PCI 9.1.2.

Hydrogen Interconnector Portugal-Spain

Non-technical summary

Co-funded by the European Union

Contents

1. Background and milestones in the development of green hydrogen

The commitment to the fight against climate change embodied in European and domestic energy policy underscores the need for a transition towards a decarbonised economy and energy model, implying a profound paradigm shift in the energy model, in which the priority for Europe and Spain lies in attaining energy sovereignty.

Green hydrogen is emerging as the energy vector that will enable the decarbonisation of industry and heavy transport, mainly by replacing fossil fuels.

This new context calls for the development of the necessary infrastructure, to:

- **Bring supply and demand closer together** and enable the penetration of green hydrogen into the energy *mix*.
- Achieve **energy storage** capacity that fosters the adequacy of energy supplies with a renewable energy *mix* that is characterised by its high variability and scant manageability.
- Ensure **industrial competitiveness** in a scenario that approaches NetZero by 2050.

1.1 European context

The **2015 Paris Agreement** and the **United Nations 2030 Agenda for Sustainable Development** marked the onset of a global agenda committed to sustainability and the fight against climate change, which involves the transformation of the economic and energy model in order to move towards decarbonisation.

The European Commission confirmed its strategic commitment to this agenda and the energy transition with its December 2019 presentation of the Green Deal, a package of policy initiatives aimed at putting the European Union (EU) on a pathway toward climate neutrality (net-zero emissions) by 2050. With the European Green Deal, the EU became the first region in the world to make a long-term net-zero emissions commitment, strengthening its leading position in the global fight against climate change. The European Council endorsed the Pact, recognising that **all relevant EU policies should be aligned with the goal of climate neutrality**.

In February 2022, the war in Ukraine brought about a paradigm shift in energy policy. Two weeks after Russia's invasion, **the European Union presented the** REPowerEU Plan, which endowed the continent with a common energy policy with the security of supply, decarbonisation and competitiveness as its main pillars. As a clean and indigenous resource, Europe is placing its bets on green hydrogen as a crucial ally for its strategic autonomy and to be Net Zero by 2050. With REPowerEU, it has set **a continent-wide consumption target of 20 million tonnes of renewable hydrogen by 2030.**

The European Union strengthened the commitment to green hydrogen and its infrastructures and made very significant progress in 2025:

- Within the 2028-2034 Multiannual Financial Framework, the European Commission has proposed allocating 30 billion euros of its CEF-E mechanism, compared with the previous figure of 6 billion euros, to support renewable hydrogen infrastructures and other projects.
- The allocation of European funds to the development of the Hydrogen Accelerator Bill in the first half of 2025 totalled €1,242 M, €992 M from the **2nd European Hydrogen Bank Auction** and €250 M from CEF-E funds.
- This year has also witnessed the launch of the EU's Energy and Raw Materials Platform, whose aim is to accelerate the creation of a European market for hydrogen and derivatives (ammonia, methanol and eSAF) geared towards infrastructure development.
- The regulatory framework governing emissions from clean hydrogen has been completed with the

publication of EU Delegated Act 2023/1184 and EU Delegated Act 2023/1185, complementing the previously published legislation on RFNBOs.

- The results of the second auction of the European Hydrogen Bank were announced in May 2025, with **Spain boasting the highest number of projects submitted and awarded** and the most competitive average production price.

- **Portugal held its first renewable gas (biomethane and green hydrogen) auction in January 2025, with an allocation totalling 140 million euros** over ten years that was financed by the Environmental Fund. The results of the auction in the green hydrogen segment were awarded in full, with all of the 120 GWh/year placed under contract at a base price of €127/MWh. The projects were divided between injection into the high-pressure gas transmission network and the medium/low-pressure gas distribution network. The main awardees guaranteed production volumes ranging between 5,000 and 30,000 MWh/year. The winning projects now have up to 36 months to start injecting renewable gases into the national grid.

- The injection of green hydrogen into the Portuguese gas infrastructure is regarded as significant for the start-up of the hydrogen market and the decarbonisation of the gas system before mass demand for hydrogen and its production occurs. In this respect, the Portuguese Government designated REN Gás as the Interim Hydrogen Transmission Network Operator (HTNO) in June 2025.

1.2 Domestic context

1.2.1 Context in Portugal

Portugal has developed a national roadmap for the deployment of hydrogen (EN-H2) as a key component of the Portuguese energy transition towards carbon neutrality. The 2050 Roadmap for Carbon Neutrality (RCN) Programme and the 2030 National Energy and Climate Plan (NECP) designed by the Portuguese Government define targets to secure **significantly fewer CO_2 emissions**, with the additional aim of guaranteeing energy sustainability for future generations, in keeping with the Paris Agreement.

Bearing in mind the governmental targets for the injection of hydrogen into natural gas infrastructures by 2025 and 2030, as well as the indicative trajectories for 2040 and 2050, several national funding lines (POSEUR, PRR, Innovation Fund, etc.) have been initiated, imposing on network operators the need to assess its compatibility with renewable gases, as some projects are expected to be connected to the national gas infrastructure in 2025. The first injections into the transmission system are scheduled for the fourth quarter of 2026.

Since the publication of the NECP and the RCN, the Portuguese government has gradually published a legal and regulatory framework to accompany the energy transition. Given that this documentation is available, REN has decided to summarise the relevant legal framework that is has at its disposal.

Portuguese National Hydrogen Strategy (EN-H2): The Portuguese National Hydrogen Strategy (EN-H2) is the official source of initiatives for the development of the hydrogen economy in Portugal. These include legal and regulatory measures to provide a solid and reliable basis for sustaining and promoting the deployment of hydrogen. The implementation of the plan is divided into three phases covering different periods of time.

Portuguese Decree-Law 62/2020 (DL 62/2020): Decree-Law 62/2020 establishes the organisation and functioning of the National Gas System (NGS) and the legal regimes applicable to the reception, storage and regasification of liquefied natural gas (LNG).

The incorporation of gases of renewable origin and low-carbon gases into the NGS networks is envisaged, facilitating their decarbonisation in domestic and industrial consumption. The above incorporation will also help to prevent the networks with concessions from becoming obsolete, allowing for their continued use.

The production of renewable and low-carbon gases is established as a liberalised activity, with few administrative requirements and adequate regulation to guarantee the security of the supply of the NGS. The producers of these gases can use them for any purpose, including self-consumption, injection into the public gas grid, supply by tanker to industrial and

private consumers, exports and application in the transport/mobility sector.

DL 62/2020* gives increasing recognition to renewable gases, particularly hydrogen, as modern, clean and versatile energy vectors, thus promoting **an energy transition committed to national economic development, competitiveness and sustainability.**

Although all the above-mentioned legislation is scheduled to enter into force in the short term, there is still no specific legislation on hydrogen in Portugal, except for the recently published general regulations for its transmission and distribution:

- Regulation of the National Gas Transmission Network, published in *Diário da República* issue 51/2025, Series 2, dated 13 March 2025.
- Regulation of the National Gas Transmission Network, published in *Diário da República* issue 42/2025, Series 2, dated 28 February 2025.

(*) Source: https://files.dre.pt/1s/2020/08/16800/0000800160.pdf?lang=EN

1.2.2 Context in Spain

The Spanish government has transferred the European energy policy framework to the domestic sphere. Fully aligned with the European Green Pact, since February 2019 Spain has had a **Strategic Energy and Climate Framework**, which constitutes the key tool for achieving the objective of decarbonising the economy. A regulatory and legal framework is provided through it for measures to facilitate the change towards a sustainable and competitive economic model that will play its part in slowing climate change.

The main elements of this framework are the Climate Change and Energy Transition Law, the Integrated National Energy and Climate Plan (INECP), the Long Term Decarbonisation Strategy 2050, the Energy Poverty Strategy and the Fair Transition Strategy. These elements are backed by a range of sector-based strategies and roadmaps, such as the **Renewable Hydrogen Roadmap** *(Hoja de Ruta del Hidrógeno Renovable)*.

The 2023-2030 Integrated National Energy and Climate Plan (INECP), approved in September 2024 by the Council of Ministers at the proposal of the Ministry for the Ecological Transition and the Demographic Challenge (MITECO), ambitiously pursues the deployment of renewable energies and increases the hydrogen consumption target for Spanish industry to 74% by 2030, compared to the 42% set out in the RED III Directive. Out of a consumption of approximately 650,000 tonnes, some 500,000 tonnes would be renewable hydrogen.

Furthermore, the INECP triples the capacity of electrolysers for renewable hydrogen production envisaged in the previous 2021 plan to 12 GW by 2030 and sets the target that 17.26% of the fuels used by Spanish transport will be non-biological renewables by that date, including hydrogen.

These objectives show that renewable hydrogen is a national project with which Spain has a historic opportunity to become the European **hub** that will produce the most competitive green hydrogen, which it will be able to pass on to the rest of the continent.

The INECP highlights the development of the Spanish Hydrogen Backbone and the international H2med corridor as strategic infrastructures.

2. Green hydrogen

2.1 What is it?

Hydrogen is the most abundant chemical element on the planet and it can be found in 75% of all matter on earth. It is often found together with other chemical elements such as oxygen, forming water, or carbon, forming other organic compounds such as hydrocarbons.

Green hydrogen as an energy vector is clean (it generates no emissions) as well as natively-produced and versatile, making it the ideal ally for the decarbonisation of many key sectors of the economy, in particular those in which electrification is not a viable solution, such as energy-intensive industry and heavy transport.

This energy vector is a key part of accelerating the energy transition process and fostering a future net-zero emissions economy. For all these reasons, green hydrogen is essential for achieving the goals of decarbonisation, security of supply and energy sovereignty set out by the European Union in its REPowerEU Plan.

2.2 How is it produced?

Green hydrogen is produced by the electrolysis of water in devices called electrolysers that use electricity to separate water (H_2O) into hydrogen (H_2) and oxygen (O_2). When this electricity comes from renewable sources, such as solar or wind, the resulting hydrogen is called “green” or “renewable” because of its low environmental impact. This process, which complies with the delegated acts and European directives, emits no CO_2, making it a key option for reducing emissions.

Electrolysers can be classified into different types, the main ones in use being what are known as alkaline and PEM (proton exchange membrane) electrolysers. The former are more suitable for industrial processes with stable electricity supply, because they respond less quickly to changes in electricity demand. However, PEM electrolysers are capable of operating with high efficiency and respond quickly to electrical variability, making them the best choice for renewable energies such as solar and wind.

Thanks to the versatility of green hydrogen and its capacity to be stored and transmitted, the production and consumption processes can be decoupled, allowing it to be produced in one place and used in another when needed.

2.3 Advantages of green hydrogen

Green hydrogen brings numerous benefits to different areas throughout the value chain, from environmental sustainability to its contribution to the country’s economic fabric and technological development:

- **Lower emissions:** by not emitting CO_2 during its production, it is key in the fight against climate change.
- **Versatility:** it can be used in all sectors, especially ones that are difficult to electrify, such as high-temperature process-intensive industries, industrial steel and fertiliser production and heavy transport.
- **Energy storage:** it is effective for storing renewable energy, allowing it to be used when production is low. It therefore helps to manage the intermittency of energies such as solar and wind, providing stability.
- It is **native, abundant** and key to improving the competitiveness of industry.
- **It cuts down on energy dependence** on imported fuels by being locally produced from renewable sources such as solar and wind.
- **It can also be efficiently transmitted and stored**, which facilitates its integration into the existing energy infrastructure.

2.4 Socio-economic benefits: Portugal

The projects led by REN are fully aligned with the strategic objectives set out in the National Hydrogen Strategy (EN-H2) and the 2030 National Energy and Climate Plan (NECP 2030). These initiatives are expected to generate significant socio-economic benefits, including the creation of skilled jobs, the re-industrialisation of strategic regions along the route of the pipeline, the development of a national hydrogen value chain and the attraction of European investment. Both the EN-H2 and the NECP 2030 highlight the potential of green hydrogen to reduce external energy dependence, improve national competitiveness, foster technological innovation and promote territorial cohesion.

According to the EN-H2, green hydrogen is expected to:

- Create skilled jobs, especially in industrial and logistical areas.
- Develop a new industrial and technological value chain.
- Reduce external energy dependence.
- Increase the competitiveness of the national economy.
- Promote territorial cohesion, with projects in less developed regions.
- Enable access to European funding, including the RRP and the CEF.

According to the NECP 2030, green hydrogen will also:

- Serve as a key decarbonisation vector in sectors that are difficult to electrify.
- Support the creation of industrial hydrogen clusters, such as the one in Sines.
- Promote innovation and R&D in electrolysis, storage and transport technologies.
- Contribute to sustainable economic growth, with positive impacts on the GDP and employment.

2.5 Socio-economic benefits: Spain

The impetus of green hydrogen can contribute to industrial development and innovation while attracting socially responsible investment.

Spain's hydrogen infrastructure network and the international connections will drive multiple sectors of the national economy forward and spur the creation of new business opportunities with a significant positive impact on Spain's economy and the territory:

- It will boost the growth and competitiveness of the regions. It will receive gross investment up to 2030 totalling **€3.31 billion**.(*). Specifically, CelZa will entail investment totalling around 350 million euros.
- It will foster industrial and technological development, promoting the creation of a hydrogen industry and the generation of an **innovative business fabric** in Spain.
- Around **17,200 new jobs** will be created during the construction of the network and storage facilities and approximately 900 jobs will be maintained in the operation and maintenance phases. (*). In the case of H2med (CelZa and BarMar), around 1,700 new jobs are estimated during the construction and 300 in the operation and maintenance phase.

(*) Source: "Socio-economic impact of the development of the hydrogen economy in Spain", a report issued by PWC for Enagás (2023)

2.6 Uses and applications of green hydrogen

The following infographic shows the path of renewable hydrogen from production to final use in different sectors.

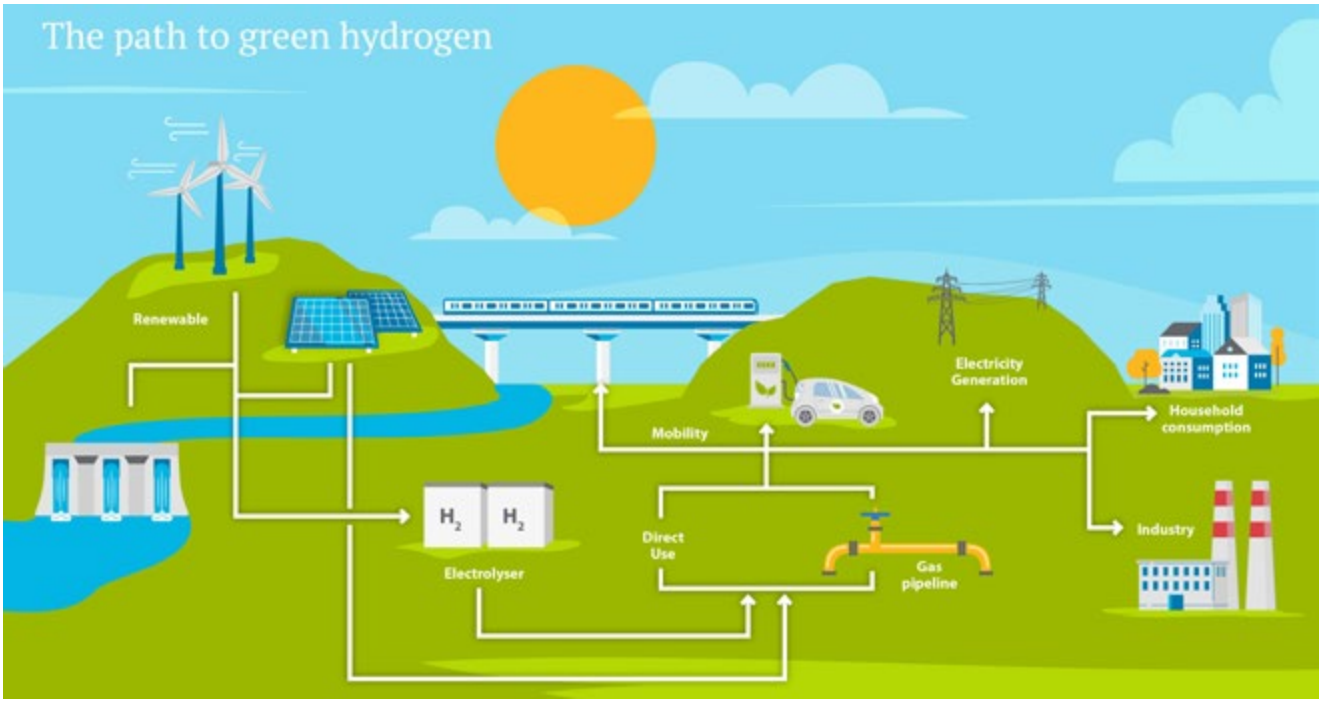


Illustration 1: The path to green hydrogen

Some of the most frequent uses of this energy vector are:

1 Industrial
This energy vector will enable the industry to minimise its environmental footprint

2 Mobility
Green hydrogen will help decarbonise heavy transport, one of the sectors that emits the most CO_2 into the atmosphere, and improve air quality

3 Residential
Green hydrogen for domestic and commercial consumption.

4 Energy storage vector
It will enable the use of surplus renewable energy production.

5 Electricity generation
At times of peak electricity demand, it acts as a future substitute for natural gas.

2.7 Green hydrogen, a challenge and opportunity

The Iberian Peninsula is in an excellent position to become the first green hydrogen hub in the European Union, thanks to its large capacity for renewable energy generation, excellent geographical position, industrial technological capacity, powerful network of infrastructures and broad experience of network management.

The development of this energy vector constitutes an excellent opportunity for Spain. To this end, great strides are being made to:

- Build a competitive hydrogen economy, enabling the creation of a liquid market.

- Have regulatory clarity and secure European funding to produce an integrated market.
- Commit to research and innovation to scale up existing technologies that guarantee the efficiency of this market.
- Encourage public-private collaboration and facilitate synergies and alliances between companies to accelerate the energy transition and sustainable development.
- Move cohesively forward and involve the entire green hydrogen value chain in the process.

3. Presentation of the project

3.1 REN

In keeping with the European Union's Hydrogen and Gas Market Decarbonisation Package, Portugal has designated REN as the interim manager of the hydrogen network, or *Hydrogen Transmission Network Operator* (HTNO), for the Portuguese section of the project. This process was established by means of the publication of Notice no. 930-A/2025 in the ***Diário da República*** on 21 May 2025.

The notice invites expressions of interest by entities that are capable of assuming, on a transitional basis, responsibilities for the planning, development and management of the national hydrogen network infrastructure. This transitional designation will remain in force until the complete transposition of Directive (EU) 2024/1788 into Portuguese law and the subsequent permanent designation of the HTNO.

The process is governed by the principles of transparency, competition and public interest and it forms part of Portugal's commitment under the Recovery and Resilience Plan (RRP) to accelerate the deployment of renewable hydrogen infrastructures. The transitional HTNO will also guarantee Portugal's representation in the creation of the European Network of Network Operators for Hydrogen (ENNOH).

This regulatory milestone provides the institutional framework required to support strategic projects such as **CelZa**, allowing Portugal to access European funding, coordinate cross-border infrastructures and contribute to the development of the EU hydrogen market.

3.2 Enagás Infraestructuras de Hidrógeno (EIH)

In April 2022, Enagás set up the company known as Enagás Infraestructuras de Hidrógeno, through which the company separates its functions as a natural gas infrastructure operator, or *Transmission System Operator* (TSO), from the management of hydrogen infrastructures.

The company's objective is the development, construction and operation of infrastructures to meet the need for hydrogen transmission and storage, in line with domestic and European legislation, plans and roadmaps.

In December 2023, Enagás was designated by Royal Decree-Law 8/2023 of 27 December as the interim manager of the hydrogen network, or **Hydrogen Transmission Network Operator** (HTNO), for the Spanish section of the project.

By virtue of an agreement of the Council of Ministers, at the proposal of the Ministry for Ecological Transition and the Demographic Challenge (MITECO), in July 2024, **Enagás Infraestructuras de Hidrógeno (EIH)** was authorised to provisionally exercise the functions of developing European Projects of Common Interest (PCI) for hydrogen networks. These functions range from the authorisation application, construction, and start-up to the monitoring and maintenance of hydrogen transmission and storage infrastructures recognised as PCIs.

3.3 Portugal-Spain Hydrogen Interconnector (PCI 9.1.2.)

European Project of Common Interest PCI 9.1.2. The aim of the **"Portugal-Spain Hydrogen Interconnector"** is to connect a hydrogen

transmission pipeline between the towns of Celorico da Beira (Portugal) and Coreses in the province of Zamora (Spain), with an annual capacity totalling 0.75 Mt of hydrogen.

This pipeline, known as H2med-**CelZa**, consists of an underground pipeline with a total length of approximately **270 km**, divided between:

- 86 km in Spain.
- 184km in Portugal.

The project also envisages a **compressor station (CS)** in the municipality of Coreses (Zamora) with a capacity of approximately 30 MW.

3.4 Main project infrastructures

The hydrogen interconnection between Portugal and Spain will consist of the following infrastructures:

- A **hydrogen pipeline**, made up of a set of underground pipes and their ancillary surface facilities, known as valve positions.
- A **compressor station**, consisting of a series of compressors driven by electric motors and their accompanying high-voltage power supply lines.

H2med-CelZa, the interconnection network between the two countries, will be completed by the connection to the internal hydrogen infrastructure in Portugal (*PCI Project 9.1.1.*), the internal hydrogen infrastructure in Spain (*PCI Project 9.1.3.*) and the interconnection network between Spain and France (*PCI Project 9.1.4.*), the latter known as H2med-BarMar, via an undersea pipeline connecting the cities of Barcelona and Marseilles.

In addition to this network of pipelines and compressor stations, there are two projects for underground hydrogen storage in national territory (*PCI Projects 9.24.1. Hydrogen Storage North-1* and *9.24.2. Hydrogen Storage North-2).*

In terms of safety, **the design of the network will comply with all the applicable and current international and national** regulations regarding hydrogen transmission infrastructures.

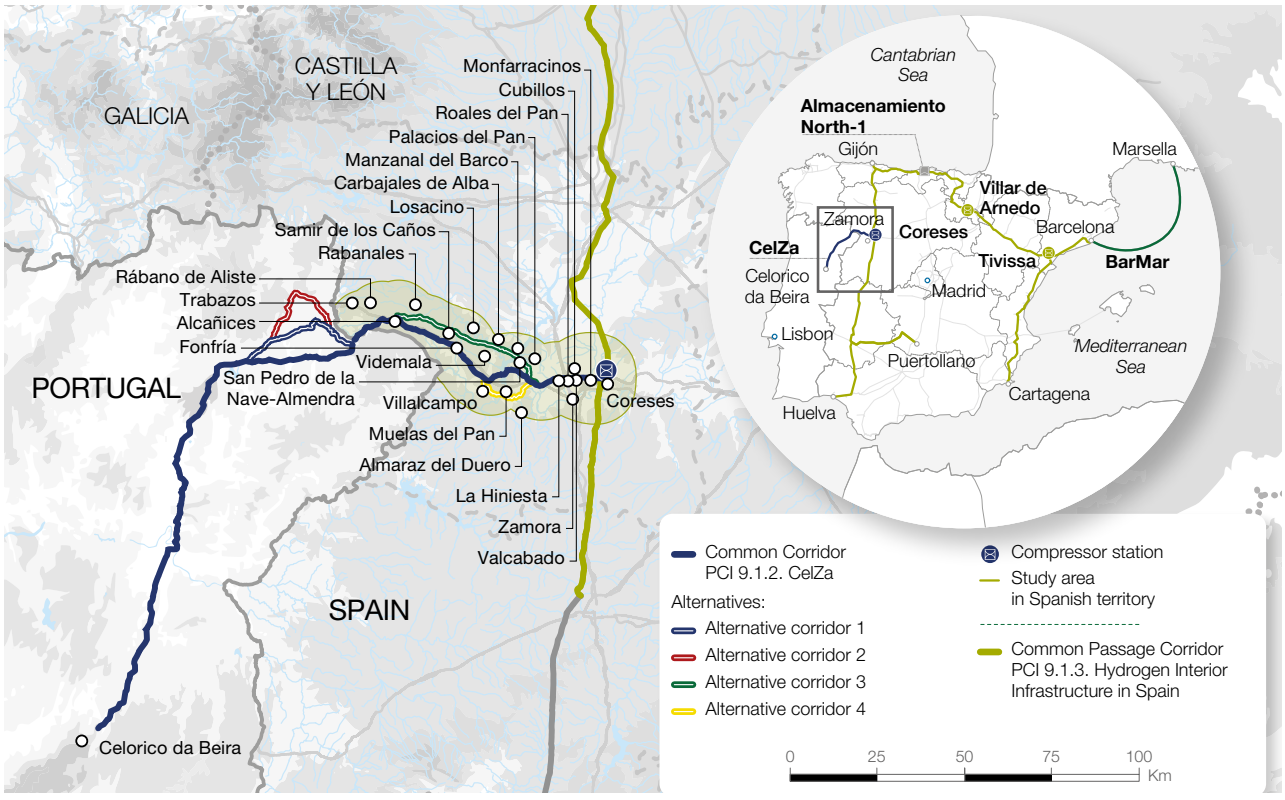


Illustration 2: Details of the main hydrogen routes in Portugal and Spain

Furthermore, the final design will be subject to a specific review by means of the different safety studies, risk analyses, etc. required of the project, thereby complying with the various applicable regulations, legislations, standards and codes, **verifying the safety and integrity of all the personnel and facilities** during their operation.

3.4.1 Hydrogen pipeline

The technology used to transmit the hydrogen from its production site to the consumption locations consists of underground piping, for public safety and for economic and environmental reasons alike.

In the specific case of PCI 9.1.2., **a single section of newly-constructed pipeline 28" (711 mm) in diameter** has been shaped.

The technical characteristics of the conduit system are specified below:

- Conduit diameter: 28 inches (711 mm).
- Conduit material: high-elastic-limit steel.
- External cladding and internal protection of the conduit.
- The pipeline will be buried along its entire length, with a minimum cover of 1 m above the upper generatrix of the pipeline.
- Impressed current system to protect against corrosion.

Inner cladding of the pipeline	Provides protection against the ground conditions
Inner cladding of the pipeline	Provides protection, facilitates internal cleaning and reduces internal fluid friction

The pipeline will be buried as follows, accompanied by a twin-pipe to facilitate the laying of the cable, control communications and security.

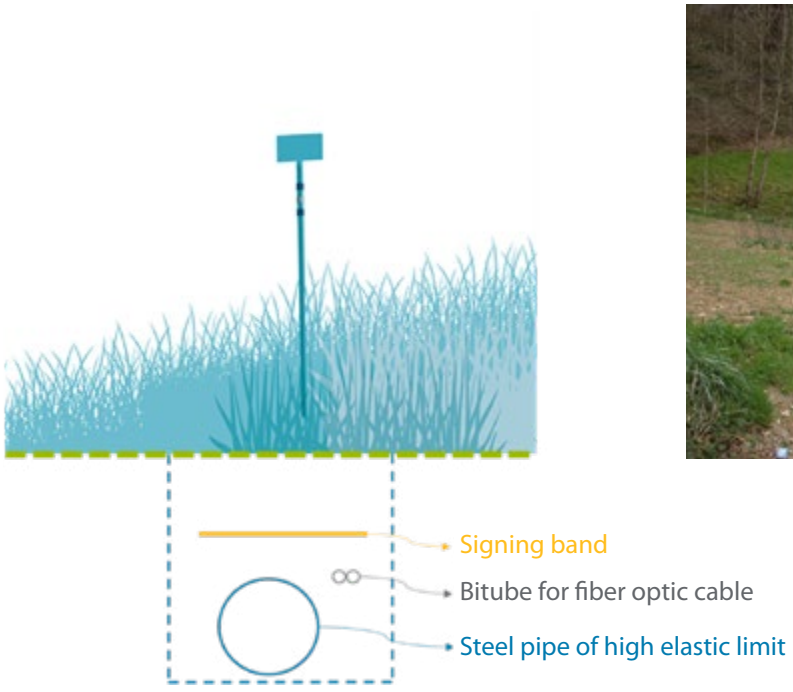


Illustration 3: Details of the installation section of the pipeline, the optical fibre and the signalling band.

The construction phase requires the creation of a work runway large enough for the carrying out of the work necessary to lay the piping and auxiliary installations. It will be **temporary** while the work is being executed and the area will be **restored to its original state** once it has been completed.

Areas with certain limitations of use will be established during the operational phase of the installation, as shown in the following infographic:

A permanent access easement will be created on a strip of land two metres wide on each side of the axis of the pipeline to facilitate the personnel's access for surveillance and maintenance work. The planting of trees and tall-stemmed shrubs will not be permitted in this area, nor ploughing or similar work at a depth that could affect the pipeline.

Furthermore, the network will have a series of valve positions, installations that allow the segmentation and blocking of a pipeline section for maintenance and safety purposes, and other ancillary facilities to enable the operation and integrity of the system.

Above the physical infrastructure, there will be a layer of control and maintenance management systems to enable the efficient and safe monitoring, operation and maintenance of all the facilities.

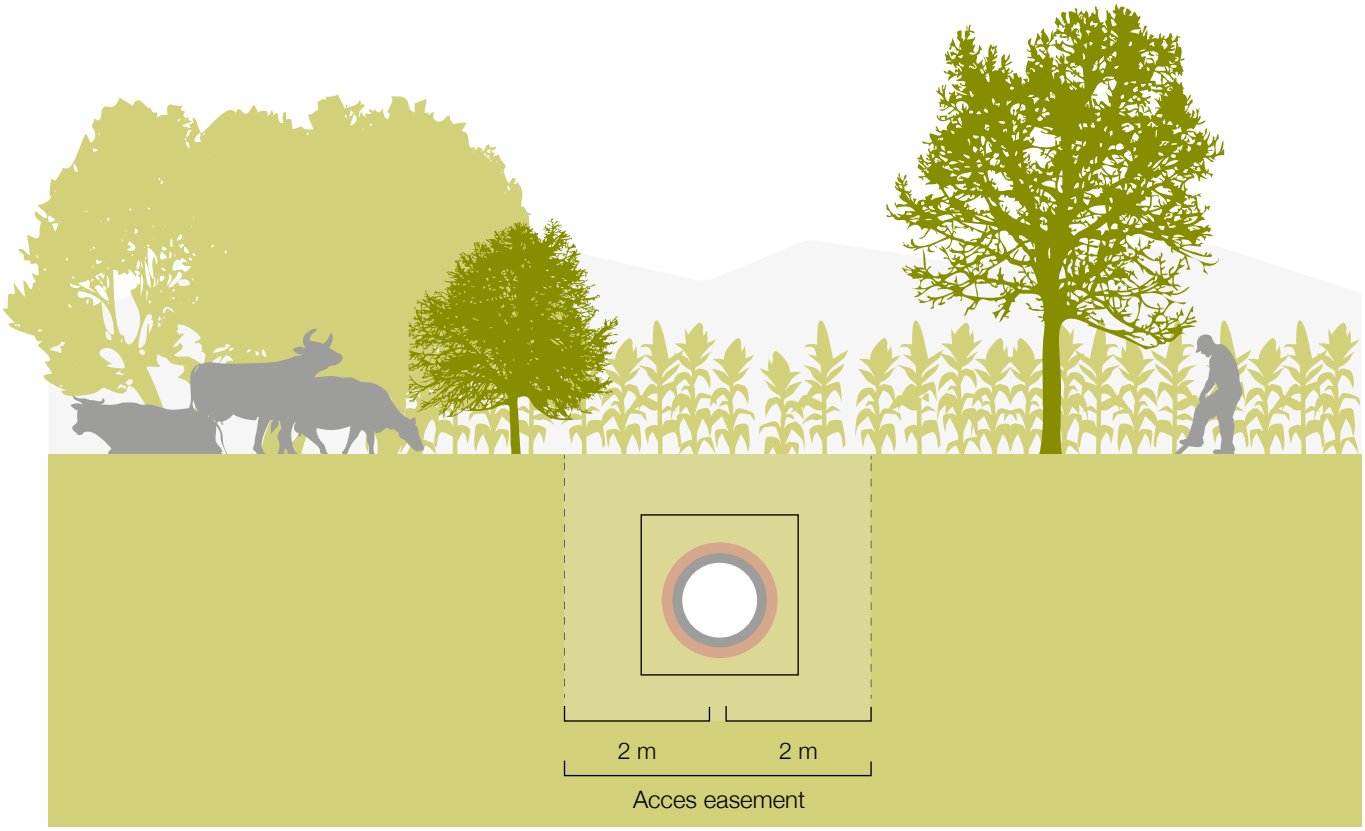


Illustration 3: Details of the installation section of the pipeline, the optical fibre and the signalling band.

3.4.2 Compressor station

A compressor station is a facility similar to a water pumping station with compressors that provide energy to the hydrogen, in the form of pressure, so that it can be transmitted over long distances through the pipelines.

Before passing through the compressors, the hydrogen undergoes a filtration process to remove any particles that could affect the operation and integrity of the main equipment.

Once it has been filtered, the hydrogen passes through the installation's conduit system to the compressor units, where it is pressurised accordingly. The compressors are powered by electric motors.

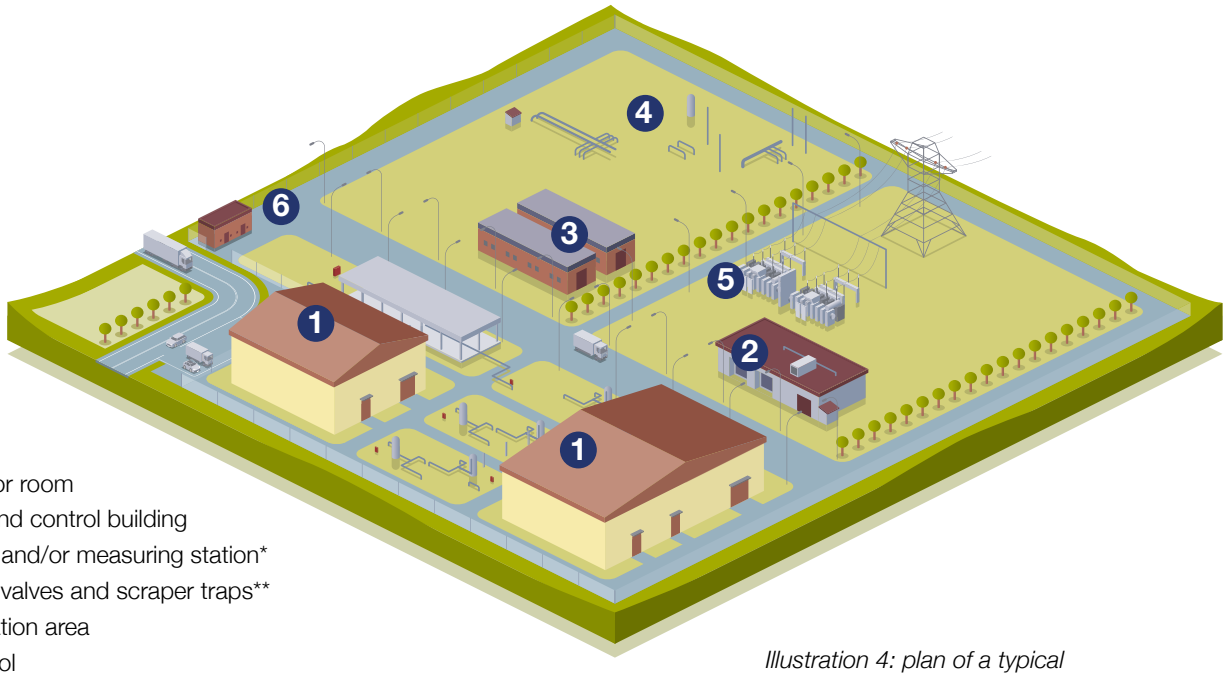
Given that the compression process also raises the temperature of the hydrogen, it must be cooled before returning it to the transmission system. Air coolers are used for this purpose.

As well as this equipment, the compressor station is equipped with auxiliary control and command systems, an electrical power distribution system for the plant's various consumers, several safety systems and one to ensure the integrity of the facility's assets.

The typical location and deployment of this type of facility is a plot of land approximately five to eight hectares in size. The final dimensions will be determined during the development of the project engineering studies.

PCI Project 9.1.2. The **"Portugal-Spain Hydrogen Interconnector"** envisages a compressor station (CS) at the end of the pipeline. Its location coincides with the compressor station in PCI Project 9.1.3 titled "Spanish Hydrogen Backbone", which will be located in the municipality of Coreses (Zamora).

The interconnection between the two projects will be made in this location in order to facilitate the transmission of the hydrogen from Portugal along the pipeline network in the national territory.



1. Compressor room
2. Electrical and control building
3. Regulating and/or measuring station*
4. Position of valves and scraper traps**
5. Transformation area
6. Entry control

* Hydrogen input or output facilities to the transmission system
** Connection facilities to the transmission pipelines

Illustration 4: plan of a typical compressor station.

3.5 Project timeline

3.6 The Iberian hydrogen corridor: European PCI projects

This hydrogen transmission infrastructure between Spain and France and the interconnection between Spain and France (BarMar) form part of the H2med project, set to be the first green hydrogen corridor in the European Union, which will connect the renewable hydrogen produced on the Iberian Peninsula with the main consumption centres in central Europe.

H2med is promoted by the governments of Spain, Portugal, France and Germany and supported by the European Commission.

The transmission operators of the gas networks of Spain (Enagás), Portugal (REN), France (NaTran and Teréga) and Germany (OGE) are the partners promoting the project. H2med will have an export capacity of 2 Mt per year via BarMar, equivalent to 10% of the hydrogen production expected in Europe in 2030 according to the REPowerEU Plan.

The inland hydrogen infrastructure in Spain and Portugal, the H2med interconnections (CelZa and BarMar) and the North 1 and North 2 Storages were designated as European Projects of Common Interest (PCIs) by the European Commission under the first call for hydrogen projects in April 2024. Furthermore, in January 2025, the Climate, Infrastructure and Environment Executive Agency (CINEA) awarded 100% of the Connecting Europe Facility (CEF) Energy funds requested by Enagás for the study phase of the infrastructures, constituting an investment amounting to 75.8 million euros.

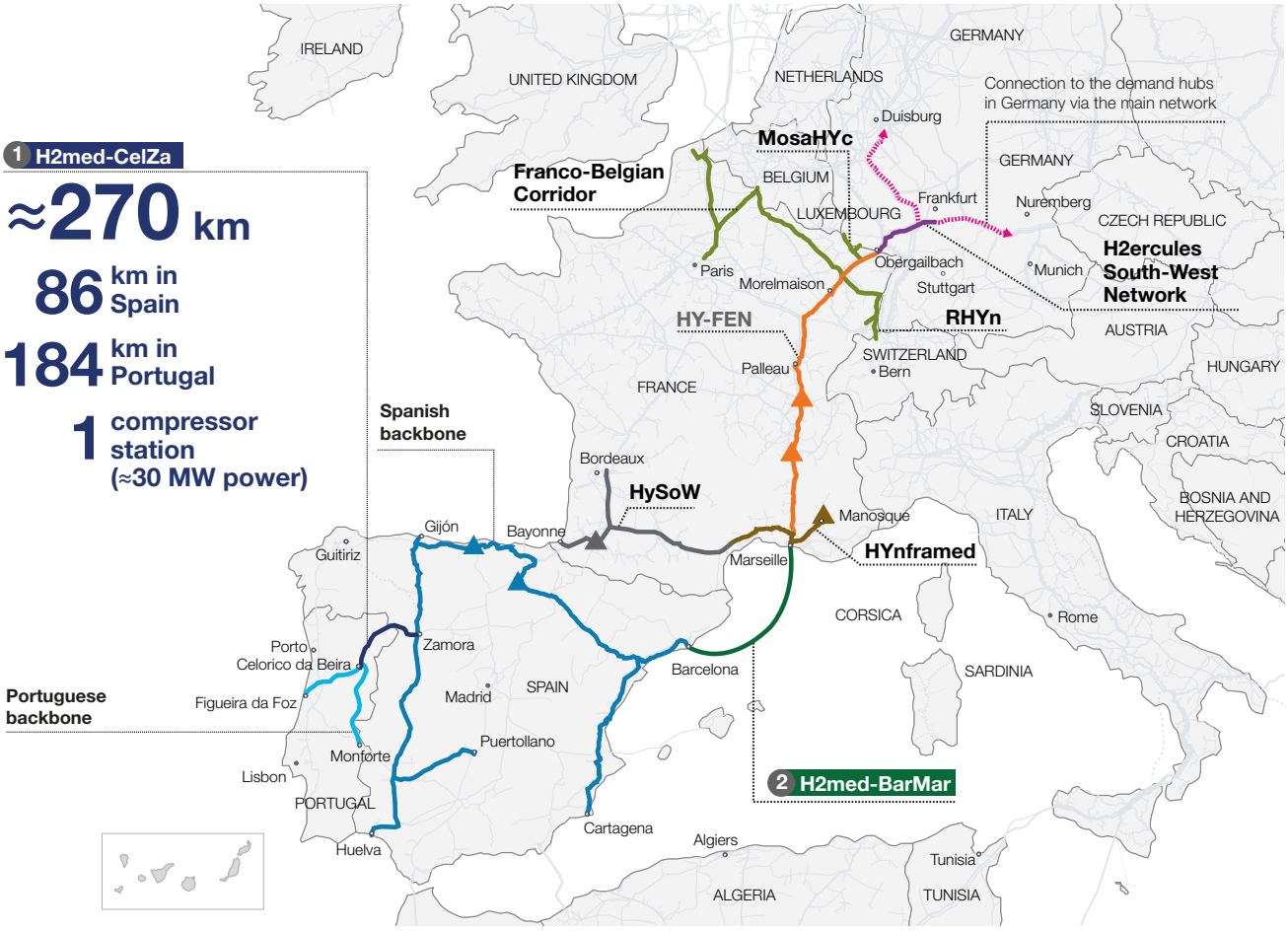


Illustration 5: Details of the main hydrogen routes in Europe (Source: Enagás).

4. Geograaphical scope

The hydrogen pipeline corridor set to form part of this PCI (Portugal-Spain Hydrogen Interconnector) has been determined upon the basis of the following premises:

Firstly, the infrastructure must be able to link the pipeline across the border with Portugal to the Spanish inland pipeline network for the importing and exporting of the hydrogen.

Once the scope of the network has been defined, whenever technically and administratively feasible, the corridor should be located as near and parallel to other existing infrastructures as possible, including pipelines and other kinds of linear infrastructures.

In any case, the transit corridors will avoid:

- Being located or run nearby urban centres and areas with high population density and the concentration of vehicles and people.
- Generating interferences with the General Land Use Plans of the different municipalities that are affected or opencast Mining Concessions.
- The incompatibility with aeronautical, road, rail and water infrastructures, whether existing or at the design or construction stage.
- Being located in areas classified as Protected Natural Spaces, Sites of Community Interest (SCI) or Special Bird Sanctuaries (SBS) to ensure compatibility with the conservation of fauna and flora.
- Causing interference with or not mitigating effects on the Historical, Cultural and Archaeological Heritage.
- Being located in geologically unstable areas.

With regard to the location of the compressor station, one fundamental issue that conditions the location of this type of facility is the determination of the point in the network at which it should be situated to ensure compliance with the operational design conditions.

Once this issue has been determined, a suitable site for such a facility should avoid more environmentally and socially sensitive areas. When it comes to designing the site alternatives for the compressor station, it is always considered that the best option is to locate it next to a natural gas compressor station to facilitate the use of part of the existing facilities.

In cases in which the installation next to an existing natural gas compressor station isn't feasible or it is technically and environmentally inadvisable, alternative locations close to it will be studied.

4.1 Celorico da Beira (Portugal)

The axis and section of the project cross the territory in the districts of Guarda and Bragança.

The following conditions have been taken into account to define the study area and the corridors:

- The border connection point with the section of the pipeline in Spain (battery boundary) is defined by the part of the project assigned to Spain (Enagás). This point will be located in the municipality of Vimioso (Vale dos Frades).
- The section passes through the districts of Guarda and Bragança in a north-easterly direction towards Zamora (Spain).
- Different alternatives for the final design of the pipeline are being presented, and they will be assessed for their constructional and environmental suitability.

The three alternatives evaluated are outlined below:

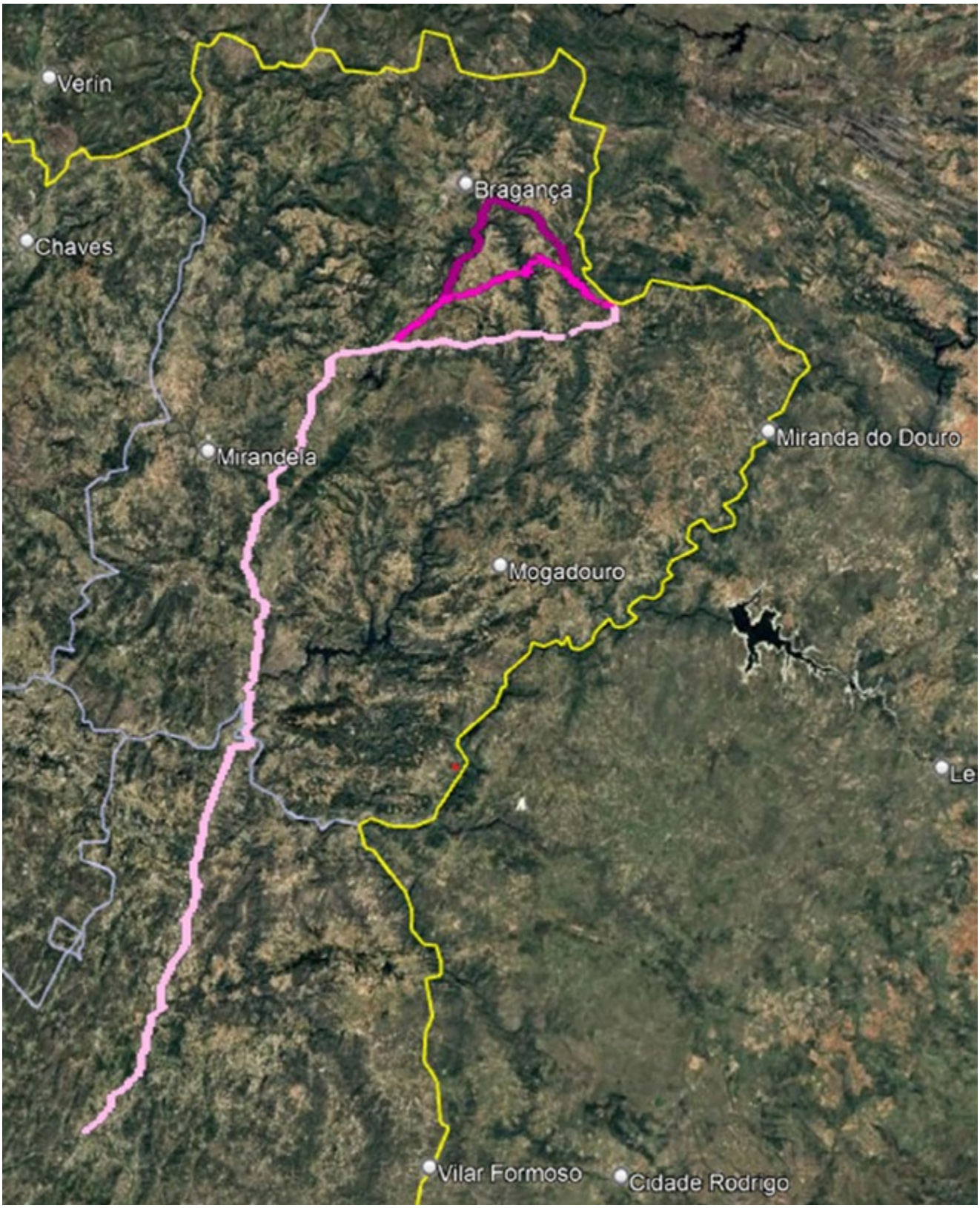


Illustration 6: Details of the three alternative options for the CelZa project in Portugal.

The approximate total length of the entire project is **270 km, of which around 184 km will be installed in Portuguese territory and 86 km in Spanish territory**.

4.2 Zamora (Spain)

The axis and section of the project is entirely located in the province of Zamora, the **only Spanish province in which the project implementation work will take place.**

The following conditions have been taken into account to define the study area or corridors:

- The border connection point with the section of the pipeline in Portugal (battery boundary) is defined by the part of the project assigned to Portugal (REN). This point will be located in the municipality of Trabazos (Zamora).
- The section passes through the province of Zamora in a south-easterly direction towards Coreses (Zamora).
- Coreses hosts the connection of the section of the project to the compressor station associated with it.
- Different alternatives for the final design of the pipeline are being presented to assess their constructional and environmental suitability.

The three alternatives evaluated are outlined below:

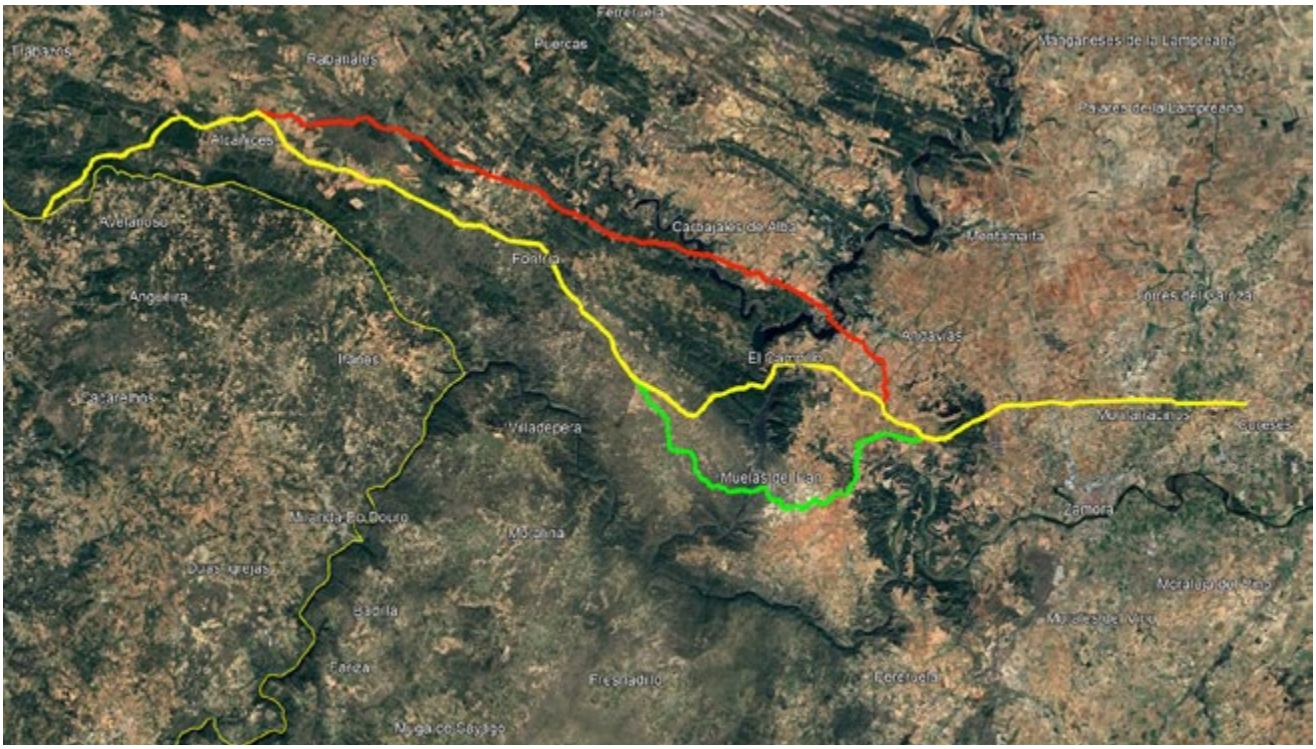


Illustration 7: Details of the three alternative options for the CelZa project in Spain.

5. Main project impacts and mitigation measures

5.1 Main project impacts

Broadly speaking, the **impacts will be temporary** and limited to the area in which the project is located during the construction period, depending on the type of the facility. However, although a detailed analysis is still to be conducted at a later stage, so far **no environmental variables have been identified that could affect the project's viability**.

A priori, all the environmental impacts can be regarded as compatible or moderate, with none that could have a significant impact on the environment having been identified, provided that the corresponding preventive and corrective measures are implemented.

The methodology and potential effects of the crossing through the Natura 2000 Network will be analysed in detail, with the aim of adequately managing this key point of the hydrogen pipeline corridor, together with the crossing of major rivers.

In relation to the assessment of the potential impacts of climate change on the project, considering the characteristics of the facilities and the preventive and corrective measures, it can be deduced that the **overall vulnerability of the project to physical and climatic risks is low**.

The main impacts posed by the different elements of the project are identified below:

Soil. The potential impact may relate to the movement of earth during the construction work, which could affect the vegetation cover and, in the case of steep slopes, lead to potential erosion problems. To a lesser extent, there could be soil modification of the land and ground impermeabilisation in the surface installations, which could result in the loss of natural soil and the upsetting of the natural run-off systems.

Atmosphere. During the construction phase, dust particles may be released due to the movement of machinery and the generation of noise. In the operational phase, noise could be produced by the equipment in the compressor stations.

Hydrology. During the construction phase, there could be some temporary impacts due to the crossing of the various watercourses affected by the pipeline's passage. To a lesser extent, modification of the drainage network may arise due to the implementation of the surface facilities.

Geomorphology. There will be temporary changes in the relief of the area affected by the works due to the formation of the work track, especially at certain watercourse crossings, which will be restored to their original state after completion of the works. The above-ground installations will require a small platform for their deployment.

Vegetation. The project could result in the loss of vegetation in the area where the compressor stations are located and in the construction of the working track and new accesses.

Fauna. During the construction phase, the wildlife may be affected by the movement of the machinery and people and, during the operational phase of the compressor stations, the noise that they generate. The potential loss of habitat due to the removal of vegetation in the area occupied could result in the displacement of certain animal populations.

Cultural heritage. The most effective measure to prevent or minimise the impacts that could be caused by the possible direct effect on the existing heritage elements is to locate the project as far as possible from known and registered heritage assets.

Landscape. The potential impacts on the landscape would be a consequence of the effects on the vegetation, depending on the quality and visual fragility of the landscape.

Use of energy resources. During the construction and operation, the consumption of energy resources will be required. This aspect will be particularly significant during the operational phase at the compressor stations, as the compressors require intensive use of electrical energy in order to function.

Waste generation. Broadly speaking, small quantities of waste associated with the maintenance of the site machinery and plant equipment (oil, paint, etc.) could be produced during the construction phase, and these will be specifically handled to ensure the protection of soil and water, thus preventing any risk of pollution. The generation of larger amounts of solid urban waste fractions (packaging, cardboard, wood, etc.) could also occur, especially during the work.

Protected areas or areas of special interest. Preventive and corrective measures will be applied to minimise the impact on them. Impacts on natural areas protected by the State or region and the Natura 2000 Network and other sites protected by international agreements are expected.

5.2 Mitigation measures

Identifying and assessing the potential impacts can define the preventive and corrective measures necessary to minimise their consequences, acting in the different phases of the project's development (design, construction, operation, closure and abandonment).

During the detailed studies, preventive and corrective measures will be determined to ensure that the project's environmental impact is fully compatible with the applicable legal imperatives, especially with regard to the integration of the surface elements, in addition to the flora for which habitats of community interest and protected fauna are declared.

The main preventive measure to be taken will be to consider the different environmental conditions to which the project's elements are exposed in the area, choosing the optimal location for the compressor stations and the corridor with the least environmental impact for the pipelines.

A series of measures are proposed which strive to:

- To make better use of the opportunities offered by the environment in order to reduce the environmental impact.
- To nullify, mitigate, avoid, correct or compensate for the effects that the actions derived from the project may have on the environment where these are located.
- To increase, improve and enhance any positive effects that may exist.

The measures to be introduced will be based on the following typology:

- **Preventive measures**: those set forth in current legislation and those which, although not established, are taken to prevent the effect of the activity's defining elements of the activity (waste generation, dumping, emissions, etc.) from occurring.
- **Corrective measures**: aimed at nullifying, attenuating, rectifying or modifying the actions and effects on the environment once the works have been completed.

Preventive measures in the design phase

- Use the existing road and energy infrastructure, especially gas pipelines and electricity lines, for the hydrogen pipeline corridors and electricity lines to the compressor stations, minimising the impact on the forest cover.
- Choose a crossing point over watercourses that does not affect the associated vegetation and fauna.
- Minimise the impact on natural areas.

Preventive measures during the construction

The main preventive measures during the construction phase will be the following, subject to any additional

measures required by the competent environmental agencies:

- Suitable maintenance of the machinery use.
- Proper management and maintenance of soil and vegetation with limitations on construction work and machinery near watercourses.
- Protection of the vegetation during the execution of the works.
- Study, surveys and verification of the presence of protected species with the possible adjustment of the work schedule according to the reproductive season of the species.
- Signposting of the work area and ban of dumping of any type of waste.

Corrective measures

Once the work on the installation of the hydrogen pipeline, positions, power lines and compressor stations has been completed, the land and watercourses will be restored, by means of the following:

- The re-establishment of the existing topography, the repositioning of the topsoil where it was before the start of the work and the removal of any debris.
- In open water crossings, there will be restoration of the riverbed and banks and the cleaning of waste materials or debris, which will be managed in accordance with the regulations.

Once the restoration work has been completed, the vegetation will be restored, consisting of the tasks geared towards restoring and recovering the vegetation, including planting, hydroseeding, replanting, etc.

6. Public Participation Conceptual Plan (PPCP)

In compliance with the provisions of the TEN-E Regulation of the European Union (EU Regulation 2022/869), the project developer in each region is obliged to implement a public participation plan to inform and involve citizens and stakeholders in decision-making on a Project of Common Interest (PCI) in the field of energy.

6.1 What is the Public Participation Conceptual Plan?

Public participation or consultation has the following objectives:

- Include the environmental and social sensitivity of the population from the project's phase zero.
- Ensure that no relevant decision is made without consulting the public concerned.
- Make the relevant information about the project accessible, in a way that is easily understandable for citizens and without technicalities.
- Inform all interested members of the public about the right to participate and how to exercise this right.
- Set up a direct channel of communication for the population's questions with those responsible and experts in each phase and area of a project of extraordinary complexity.
- Involve the public from the outset of the decision-making process and on an ongoing basis, facilitating the understanding of the project information, explaining clearly and transparently the need for the project and setting out the issues to be addressed in the different project phases. The activities must be carried out in a language

that is understandable and accessible to the entire population, highlighting how environmental, social and landscape variables have been taken into account.

- Obtain useful information from the interested public.
- Justify the option adopted and how public input has been incorporated.
- Enable broad forms of public consultation and citizen participation in order to inform about the right to participate and how to exercise this right from the beginning to the end of the procedure.
- Enable the diversity of opinions to have a voice through the citizen participation associations organised to discuss the project.
- Identify potential conflicts in advance and encourage action to resolve them.
- Consider community input in the description of potentially affected territorial, environmental and social conditions when evaluating project alternatives.

6.2 Roles of the stakeholders

The roles of the stakeholders in the participation process:

The developers' roles

- Development of a Conceptual Plan for Public Participation.
- Provide the necessary resources for the public participation process.
- Ensure that citizens have adequate opportunities to participate.
- Ensure that information presented to the public is clear, complete, truthful and understandable.
- Take into account the views of the general public.
- Give due attention and response to citizens' comments, recommendations and interests.
- Seek out consensus.
- Make the final decisions.

Roles of the stakeholders

- Take an active part in the participation process.
- Acquire an awareness of the different interests and views that converge in the country and understand the need to seek consensus solutions.
- Contribute from their particular perspective to improve and enrich the proposals.

6.3 Development of the Public Participation Conceptual Plan

The process will be carried out as follows:

The public and citizen consultation will be carried out in the Preliminary Procedure, with a view to informing all stakeholders about the project at an early stage and helping to identify the most appropriate alternatives and relevant issues to be addressed in the application process.

As part of this public consultation process, the project developer must prepare and develop a Public Participation Conceptual Plan, which will take into account all forms of public participation and consultation.

During this phase, the national, regional and local authorities, land owners and citizens living in the vicinity of the project, the general public and their associations, organisations or groups will be informed.

The Public Participation Conceptual Plan will, at least, contain the following informative elements:

- The project **information leaflet**, which will contain:

- General description of the objective.
- The project timeline.
- The route under study.
- Expected impacts.
- Palliative measures.
- Infrastructure development plan.
- Transparency platform.
- Procedural manual.

This information leaflet will clearly and concisely present the contents listed above, including the project's website and contact details for consultation.

- **Project website**, which will contain:
  - The information leaflet.
  - A non-technical summary, to be updated on a regular basis, giving the current status of the project and clearly indicating the changes compared to previous versions.
  - The timeline for the project and public consultation, the dates and locations of public consultations and forums.
  - The contact details for obtaining documents.
  - The contact details for comments and objections.

This website will be set up and regularly updated by the project developer and linked to the Commission's website.

- **Participatory seminars:** The public will be invited to informative seminars, during which all the relevant information on the project will be made available and attendees will be able to express their views and comments.

As a final point of this public consultation, the infrastructure developer will have sufficient information on the study area and on the effects of the project to put forward a solution that, while complying with the project's technical requirements, will accommodate the best integration possible of the facility in the region from an environmental, social, etc. stand point.

The project developer **will draw up a final report** summarising the results of the activities related to the public participation prior to the submission of the application dossier. The project developer will submit this report together with the application dossier to the competent authority. Due account will be taken of these results in the overall decision.

7. Procedure for the granting of regulatory approvals

7.1 Regulatory procedure in Portugal

The EIA (Environmental Impact Assessment) (AIA - Avaliação de Impacte Ambiental) is a basic preventive instrument in Portugal's environmental policy. It analyses the potential direct and indirect impacts arising from the implementation of public and private projects and their alternatives in an integrated manner. Its main objective is to support the decision-making regarding the environmental feasibility by defining and implementing measures to prevent, minimise and offset such impacts, promoting more sustainable decisions.

The EIA also includes project monitoring, in order to verify the effectiveness of the measures taken and to understand the actual impacts, and it guarantees public participation, ensuring transparency, social acceptance and the involvement of the different stakeholders in the decision-making process.

The Legal Regime for the Environmental Impact Assessment (RJAIA - Regime Jurídico de AIA) establishes a number of project types, listed in Annexes I and II of Decree-Law no. 151-B/2013 of 31 October, in its current wording, transposing Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 into domestic law. Thresholds and criteria are set for these types of projects to objectively determine the obligation to undergo the EIA process. These thresholds and criteria are generally stricter for projects affecting, in whole or in part, sensitive areas (in accordance with article 2 of the RJAIA, sensitive areas include protected zones, Natura 2000 Network sites, classified heritage protection areas and areas undergoing classification, among others).

The EIA process begins with the drawing up of an Environmental Impact Assessment (EIA - Estudo de Impacte Ambiental), which is submitted by the developer to the EIA Authority (usually the APA - Portuguese Environment Agency).

This EIA can be submitted at the Preliminary Study/ Preliminary Project stage or at the Implementation Project stage. The EIA is subject to public consultation and the issuance of opinions by the competent authorities, after which a favourable or unfavourable EIS (Environmental Impact Statement) (DIA - Declaração de Impacte Ambiental) is issued, determining the decision to license the project or not. The approval may include mitigation, offsetting and monitoring measures for any impacts that are identified. Compliance with the EIA is mandatory in order for the project to progress to the subsequent licensing and implementation phases.

When the EIA is drawn up at the Preliminary Study or Preliminary Project stage (as in the case of Celza), the Environmental Impact Statement (EIS) will include indications of the measures to be incorporated into the Implementation Project, which must be verified in the Environmental Compliance Report of the Implementation Project (RECAPE - Relatório de Conformidade Ambiental do Projeto de Execução). The approval of the RECAPE concludes with the issuance of a Declaration of Environmental Compliance) for the Implementation Project (DCAPE - Declaração de Conformidade Ambiental do Projeto de Execução).

After the Implementation Project phase (with the issuance of the EIS or DCAPE), the EIA Authority must implement a subsequent monitoring system to verify compliance with the provisions of the ECR/DCAPE in relation to the licensing and the recommended measures for the construction, operational and decommissioning phases.

7.2 Regulatory procedure in Spain

Subsequent to the public information and participation process, the appropriate regulatory authorisation procedure must be carried out in accordance with Royal Decree 1434/2002 and Law 21/2013 of 9 December, on environmental assessment.

The developer will submit to the processing authority an application for:

- Prior Administrative Authorisation (PAA)
- Administrative Authorisation for Construction (AAC)
- Declaration of Public Utility (DPU)
- Environmental Impact Statement (EIS)

The first three administrative authorisations (PAA, AAC and DPU) are the responsibility of the Directorate General for Energy Policy and Mines (DGPEM), under Spain's Ministry for the Ecological Transition and the Demographic Challenge (MITECO), and they are processed by the Industry and Energy Areas or Departments of the Government Delegations and/or Sub-Delegations in the provinces in which the installation is located, with a report issued by the CNMC (Spanish Markets and Competition Commission).

The environmental authorisation (EIS) is the responsibility of the Directorate General for Environmental Quality and Assessment, which also belongs to the MITECO.

For the submission of these applications, the developer must prepare two main documents, the Implementation Project and the Environmental

Impact Assessment (EIA). The submission of these documents will be subject to public information in the provinces concerned.

This information will be sent to the town councils in whose municipal districts the assets and/or rights affected by the installation are located, to be posted for public display, and the different administrations, bodies and, as appropriate, public service and general interest enterprises that have or may have assets or rights affected will be informed.

Once the process has been completed, i.e. once the legal deadlines have gone by, the technical reports, allegations and terms have been completed, the EIS has been obtained and a favourable report has been issued by the CNMC, the DGPEM becomes responsible for approving the applications for Prior Administrative Authorisation and Construction (PAA and AAC) and the Declaration of Public Utility (DPU).

ANNEX TO THE PCI PROCEDURE MANUAL
Art 10.1.b) Procedure for granting regulatory authorisations. Regulation 869/2022

8. Additional Information

8.1 Additional Information: Portugal

Further information on the project is available at:

CelZa e Eixo Nacional de Transporte de Hidrogénio (www.ren.pt/pt-pt/atividade/principais-projetos/celza-e-eixo-nacional-de-transporte-de-hidrogenio)

H2med - Europe's first major green hydrogen corridor (https://h2medproject.com/)

8.2 Additional Information: Spain

Enagás has made the following means of communication available to the public in the event of any queries, doubts, complaints and suggestions:

CelZa@infraestructurasdehidrogeno.es

(+34) 685 17 08 69 (Monday to Friday, from 9:00 am to 2:00 pm)

All the information on the project is available on the following websites:

https://www.infraestructurasdehidrogeno.es

H2med - Europe's first major green hydrogen corridor https://h2medproject.com/

Hydrogen Interconnector Portugal-Spain

Co-funded by the European Union