly in hydrogen production, storage and distribution.		
More Information: - Website.		

HYSHORE		TRL 3-4
BOSLAN	Astilleros Murueta, Naviera Murueta, Navacel, ABC Compressors, Tratamientos Térmicos TTT Group, Acería de Álava, Tubacex Tubos Inoxidables, Tubacoat, Tubacex Innovación y Erreka	
Stimulate and strengthen the capabilities of the Basque Country's shipbuilding, offshore renewable energy and oil and gas industries (as they undergo transformation), as well as its emerging hydrogen industry.		
More Information: - Website		

H2OCEAN		TRL 3-4
ASTILLEROS MURUETA	H2Site, Ingeteam, Sener, SKV, Guascos Energy, Oliver Design, Pine, Wärtsilä	
Research into less mature technologies to position Basque industry as a national and international leader in the development of the sustainable vessel of the future, primarily powered by hydrogen-based technologies.		
More Information: - Website		

TRL 5-6 projects.

GREENHYCELL - Development of New Green Hydrogen Generation System Prototypes to Enhance the Competitiveness of Spanish Industry	TRL 5-6
IDEA INGENIERIA	REGENERA LEVANTE, GARITA AUTOMOTIVE, VIELCA MEDIO AMBIENTE, VODIK, ICP-CSIC, UPCT, TEKNIKER
The overall objective of the Green HyCell project is to investigate a new conceptual design for Proton Exchange Membrane Water Electrolysers (PEMWEs) based on alternative materials to those currently used in PEM electrolysers. The project will develop anode and cathode electrodes with a low content of noble metals (Ir and Pt, respectively), as well as porous transport layers (PTLs) based on titanium fibre felts for the anode and carbon-based gas diffusion layers (GDLs) for the cathode. In addition, stainless-steel bipolar plates (BPs) coated with non-noble (or non-critical) metals will be developed. A PEM electrolyser prototype (0.5-1 kW) will be assembled and validated.	
More Information:	

MEASURED - Advanced MEAs Ensuring High-Efficiency HDVs	TRL 5-6
ADVANCED ENERGY TECHNOLOGIES AE EREUNAS & ANAPTYXIS YLIKON & PROIONTONANANEOSIMON PIGON ENERGEIAS & SYNAFON SYMVOULEFTIKON Y PIRESION (ADVENT)	Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV
The project will provide advanced and cost-effective Proton Exchange Membrane (PEM) materials and stable membrane electrode assemblies (MEAs) capable of operating at temperatures above 160°C. High-Temperature PEM technology (HT-PEM) has already demonstrated competitiveness for heavy-duty vehicles (HDVs). The integration and simulation of the MEA within a fuel-cell stack will contribute to sustainable HDV applications and advance the technology towards TRL 4. Modelling and simulation tools will be applied to improve MEA performance and durability. The project will optimise MEA components, investigate ionomers and membranes capable of operating under low-humidity conditions, and develop highly durable catalysts, catalyst supports and membranes. Environmental aspects, including recyclability and material circularity, will also be assessed, together with potential applications in the maritime, aviation and railway sectors.	
More Information:	

HYSTORE		TRL 5-6
CIEMAT	ICP/CSIC	
HYSTORE aims to demonstrate the feasibility of the direct use of Liquid Organic Hydrogen Carriers (LOHCs) in electrochemical devices with zero CO_2 emissions, both for energy production through dehydrogenation and for hydrogen storage during reversible operation. The project represents a proof of concept for the development of electrochemical devices capable of directly storing and converting hydrogen in the form of organic liquids, enabling fully reversible power-generation systems in which water is the only oxidation by-product. The project combines an innovative concept with the tailored design of an electrochemical system based on advanced materials and components.		
More Information: - Website. - Contact email: paloma.ferreira@ciemat.es / MatH2@ciemat.es		

INNOMAT-H2 - Design and Validation of Innovative Materials for Proton Exchange Fuel Cell Electrolytes in Vehicles		TRL 5-6
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV		
The INNOMAT-H2 project focuses on the development of new materials for hydrogen fuel cell applications in the transport sector and their validation from the microscopic scale up to pilot-plant level.		
More Information:		

DIVERGENT - Design of Advanced Control Strategies for the Next Generation of Fuel Cell Trucks Supporting the Decarbonisation of the Transport Sector	TRL 5-6
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
The project aims to develop advanced control strategies for fuel-cell-powered trucks operating under real driving conditions to maximise performance and durability while minimising emissions and vehicle lifecycle costs. The project contributes to decarbonisation, improved energy efficiency and storage, renewable hydrogen deployment, economic electrification, nature-based solutions and enhanced resilience across multiple sectors. Its key innovation lies in evaluating and optimising durability and efficiency through energy management strategies for fuel-cell trucks under realistic driving conditions, while assessing their impact on emissions and lifecycle costs and comparing degradation effects against standardised durability testing protocols.	
More Information:	

DIALOGUE - Design of efficient and stable low-nox hydrogen burners	TRL 5-6
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
The project aims to compare three hydrogen burner concepts, ranging from premixed diffusion combustion to micromixing configurations based on multi-regime pilot-assisted flames. The performance evaluation of the selected burners will make it possible to identify the governing factors behind each concept and support industry stakeholders in selecting the most promising solution. Experimental environments will include atmospheric-pressure burners, high-pressure and high-temperature test benches, and operating conditions representative of engine applications. Optical diagnostics will include high-speed visualisation tools, spectroscopic techniques and laser-induced fluorescence methods. CFD modelling will make extensive use of detailed chemical kinetics and advanced turbulence-chemistry interaction models based on Large Eddy Simulation (LES) approaches.	
More Information:	

AURORA - Design of Advanced Hydrogen Fuel Cell Aircraft for the Deployment of Sustainable and Decarbonised Air Mobility	TRL 5-6
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
The feasibility assessment of different aircraft architectures for advanced air mobility solutions and the development of a virtual vehicle simulation platform contribute significantly to the strategic line "Modelling, Mathematical Analysis and New Mathematical Solutions for Science and Technology" within the thematic area "Digital World, Industry, Space and Defence". Through the application of hydrogen and fuel-cell technologies to urban and regional air transport, the project also contributes to the strategic line "Climate Change and Decarbonisation" within the thematic area "Climate, Energy and Mobility".	
More Information:	

Research into New Technologies to Improve the Performance of Medium-Scale Alkaline Electrolysers for Hydrogen Self-Consumption Applications	TRL 5-6
Indox Energy Systems SL	
The project focuses on the investigation of various components used in medium-scale alkaline electrolysers, aiming to advance them beyond the current state of the art and, in the short term, develop an in-house solution for the commercialisation of a modular electrolyser. The proposed system will be capable of operating in combination with renewable energy sources and converting electricity into hydrogen more efficiently. This project has received support from ACCIÓ - Generalitat de Catalunya under the 2022 Industrial Research and Experimental Development Projects for Climate Change Challenge programme.	
More Information:	

SHIMMER		TRL 5-6
SINTEF	Tecnalia, SNAM, POLITO, INIG, TNO, BAM, Gaz-System, GERG, Gassco, Redexis, INRETE, Enagás Transporte	
The SHIMMER project seeks to facilitate greater integration of non-fossil gases and ensure the safe injection of hydrogen into multi-gas networks while strengthening knowledge of associated risks and opportunities. Key activities include: - Analysis of European gas infrastructure and operating conditions. - Assessment of network integrity and safety management. - Evaluation of flow capacity through virtual gas-network modelling.		
More Information: - Website.		

OceanH2		TRL 5-6
Acciona Industrial	Acciona Construcción, Acciona Ingeniería, Redexis S.A., Técnicas y servicios de Ingeniería S.L., Ariema Energía y medioambiente, Bluenewables y Wunder Hexicon	
The OCEANH2 project focuses on the industrial research and development of a modular, flexible and intelligent offshore green hydrogen generation, storage and distribution plant powered by offshore renewable electricity generation through the hybridisation of floating wind and floating photovoltaic technologies.		
More Information: - Website.		

MACBETH - Membranes And Catalysts Beyond Economic and Technological Hurdles		TRL 5-6
EVONIK	Evonik Performance Materials Gmbh, Evonik Technology & Infrastructure Gmbh, Liqtech International A/S, Friedrich-Alexander-Universitaet Erlangen Nuernberg, Danmarks Tekniske Universitet, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Helmholtz-Zentrum Geesthacht Zentrum Fur Material- Und Kustenforschung Gmbh, Technische Universiteit Eindhoven, Fundacion Tecnalia Research & Innovation, I.C.I Caldaie Spa, Politecnico di Milano, Rauschert Kloster Veilsdorf Gmbh, Engie, Kt – Kinetics Technology Spa, Universita Degli Studi Di Salerno, Ciaotech Srl, Enzymicals Ag, Chiralvision Bv, Vlaamse Instelling Voor Technologisch Onderzoek N.V., Johnson Matthey Plc y CNH2	
Development of highly efficient Catalytic Membrane Reactors (CMRs) through the integration of catalytic synthesis and separation processes within a single reactor for hydrogen production, hydroformylation and propane dehydrogenation. This disruptive technology enables significant reductions in greenhouse gas (GHG) emissions while increasing the energy and resource efficiency of large-scale industrial processes. The innovative reactor design will result in substantially smaller and safer production plants, thereby reducing both capital and operating costs. One of the hydrogen production reactors developed within the project will be integrated, tested and validated in a natural gas plant at the facilities of the Centro Nacional del Hidrógeno (CNH2).		
More Information: - Website.		

ATMOSPHERE		TRL 5-6
IBERDROLA	INGETEAM, IDESA, ABC, INNOMERICS, INERCO, TECNALIA	
New technologies for hydrogen storage, generation and safety in green hydrogen plants.		
More Information: - Website. - Contact email: *José Antonio Peregrín Fernández*, japeregrin@inerco.com		

Green – H2	TRL 5-6
Eurecat	
The major challenges addressed by the Green-H2 project are: - The conversion of electrical energy into chemical energy through the production of green hydrogen as an energy carrier capable of enabling more flexible energy use across multiple applications; and - The use of green hydrogen as a key feedstock for the chemical industry, supporting the transition towards a low-carbon economy. To address these challenges, the Green-H2 project will develop key enabling technologies across the green hydrogen value chain, including hydrogen production processes, energy conversion and storage technologies such as fuel cells and electrolysers, and thermocatalytic technologies capable of using green hydrogen to produce liquid fuels and value-added chemicals.	
More Information: - Contact email: pedro.nadal@eurecat.org	

SCWG - Gasificación supercrítica de biomasa	TRL 5-6
Cade Soluciones de Ingeniería	
Supercritical biomass gasification test platform.	
More Information:	

SUNCOCHEM		TRL 5-6
Eurecat	POLITECNICO DI TORINO,THE REGENTS OF THE UNIVERSITY OF CALIFORNIA,HELMHOLTZ-ZENTRUM BERLIN FUR MATERIALIEN UND ENERGIE GMBH,FONDAZIONE ISTITUTO ITALIANO DI TECNOLOGIA,CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE CNRS,UNIVERSITE DE MONTPELLIER,SOLARONIX SA,AVANTIUM CHEMICALS BV,AVANTIUM SUPPORT BV,LAURENTIA TECHNOLOGIES SLL,IOLITEC IONIC LIQUIDS TECHNOLOGIES GMBH,HYSYTECH SRL,DOW CHEMICAL IBERICA SL,IFF BENICARLO SL,INTERNATIONAL FLAVORS & FRAGRANCES INC.,ASOCIACION ESPANOLA DE NORMALIZACION,DIETHNES PANEPISTIMIO ELLADOS	
Development of a Tandem Photo-Electrocatalytic Reactor (TPER) for the production of chemicals from renewable resources based on CO_2, water and sunlight, integrating CO_2 capture and conversion into a single device.		
More Information: - Website. - Contact email: pedro.nadal@eurecat.org		

Valor H2		TRL 5-6
Hiperbaric	ARIEMA Enerxía, Aciturri, Desmasa. DGH, Addisseo, MTorres	
Research into new technologies, materials and processes associated with the hydrogen value chain.		
More Information: - Website		

Hydrogen Production through Enhanced Residual Biomass Gasification	TRL 5-6
Institute of Carbon Science and Technology - CSIC	
The project focuses on hydrogen production through enhanced biomass gasification. In this process, biomass is steam-gasified in the presence of steam and calcium oxide, producing a gas stream containing more than 70% hydrogen by volume on a dry basis. The project also addresses syngas cleaning, including the removal of chlorine-containing species, sulphur compounds and tars, as well as increasing hydrogen concentration through the integration of a water-gas shift reactor. As a result, a biomass gasification plant with a nominal capacity of 100 kWth will be available. Enhanced biomass gasification with integrated CO_2 capture and a complete gas-cleaning train will be demonstrated, producing a gas stream with a hydrogen content between 70% and 80% by volume on a dry basis.	
More Information:	

IRON NPE	TRL 5-6
AIRBUS Operations	Aertec, Airbus Upnext, Altran Innovation, ARIEMA Enerxía
Design and development of new hydrogen system architectures capable of supplying auxiliary power to aircraft.	
More Information: - Website.	

Regenera	TRL 5-6
Confidential Information	Confidential Information
Research into hybrid energy storage technologies and predictive models to transform industrial facilities into distributed renewable energy management hubs.	
More Information:	

VAL2H2		TRL 5-6
Sorigué	Eurecat, Universidad Rovira i Virgili (URV), IREC, CIEMAT e INDOX.	
The VAL2H2 project develops technologies that enable the conversion of difficult-to-manage biowaste into renewable hydrogen. VAL2H2 adopts a decentralised approach to hydrogen production, enabling its local and circular use as fuel for waste collection and transport vehicles. The project covers the entire hydrogen value chain, including production, purification, analysis, storage and end use. For hydrogen production, research activities focus on the combination of microwave pre-treatment with fermentation and reforming processes, as well as thermochemical conversion routes. For hydrogen purification, several technologies are being investigated, including membrane reactors for selective hydrogen separation and enrichment. VAL2H2 addresses multiple challenges simultaneously, including the energy transition, the development of a circular economy, and the protection of soil and water resources.		
More Information:		

BrainEn		TRL 5-6
SISTEM	Universidad Politécnica de Madrid	
Demonstration of a biomethane pyrolysis reactor based on liquid-metal bubbling technology for the production of hydrogen and carbon.		
More Information: - Website.		

GREENH2-CM		TRL 5-6
CIEMAT	Instituto IMDEA Energía, UCM, CEU-San Pablo, UPM, INTA, UC3M	
Strategic positioning of the Community of Madrid in green hydrogen and fuel cell R&D&I. The project focuses on: - The development of innovative hydrogen production technologies based on low-temperature electrolysis, high-temperature electrolysis and other novel pathways. - Increasing hydrogen production efficiency through optimisation of the renewable electricity-electrolyser interface, including off-grid operation. - The development of technologies that optimise fuel cell integration across various applications. - The development of safe hydrogen combustion technologies for both pure hydrogen and hydrogen blends in end-use devices such as burners, engines and turbines.		
More Information:		

ARENHA - Advanced materials and Reactors for ENergy storage tHrough Ammonia		TRL 5-6
TECNALIA	TECHNISCHE UNIVERSITEIT EINDHOVEN (TUe), CENTRO NACIONAL DEL HIDRÓGENO (CNH2), DANMARKS TEKNISKE UNIVERSITET (DTU), FRAUNHOFER, UNITED KINGDOM RESEARCH AND INNOVATION, PROTON VENTURES, ELCOGEN, HYDROGEN ONSITE, S.L., PSA ID y ENGIE.	
Research project with global impact seeking to develop, integrate and demonstrate key material solutions enabling the use of ammonia for flexible, safe and profitable storage and utilization of energy		
More Information: - Website.		

HIDROGENIA		TRL 5-6
SOFITEC	Eurecat	
Design, manufacture and validation of a gaseous hydrogen storage tank with improved permeability properties for aeronautical applications.		
More Information: - Website. - Dirección de Contact email: pedro.nadal@eurecat.org		

TRL 7-8 projects.

H2PORTS - Implementing Fuel Cells and Hydrogen Technologies in Ports	TRL 7-8
FUNDACIÓN VALENCIAPORT	BALLARD, AUTORIDAD PORTUARIA DE VALENCIA, CNH2, Mediterranean Shipping Company Terminal Valencia SAU, Hyster-Yale Nederland B.V, GRIMALDI EUROMED SPA, Atena scarl - Distretto Alta tecnologia Energia Ambient y ENAGAS, S.A.
The project aims to provide real zero-emission solutions for the port industry and facilitate the rapid deployment of hydrogen technologies within the sector. To achieve this, several hydrogen and fuel-cell-based prototypes will be developed. The first will be a container-handling reach stacker tested under real operating conditions. The second will be a terminal tractor capable of performing standard container-handling operations. Finally, a hydrogen refuelling station will be deployed to supply hydrogen to these vehicles. In addition, the project has a strong cross-sectoral dimension by providing sustainable hydrogen supply in ports and coordinating all relevant stakeholders, including hydrogen consumers, suppliers and producers.	
More Information: - Website. - Contact email: *Cristina Ballester*, cristina.ballester@cnh2.es	

FCH2RAIL - Fuel Cell Hybrid PowerPack for Rail Application	TRL 7-8
Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR)	Construcciones y Auxiliar de Ferrocarriles, S.A.(CAF), Toyota Motor Europe NV/SA (TME), Entidad Pública Empresarial, RENFE – Operadora, Administrador de Infraestructuras Ferroviarias (ADIF), Centro Nacional del Hidrógeno (CNH2), Infraestruturas de Portugal S.A. (IP), STEMMANN-Technik GmbH (STT).
The project aims to develop, build, test, demonstrate and certify a scalable, modular and versatile hybrid fuel-cell PowerPack suitable for a wide range of rail applications, including regional trains, freight locomotives and shunting locomotives. The solution is also designed for the retrofitting of existing electric and diesel rolling stock. The hybrid fuel-cell PowerPack will be demonstrated on a retrofitted bi-modal regional train capable of drawing electricity from overhead catenary systems on electrified sections while using the fuel-cell-based power system on non-electrified routes. An innovative train-wide energy management system will minimise energy consumption and power demand.	
More Information: - Website. - Contact email: *Beatriz Nieto*, beatriz.nieto@cnh2.es	

IMPROVEMENT - Integration of Renewable Energy Microgrids with Combined Heating, Cooling and Power Generation for Nearly Zero-Energy Public Buildings under High-Quality and Reliable Electricity Supply Requirements	TRL 7-8
Centro Nacional del Hidrógeno (CNH2)	Laboratório Nacional de Energia e Geologia de Portugal (LNEG), la Ecole Nationale Supérieure de Mécanique et Aérotechnique (ENSMA), la Universidad de Córdoba, la Universidad de Castilla La Mancha, la Université de Perpignan Via Domitia, el Instituto Superior Técnico de Lisboa; la Agencia Andaluza de la Energía y a nivel de Gobierno Regional la Junta de Andalucía.
The main objective of the project is to transform existing public buildings into nearly zero-energy buildings through the integration of renewable energy microgrids with combined heating, cooling and power generation systems, together with energy storage technologies. The project will develop the key elements required for the deployment of a new generation of renewable microgrids capable of supplying both thermal energy (heating and cooling) and electricity. This technology will improve power quality and supply continuity, which are essential requirements for facilities with energy-intensive high-tech equipment such as hospitals, research centres and transport hubs.	
More Information: - Website. - Contact email: *Javier Tobajas*, javier.tobajas@cnh2.es	

Design and Integration of a Fuel Cell Auxiliary Power System (FCAPS) for Refrigerated Vehicles	TRL 7-8
Confidential Information	CITES
Development of a refrigerated van for the transportation and distribution of chilled or frozen perishable goods, in which the refrigeration compressor is powered by a fuel cell whenever the vehicle is stationary. This solution eliminates the need to keep the main engine running during deliveries or driver rest periods, reducing emissions, fuel consumption and noise levels.	
More Information:	

Configuration and Management of a Smart Renewable Microgrid Hybridised with Hydrogen Technologies (DPI2017-85540-R)	TRL 7-8
CITES	
A fully renewable electrical microgrid capable of operating 24/7 through the integration of the complete green hydrogen cycle, including hydrogen production, storage and utilisation. The microgrid combines photovoltaic and wind energy generation. During periods of renewable energy surplus, electrolysers produce hydrogen for storage. During periods of renewable energy deficit, the stored hydrogen is converted back into electricity using fuel cells. An intelligent energy management system enables the microgrid to operate both connected to and isolated from the main grid, while also allowing energy trading with the external network.	
More Information:	

Design, Development and Construction of a Modular Fuel Cell Stack: Instrumentation and Control, Online Monitoring and Degradation Analysis (DPI2013-43870-R)	TRL 7-8
CITES	
Development of an air-cooled PEM fuel cell consisting of four 3.6 kW stacks. The system incorporates an intelligent control platform capable of performing predictive maintenance and ensuring that degradation occurs uniformly across all stacks throughout their operational lifetime.	
More Information:	

ECLOSION - New Materials, Technologies and Processes for the Production, Storage, Transport and Integration of Renewable Hydrogen and Biomethane from Biowaste	TRL 7-8
AQUALIA	Cade Soluciones de Ingeniería, FCC Medio Ambiente, H2B2. Mindcaps, Idecal, Ghenova y Ariema Enerxia.
Research and development project focused on supercritical gasification technologies for the production of renewable gas streams composed mainly of biohydrogen, biomethane and CO_2 obtained from the treatment and valorisation of organic matter contained in sewage sludge, agri-food waste, municipal biowaste and sanitised digestate. The project includes the design, manufacture, assembly and commissioning of a pilot plant incorporating high-pressure renewable gas storage systems and gas purification and separation technologies.	
More Information:	

ZEPPELIN	TRL 7-8
AQUALIA	NATURGY Nuevas Energías, NORVENTO, REGANOSA Servicios, PERSEO Biotechnology, REPSOL, Técnicas Reunidas, CIEMAT, EnergyLab, ITQ-CSIC, Redexis
The ZEPPELIN project focuses on the research and development of innovative and efficient green hydrogen production and storage technologies based on the valorisation of waste and industrial by-products within a circular economy framework. Its goal is to significantly improve the cost competitiveness and efficiency of renewable hydrogen production.	
More Information: - Website. - Contact email: innovacion@aqualia.es	

FORMPLATE	TRL 7-8
ESTAMP, S.A.U.	Eurecat
Innovation in materials, design and manufacturing processes for high-performance, durable PEM fuel cell bipolar plates.	
More Information: - Contact email: pedro.nadal@eurecat.org - Website.	

HACDOS		TRL 7-8
FACSA	URV, EURECAT, ENDESA	
Production of solar hydrogen from wastewater using cost-effective and scalable photocatalytic panel technologies.		
More Information: - Contact email: pedro.nadal@eurecat.org		

Projects for which no TRL level has been specified

Proposal for the Design and Machining of Bipolar Plates for the Assembly of an AEM Electrolyser Stack	Confidential Information
Confidential Information	CITES
Design proposal and machining of bipolar plates for the assembly and integration of an Anion Exchange Membrane (AEM) electrolyser stack.	
More Information:	

Experimental Study of Hydrogen Burners	Confidential Information
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
Computational Fluid Dynamics (CFD) studies are being carried out on hydrogen burners for gas turbine combustion chambers. The CMT Institute is performing experimental measurements to validate CFD model predictions, contributing to a better understanding of hydrogen utilisation in combustion chambers.	
More Information:	

Computational evaluation of mixture formation and combustion process in a DI hydrogen-fueled SCE	Confidential Information
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
This project focuses on the computational analysis of mixture formation and its impact on combustion in a single-cylinder Direct-Injection Spark-Ignition Engine (DI-SI SCE) fuelled with hydrogen, using Computational Fluid Dynamics (CFD). A detailed numerical investigation will be conducted to analyse the formation of the air-fuel mixture inside a single-cylinder engine available at the CMT facilities. The simulation methodology developed by CMT will be applied, incorporating all recently implemented features and tools specifically designed to model hydrogen combustion processes.	
More Information:	

Experimental Investigation of Hydrogen Mixing and Combustion Process on Optical H2-ICE Single Cylinder Engine	Confidential Information
Instituto Universitario CMT - Clean Mobility & Thermofluids - UPV	
This project focuses on the experimental analysis of mixture formation and its impact on combustion in a hydrogen-fuelled single-cylinder Direct-Injection Spark-Ignition Engine (DI-SI SCE). Experiments will be conducted using an optical single-cylinder engine available at the CMT facilities to investigate in detail the phenomena involved in air-fuel mixture formation within the cylinder and their impact on ignition and flame propagation processes. The objective is to achieve a deeper understanding of how direct hydrogen injection and engine operating conditions influence ignition and combustion characteristics.	
More Information:	

HYPOP - HYdrOgen Public OPiniOn and acceptance		No aplica
Environment Park S.p.A. (Parco Scientifico Tecnologico per l'Ambiente), Turin, Italy	TWEED Cluster (Bélgica), Pomeranian Hydrogen Cluster (Polonia), BH2 – Balkan Hydrogen Cluster (Bulgaria), IMDEA Energía (España), CNH2 – National Hydrogen Centre (España), IMI – Institute for Methods Innovation (Irlanda), y APRE – Agenzia per la Promozione della Ricerca Europea (Italia).	
HYPOP is a project running from 2023 to 2025 aimed at increasing public awareness of and confidence in hydrogen technologies and their benefits. To achieve this objective, a range of activities will be carried out, including the development of best-practice guidelines defining effective approaches for engaging citizens, end users and stakeholders in the deployment of hydrogen technologies; the creation of a social platform hosting audiovisual materials related to hydrogen technologies; and the definition of indicators to support a Social Life Cycle Assessment (S-LCA) of hydrogen focused on public acceptance.		
More Information:		

Hydrogen Hub Asturias - Research Towards a Unique Scientific Infrastructure to Boost the Green Hydrogen Value Chain (H2 Asturias)		Confidential Information
ArcelorMittal	ITURCEMI; MAGNA DEA; IDESA; IDONIAL; H2VECTOR; UNIOVI; INCAR-CSIC	
The H2ASTURIAS project aims to investigate the hydrogen value chain in an industrial environment in order to design and develop a benchmark scientific infrastructure that goes beyond the current state of the art and existing facilities in Spain and Europe. The facility will support the research and demonstration of technologies related to the industrial use of green hydrogen, both as a standalone energy carrier and in combination with industrial gases used in sectors such as chemicals and steelmaking.		
More Information:		

HYWARE - Renewable Hydrogen from Waste: A Circular Solution for Land-Constrained Regions		*No Aplica*
Fundación IMDEA Energía		
HYWARE proposes the development of mathematical models for hydrogen production processes from waste streams, including gasification, reforming of aqueous fractions from hydrothermal treatment and waste pyrolysis, steam reforming and catalytic decomposition of biomethane, dark fermentation and microbial fuel cells. The project will also generate the experimental data required to model innovative biogas reforming pathways considered at European level to be among the most promising alternatives. All processes will be assessed using environmental, economic and social life-cycle indicators. The resulting information will feed the HYWARE model, which will generate inventories for potential waste management systems integrating hydrogen production at regional level. HYWARE will enable multi-objective optimisation of these systems in terms of cost, environmental footprint and social risk. In addition, regional energy planning models will be adapted to determine the maximum quantity of electrolytic hydrogen that can be produced based on renewable energy availability. The final outcome of HYWARE will be a decision-support tool capable of identifying the optimal combination of electrolytic and circular hydrogen for each region while minimising costs and ensuring environmental sustainability and social responsibility.		
More Information:		

e-GHOST: Establishing Eco-design Guidelines for Hydrogen Systems and Technologies		No aplica
Fundación IMDEA Energía	The Institute of Applied Energy; Commissariat à l´énergie atomique et aux énergies alternatives; Univerza v Ljubljani; Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón; Symbio	
Within the e-GHOST project, two sustainable design guidelines were developed: one for a PEM fuel cell stack for automotive applications and another for a solid oxide electrolyser stack. The objective of these guidelines is to minimise environmental, economic and social impacts from the product design stage onwards. Based on the lessons learned throughout the project, a white paper on the sustainable design of hydrogen systems in general was also published.		
More Information:		

SH2E: Sustainability Assessment of Harmonised Hydrogen Energy Systems: Guidelines for Life Cycle Sustainability Assessment and Prospective Benchmarking		No aplica
Fundación IMDEA Energía	The Institute of Applied Energy; Greendelta GmbH; Forschungszentrum Jülich GmbH; Commissariat à l'énergie atomique et aux énergies alternatives; Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón; Symbio	
The objective of SH2E was to provide a harmonised, multidimensional and methodologically consistent framework for the life-cycle sustainability assessment of hydrogen systems. To this end, SH2E developed specific methodological guidelines covering Environmental Life Cycle Assessment (LCA), Life Cycle Costing (LCC), Social Life Cycle Assessment (S-LCA), and the integration of these methodologies for hydrogen systems. In addition, a materials criticality indicator specifically tailored to the European context was developed.		
More Information:		

JUST-GREEN AFRH2ICA - Promoting a JUST transition to GREEN hydrogen in AFRICA		No aplica
Universita Degli Studi Di Genova	Bluenergy Revolution scrl; STAM SRL; Commissariat A L Energie Atomique ET Aux Energies Alternatives; Fundación IMDEA Energía; Noordwes-Universiteit; African Hydrogen Partnership; Institut de Recherches En Energie Solaire Et Energies Nouvelles; Strathmore University; Forschungszentrum Julich GMBH; ARTELYS.	
A sustainability assessment of hydrogen production using both alkaline and PEM electrolysers was carried out across four case studies. The results identified renewable electricity generation (including solar PV, wind, geothermal and hydropower) and electrolyser manufacturing as the main environmental, economic and social hotspots. By contrast, water treatment processes (both seawater and groundwater) and the hydrogen production plants themselves showed relatively low contributions to the assessed environmental impact indicators. From an environmental perspective, the carbon footprint associated with the production of 1 kg of hydrogen ranged from 1.4 to 2.3 kg CO_2 eq, remaining within the threshold generally considered to define clean hydrogen. The study concluded that, under the analysed scenarios, surplus electricity and water could be generated for local domestic use without exceeding the European threshold of 3 kg CO_2 eq/kg H_2. Regarding hydrogen applications, significant reductions in the carbon footprint of ammonia production (between 61% and 67%) were identified when replacing conventional hydrogen with clean hydrogen. Similarly, the carbon footprint of methanol production could be drastically reduced through the production of green methanol using clean hydrogen and direct air capture CO_2.		
More Information:		

Ad-Grhid		Confidential Information
Magtel	H2B2, Protio	
Integration of hydrogen storage technologies into microgrids.		
More Information:		

UES-365		Confidential Information
NTT	Confidential Information	
Underground storage of hydrogen, compressed air and biogas as energy carriers.		
More Information:		

UpHyMob	Confidential Information
Fundación para el Desarrollo de las Nuevas Tecnologías del Hidrógeno en Aragón	INNOVEA, INSTITUTO TÉCNICO LISBOA, GRUPO SAN VALERO, PROMEA
Reskilling the European workforce in hydrogen-powered fleets and the operation and maintenance of hydrogen infrastructure.	
More Information: - Website. - Contact email: *Gianluca Greco* ggreco@hidrogenoaragon.org	

Design and Integration of a Hydrogen Fuel Cell System into a Test Bench for an Aerial Platform	Confidential Information
Confidential Information	CITES
Design and integration of a hydrogen fuel cell system into a test bench for aerial platform applications.	
More Information: - Contact email: andujar@uhu.es	