

# Call for Interest for the construction of a hydrogen transport infrastructure H2med

H2med Corridor Information memorandum

## Disclaimer

This document (the "**H2med Corridor Information Memorandum**") presents certain information concerning envisaged hydrogen transport, which is seen as a solution for achieving decarbonization goals at the European level. The information contained in this document is made public for information purposes only. It does not constitute any commitment on the part of the project Promoters REN, Enagás, GRTgaz, Teréga and OGE, and should not be considered as giving rise to any contractual relationship between any of them and any interested party.

# 1. Presentation of the Promoters



REN – Gasodutos, S.A. is Portugal's exclusive Gas Transmission System Operator (TSO). REN Gasodutos is part of REN Group, which operates in two major business areas: electricity transmission in very high voltage electricity and overall technical management of the National Electricity System, and gas: the transport natural gas under high pressure and overall technical management of the National Natural Gas System. It equally guarantees the reception, storage and regasification of LNG and underground storage of natural gas. REN's Group also owns a company which operates a DSO infrastructure in the northern region of Portugal which is the largest distribution network.

REN has 719 employees, including a subsidiary in Chile. REN's plans for investment and development all act in accordance with the energy goals set out by the EU. Specifically focussing on ensuring security and quality of supply, whilst tackling climate change.

Nowadays, REN has a strategic plan towards decarbonization of its assets and has applied for HTNO (Hydrogen Transmission Network Operator) designation in early 2024 according to the development of the current Gas & Hydrogen Package mandating the activities separation. Since 2021, REN has been developing and evaluating several 100% hydrogen projects, such as the H2med, while leading the H2 backbone in Sines and other hydrogen valleys in Portugal.

REN is at the core of the energy system in Portugal and acts as an energy transition facilitator. To contribute in meeting this target, REN launched the H2REN Program aiming to assure the adequacy of existing infrastructures to incorporate blending of H2 in the natural gas transmission, distribution and storage infrastructures and to identify the roadmap to repurpose them to 100%. The main goal of this program is preparing REN and existing gas infrastructures for the decarbonization process being able to accommodate whatever are the H2 market needs. Also, two new natural gas storage cavities are to be developed, with the ability from the design phase to be ready to operate in 100% hydrogen environment when required.



Enagás is Spain's Transmission System Operator (TSO) and also the technical manager of Spain's gas system, employing over 1.350 employees. In addition to its transmission activities, the company manages three underground storage facilities and eight regasification terminals. Enagás operates in seven countries: Spain, Mexico, Peru, Germany, Albania, Greece and Italy.

As part of its commitment to becoming carbon neutral by 2040, Enagás is engaged in developing the future Spanish Hydrogen Backbone, with its solid network of natural gas infrastructures as a starting point, some of which will be converted to hydrogen as demand is expected to shift. In addition to its involvement in the H2med project, Enagás aims to build a strong national hydrogen transmission network, with several projects already considered, which will lay the foundations to turn the country into Europe's first renewable hydrogen hub.

In April 2022, Enagás incorporated the subsidiary Enagás Infraestructuras de Hidrógeno, through which the company separates its functions as a natural gas infrastructure operator (TSO) from the possible future management of hydrogen infrastructure. Its objective is the development, construction and operation of infrastructure to meet the need for hydrogen transmission and storage, in line with national and European legislation, plans and roadmaps. In December 2023, and in accordance with Royal Decree-Law 8/2023, Enagás has been appointed provisional hydrogen transmission network operator (HTNO) in Spain.

In July 2024, the Council of Ministers approved the agreement authorising Enagás Infraestructuras de Hidrógeno to provisionally exercise the functions of developing European Projects of Common Interest (PCI) for hydrogen networks. These functions are the application for authorisation, construction, commissioning, operation, monitoring and maintenance of the hydrogen transport and storage infrastructures recognised as European PCI - H2Med, the Spanish hydrogen network and the two associated underground storage facilities.



GRTgaz is a natural gas transmission system operator in France and the second largest in Europe, managing over 32000 km of pipelines and employing about 3000 employees. It also operates in Germany through its subsidiary GRTgaz Deutschland, which manages the MEGAL transmission system. Another subsidiary, Elengy, provides LNG terminal services in Europe, including three LNG terminals in France.

The company's mission, "*Together, making a secure, affordable, and climate-neutral energy future possible,*" reflects its commitment to innovation and transformation, as it adapts its network to meet societal, ecological and digital challenges.

GRTgaz is dedicated to achieving a 100% carbon-neutral French gas mix by 2050 and believes that hydrogen will play a crucial role in reaching net-zero carbon emissions in an affordable and socially acceptable manner. The company recognizes that the future of hydrogen relies heavily on the availability of infrastructure capable of transporting and storing hydrogen on a large scale, connecting production areas to consumers at local, national, and European levels.

To support this vision, GRTgaz aims to be a key player in the transport of renewable and low-carbon hydrogen. It is actively working to develop a dedicated hydrogen transport network in France, based on industrial clusters as well as expanding to interconnected networks at both national and European levels.



Established in the South-West of France, at the crossroads between major European gas flows, Teréga has been deploying its know-how in the development of gas transport and storage infrastructures for more than 75 years and is now designing innovative solutions to meet the major energy challenges in France and Europe. An accelerator of the energy transition, Teréga operates over 5000 km of pipelines and 2 underground storage reservoirs representing 15,6% of the French gas transport network and 26,9% of national storage capacity.

In 2023, the company had more than 646 employees. Corporate social responsibility is at the heart of Teréga's strategy, as it embarks on the energy transition to carbon neutrality. Teréga has rolled out programs in all areas of ESG (Environmental, Social and Governance): its employee safety and its infrastructure security via the PARI 2025 program, sustainable development of territories and social responsibility via the ENERGIZ MOUV program, support of philanthropic projects via the Teréga Accélérateur d'Énergies endowment fund, and reduction of environmental impacts via the BE POSITIF program with a commitment to a 34% reduction in greenhouse gas emissions by 2030 compared to 2021 on all scopes 1, 2 and 3, which would allow us to achieve -54% across scopes 1 and 2 compared with 2017. In addition to H2med, the company is developing key transport and storage infrastructure projects for CO2 and hydrogen in the South West of France.



OGE creates and maintains a modern, safe and efficient infrastructure for natural gas, hydrogen and CO2. OGE's pipeline network with a length of over 12,000 kilometers is fundamental to Germany's energy supply and ensures the prosperity of the German society.

As the market-leading gas transmission system operator – the largest in Germany – OGE is a pioneer, driver and enabler of the energy transition and climate neutrality. OGE functions as a transformation consultant and service provider for industry, power plants, distribution system operators and OGE's partners from production and politics

The OGE Group is also a future-proof, modern workplace for more than 2,000 people. In the interests of its employees and shareholders, OGE constantly adapts its business model to ensure sustainable profitable development.

OGE dedicates large parts of its natural gas grid to the German hydrogen core grid complemented by several new-built pipeline connections and therefore actively pushes the energy transition from fossil fuels to low carbon and renewable energy implementation.

The companies hereabove will be referred to as H2med Promoters.

## 2. Global context

As stated in the European Hydrogen Strategy in 2020, hydrogen is a key asset for Europe, both in terms of meeting its targets for reducing greenhouse gas emissions and as a vector for energy sovereignty. A lever for decarbonizing sectors such as industry and mobility, a solution for storing intermittent renewable energies and producing electricity, and a source of reindustrialization. It is part of the future European energy mix. A condition for a widespread use of hydrogen as an energy carrier in the EU is the availability of energy infrastructure for connecting supply and demand.

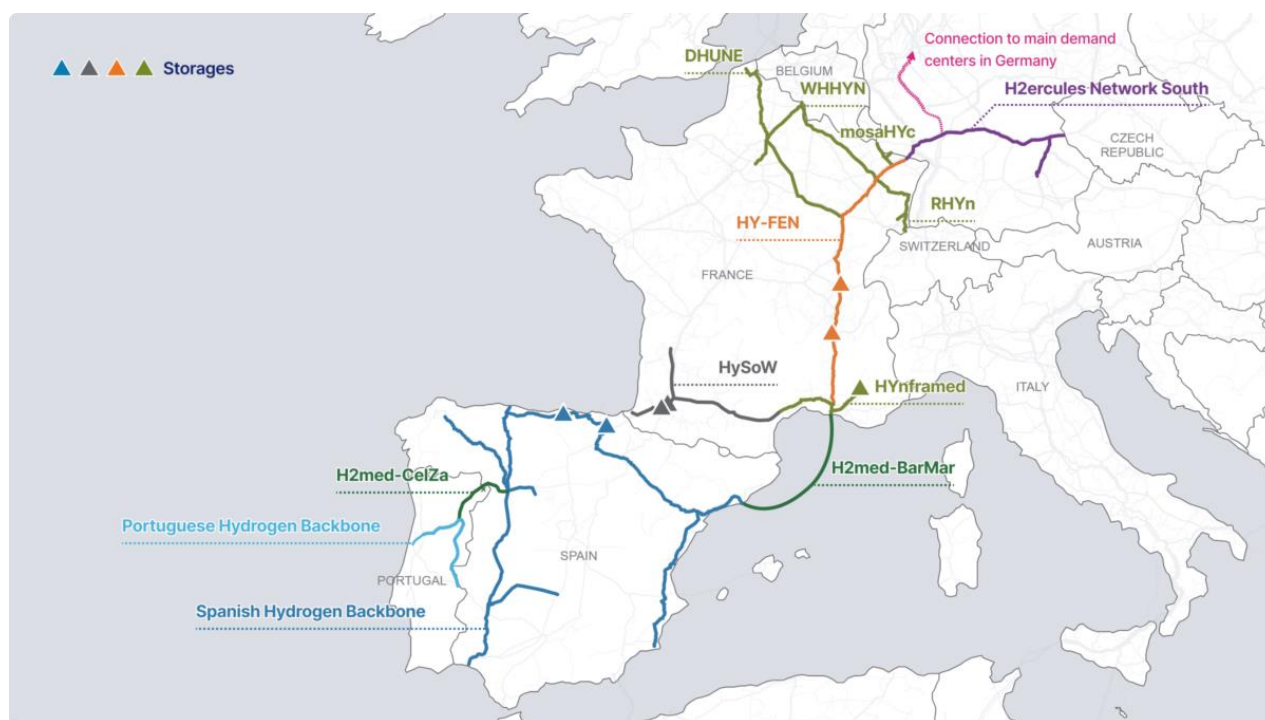
Transmission system operators have published a first common vision of the hydrogen networks in 2020 and the European Hydrogen backbone (EHB) has been evolving since then. Currently, thirty-three European Promoters are involved in this initiative and project to build or repurpose gas infrastructure to operate about 31 500 km of hydrogen pipelines across the continent by 2030 and create an integrated hydrogen market. The interconnection of the Iberian Peninsula with France and with the rest of the Western Europe, part of the EHB from its start and later named corridor B, took a concrete shape in 2022 under the name H2med Corridor.

The H2Med corridor project was announced on the 20<sup>th</sup> of October 2022 in Brussels by the President of the French Republic, Emmanuel Macron, Spain's Prime Minister, Pedro Sánchez, and Portugal's former Prime Minister António Costa. This corridor was designed as the most direct and efficient option to connect the Iberian Peninsula to Central Europe, as part of a Green Energy Corridor connecting Portugal, Spain and France.

In Alicante on 9<sup>th</sup> of December 2022, the political representatives confirmed the start of development of this corridor whose contours were specified in the presence of the European Commission President, Ursula von der Leyen.

On 18<sup>th</sup> October 2023, OGE, as Germany's largest gas TSO, joined the H2med Corridor project to connect main demand centres in Germany and to bring producers and consumers closer together.

The hydrogen corridor will be ready by 2030, enabling the transport of 0,75 Mt/y from Portugal to Spain and 2 Mt/y of hydrogen from Spain to France and will constitute a major hydrogen corridor in the Mediterranean area, as well as a key lever to decarbonize industrial clusters at European level following REPowerEU plan.



Map of H2med corridor

The project will be a key enabler of the uptake of renewable and low carbon hydrogen at European market scale for various uses, allowing to achieve decarbonisation of many strategic industrial sectors, with Germany as the

main off-taker market. Connections with salt cavern storages will strongly contribute to European security of supply, foster integration of renewables and bring necessary flexibility for industrial and mobility uses.

This hydrogen Corridor paves the way for the creation of the European Hydrogen Backbone to maximize energy independence of the EU Member states.

## H2med Corridor

The H2med Corridor is a transnational initiative bringing five Promoters to interconnect the hydrogen networks of the Iberian Peninsula to Germany and NorthWest Europe, enabling Europe to be supplied with competitive renewable hydrogen by 2030. By connecting production and consumption of hydrogen, the project is an important step for European hydrogen market development.

The H2Med Corridor is formed by the following pipeline projects:

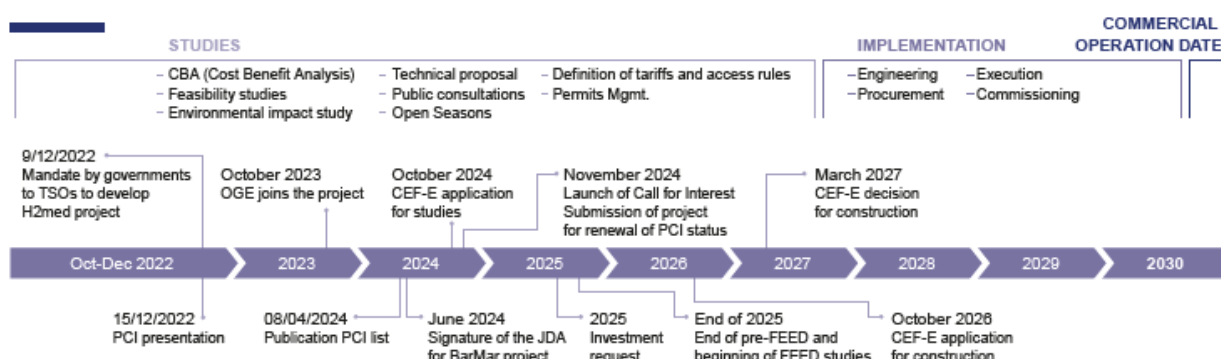
- Portuguese hydrogen backbone,
- Celza (Celorico da Beira – Zamora) – interconnection between Portugal and Spain,
- Spanish hydrogen backbone,
- BarMar (Barcelona-Marseille) – offshore pipeline connecting Spain to France,
- HY-FEN (Hydrogen French Energy Network) – onshore infrastructure crossing France from Fos-sur-Mer to Obergailbach and connecting various French industrial hubs and several hydrogen underground storage projects in France,
- Interconnection with Germany at the French-German border via the Hercules South project connecting all regions of Germany through the core grid.

The projects listed above have obtained the PCI label at European level and are eligible for submission to the Connecting Europe Facility (CEF) funding.

## Project schedule

Ongoing feasibility study aims to determine essential technical and economic elements of the project (dimensioning, pressures, possibilities to repurpose parts of existing gas networks). It will be followed by a Front End Engineering Design (FEED) study, which will detail the selected technical options and enable the Promoters to draw up a commercial offer that will finally be presented to the users of the hydrogen network.

From the commercial perspective, market screening for supporters and current Promoters will evolve to further binding commitments in order to ensure the commercial viability of the project. Therefore, a Final Investment Decision (FID) is envisaged for 2027 and the commissioning by 2030.



*Estimative schedule of H2med project*

# 3. Launch of a Call for Interest

Across the corridor, several national or local consultations have already been conducted to identify customers' needs in terms of supply, demand, transport and storage and to evaluate the progress of the hydrogen sector. H2med Corridor Promoters REN, Enagás, GRTgaz, Teréga and OGE need to update their information on the hydrogen production and consumption projects, as well as to confirm market interest for the transport corridor in a common procedure. The Promoters of H2med thus open a joint public Call for Interest in order to obtain direct market information and evaluate hydrogen development potential from 2030 to 2050.

Its purpose will be to confirm the economic interest in the H2med Corridor, namely on a cross-border hydrogen pipeline infrastructure linking hydrogen production exportable from Portugal and Spain with consumer interests in France and Germany, as well as to launch calls for interest on the geographies where no consultation was performed before.

## Call for Interest organisation

All market players interested in connecting to H2med Corridor, either as hydrogen producers, consumers or marketers of hydrogen (whether as traders, suppliers, aggregators, or different combinations of the previous), are invited to respond to the non-binding first phase of the Call for interest H2med.

Proven commercial interest will underpin Promoters' demands for national and European subsidies or any other derisking mechanisms necessary to build this strategic infrastructure.

This Call for Interest is a transparent and non-discriminatory procedure, open to all players wishing to participate. Interested parties will be able to express their interest in the infrastructure being part of the H2Med Corridor from Portugal until Germany. Dedicated questions will address the interconnections of the French hydrogen backbone project HY-FEN with internal French entry and exit points.

The Call for Interest will be conducted in two phases:

1. a non-binding consultation phase to qualify the needs and identify the appropriate infrastructure followed by
2. a binding phase with capacity allocation and signature of the necessary contracts, and an iterative, progressive approach to validating the investment.

During the first non-binding phase, market players are invited to **express their interest** on the basis of the elements communicated in this "**H2med Corridor Information Memorandum**".

**This first phase organised between 7<sup>th</sup> November and 18<sup>th</sup> December 2024 is non-binding, in the sense that it commits neither the Promoters to implement the proposed infrastructure project, nor the market players responding to the Call for Interest to book any transmission capacity.**

During this phase, market players will be asked for an estimate of their transport needs along the H2med corridor (volumes, entry and exit points either on consumption or production side or, as a midstreamer, connecting production and demand with transmission demand across the different countries along the H2med corridor). The collection of requirements resulting from this phase will serve as an input for the feasibility study, subsequent Front End Engineering study and economic studies to be carried out by the Promoters on all the parts of the H2Med Corridor.

After this first non-binding phase and with sufficient technical maturity, the Promoters will define access conditions to the infrastructure (among others, capacity allocation and indicative tariff) as well as the decision requirements for the construction of the infrastructure. The process of this binding phase will be defined according to the results of market consultation and lead to capacity bookings to trigger the investment.

## Match-making process

In parallel to this non-binding Call of Interest, the market players will have the opportunity to participate in the match-making process. With the same link to the H2med web platform as for the Call for Interest, the market players can share publicly their identity, basic information about their projects and their contact details in order to facilitate contacts, enter into eventual commercial discussions related to hydrogen sale and purchase contracts and thus develop the market activities.

This is a general, open and voluntary opportunity for the market players. This process will be non-mandatory and the consent of the Parties to publish their data will be requested. Also, sharing any data on the match-making platform is not mandatory in order to participate in the Call for Interest.

## Proposed infrastructure access principles

The Promoters propose to develop, invest in, build and operate an "open" hydrogen pipeline, with transparent and non-discriminatory access to the infrastructure in accordance with the principles set out in the EU hydrogen and gas decarbonisation package, consisting of Directive (EU) 2024/1788 and Regulation (EU) 2024/1789. Key principles are the following:

### *Principle of separation of activities*

First and foremost, the Promoters will apply a principle of separation of activities between hydrogen production, use and transport, by being positioned exclusively on hydrogen transport activities. This principle of vertical separation is key to guaranteeing a neutral position as a network operator, vis-à-vis other players in the hydrogen market (consumers, producers, etc.).

### *Non-discriminatory third-party access to the network*

Thanks to this exclusive positioning in the transmission link of the value chain, the Promoters will guarantee non-discriminatory access to the system for third parties, in order to promote the development of a growing market.

### *Transparent third-party access*

In the same way, the Promoters will guarantee transparent third-party access, with clear and public rules for participation in the Call for Interest and for access to infrastructure (allocation of capacity, pricing...). All relevant information will be published by the Promoters on the project website.

## 4. Proposed contractual and tariff principles

If the economic interest of the proposed infrastructure is confirmed, the Promoters will implement a commercial and pricing model that draws on the core principles that have enabled the development and integration of the existing natural gas markets, while taking a pragmatic and agile approach to the specific context of a nascent hydrogen market.

### *Entry-exit system*

The Promoters will propose an entry-exit system for capacities which will allow network users to book separately their entry and exit capacities. The Promoters will analyse data on different entries and exits and as a result make



sure a balance between entry and exit capacities is achieved. This will facilitate the development of an integrated hydrogen ecosystem. The consumers will have the option of being supplied by several producers connected to the network, unlike a point-to-point model where the transport of hydrogen would be fixed from a specific production point to a specific consumption point.

### *Capacity bookings*

Future users of the transmission infrastructure will subscribe capacities at the entry and the exit points of the network. In Portugal, Spain and France these capacities will be subscribed on a multi-annual basis. In Germany, the capacities will be sold as annual products, according to Kernnetz (core network) rules.

The tariffs for the capacity will be based on a Ship-or-pay principle, which means the payments to the Promoters are due regardless of the use of the capacities.

### *Tariff methodology*

The tariffs of the H2Med corridor will be defined according to the legal framework implemented in the relevant Member States. European legislation foresees as a principle that regulated tariffs will have to be applied at the latest from 2033 onwards. Before 2033, it is left up to the Member States to decide on the implementation of regulated tariffs or not. Regardless of the applicable tariff regime, the Promoters will strive to offer the most competitive tariffs possible.

In the potential period leading up to regulated tariffs approved by the relevant National Regulatory Activity (NRA), a system of negotiated third-party access would be implemented. Tariffs of the relevant H2Med entry-exit systems would be calculated by the Promoters on an annual basis in light of their costs and expected remuneration. Tariffs could be reviewed every year to take into account different factors such as inflation.

In case negotiated third-party access is used, European legislation foresees that NRAs provide guidance to hydrogen network users on how negotiated tariffs are to be affected when regulated third-party access is introduced. The aim is to ensure a smooth evolution towards a regulated tariff regime.

### *Long-term commitment<sup>1</sup>*

The long-term capacity bookings are indispensable to trigger large-scale investments. The decision to invest in infrastructure will be therefore based on customers' long-term capacity subscriptions of firm capacities for up to 15 years in accordance with the Gas Package (Directive (EU) 2024/1788 and Regulation (EU) 2024/1789, adopted in May 2024).

Ensuring a non-discriminative approach will also mean not to impose a more significant financial burden on the "first movers" of the H2 market.

The implementation of the short-term capacity products will be considered at later development stages to answer to the future market flexibility needs.

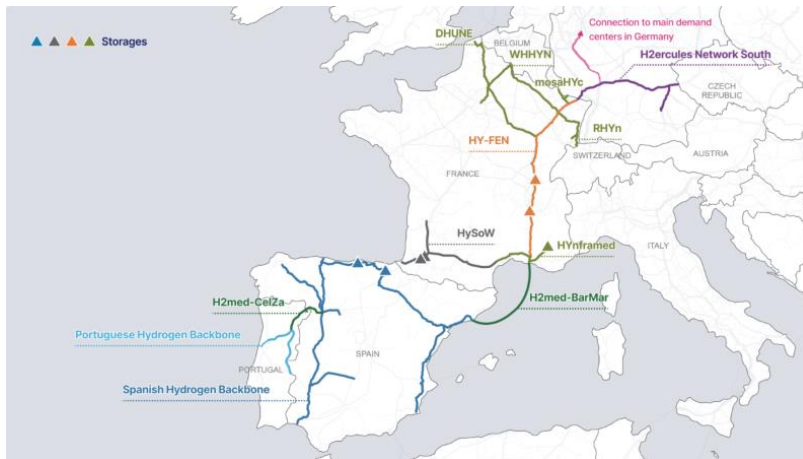
### *Other contractual and pricing commitments*

More detailed contractual and pricing terms will be defined in the next stages of the Call for Interest, prior to the launch of the binding phase, based on iterative exchanges with the Call for Interest participants.

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<sup>1</sup> Relevant for Portugal, Spain and France. In Germany core grid mechanisms serve as amortization guarantee allowing for shorter booking periods.

# 5. Transportation infrastructure proposal



## Future hydrogen infrastructure in Portugal

Portugal relies on two distinct projects (CelZa and the Portuguese Hydrogen Backbone), encompassing the following infrastructural elements:

- A 162 km hydrogen pipeline in Portugal from Celorico da Beira (Centro region) to Vale de Frades (at the Portuguese border) which will transport the green hydrogen produced in Portugal. The start of the pipeline is connected to the Portuguese Hydrogen Backbone network (PCI 9.1.1) at Celorico da Beira.
- The repurposing of 300 km of natural gas pipelines in the Eastern side of Portugal between Monforte (near the southern connection with Spain, and Cantanhede (near the shore). The conversion of such assets will imply the conversion of twelve DSO interface stations in order to foster the full conversion of the pipelines, promoting opportunities in the inner side of Portugal.

## CelZa

The starting point of **CelZa project** (PCI 9.1.2) in Celorico da Beira in Portugal forms the ending point of the Portuguese Hydrogen Backbone. In Vale de Frades a metering station will be installed to ensure correct billing of the green H<sub>2</sub> entering Spain. It will be connected to another metering station placed on the Spanish side of the border, which will be located nearby Villarino tras la Sierra in the province of Zamora. This marks the starting point of the 86 km long Spanish part of the pipeline, that ends at the compression station near the city of Zamora (which is also part of the CelZa PCI). The Spanish Hydrogen Backbone network also passes through Zamora and the compression station, and thereby, it marks the end of the CelZa pipeline, because from Zamora onwards the H<sub>2</sub> can be transported through Spain and beyond.



## Future hydrogen infrastructure in Spain

The “Spanish Hydrogen Backbone” project (PCI 9.1.3), undertaken by Enagás, aims to develop the backbone transmission network for hydrogen within the Spanish mainland and to enable the H2Med interconnections with Portugal and France, as well as new projected hydrogen maritime corridors between Spain and North-Central Europe.

The transmission network of an expected length of around 2600 km plus all the auxiliary facilities (valve stations, metering units and compression facilities) will connect producers and off-takers of hydrogen to incentivise the use of the renewable gas, as the transition away from fossil fuels continues. Of the approx. 2600 km long network, around 550 km are being analysed to be natural gas pipelines repurposed 100% to hydrogen use and over 2000 km will be newly built hydrogen pipelines. The entry into operation of these pipelines and necessary compressor stations is planned by 2030. This will enable for a wider hydrogen market to take shape and develop within Spain and other areas of Western and Central Europe.

The Spanish Hydrogen Backbone contemplates 2 main axes.

- The first axis encompasses the Cantabrian Coast Axis, the Ebro Valley Axis and the Levante Axis: Gijón - Santander - Bilbao - Guipúzcoa – Haro – Zaragoza – Teruel – Tivissa – Tarragona - Barcelona; Tivissa - Montesa, Montesa - Cartagena (approx. 1,500 km).
- The second one, the Vía de la Plata Axis connected to the Puertollano Hydrogen Valley: Gijón (Musel) – Zamora – Almedralejo - Huelva; Almedralejo – Puertollano (approx. 1,050 km).



Besides, two underground hydrogen storage facilities are under analysis, in the Cantabrian-Basque basin.

These storages and hydrogen axes, as well as H2med with its Celorico da Beira-Zamora and Barcelona-Marseille connections, have been included by the European Commission in the definitive PCI list in April 2024.

## BarMar

BarMar (PCI P.1.4) is a one-of-a-kind offshore interconnector connecting Barcelona in Spain to Fos-sur-Mer in France. The approx. 450 km pipeline is developed jointly by Enagás, GRTgaz and Teréga. It is designed to transport 2 Million tons of hydrogen per year and thus supply approx. 10% of European demand of hydrogen by 2030, in line with RePowerEU plan.



The infrastructures of the H2Med-BarMar PCI project consist of:

- A maritime renewable hydrogen pipeline stretching between the Barcelona LNG Regasification Plant and the Fos-Sur-Mer port close to Marseille. The pipeline will transport renewable hydrogen from Barcelona to Marseille. Previous conceptual and pre-feasibility studies have outlined several possible corridor routes. At present, two main routing options are considered during the ongoing pre-FEED studies, a deep-water route and a coastal route in order to ensure their feasibility and be able to select the most suitable one, from a technical, environmental and economic perspective.
- A compressor station in Barcelona, currently foreseen to have a capacity of up to 144MW. This compressor is crucial for the effective transportation of 2Mt of renewable hydrogen per year from Barcelona to Marseille.

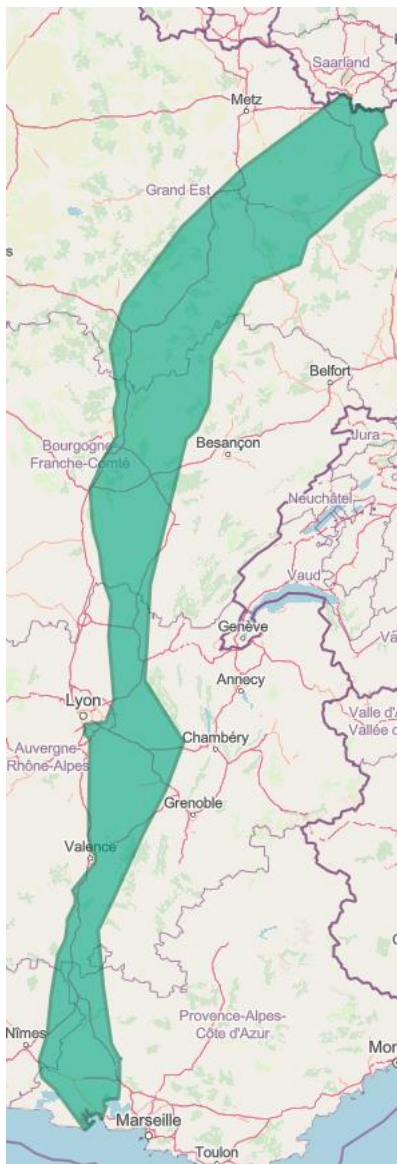
At Fos-sur-Mer a pig trap and metering station will be installed to ensure correct billing of the green H2 entering France.

## Future hydrogen infrastructure in France

The French hydrogen backbone is represented by the HY-FEN project (PCI 9.1.5), developed by GRTgaz. Its aim is to develop an ambitious hydrogen transport network through France, connecting the cost-efficient renewable hydrogen production from the Southwest of Europe with the high renewable hydrogen demand of strategic European industrial sectors in the Northwest of Europe. The resulting pipeline of over 1000 km (with hubs interconnection), connecting hydrogen production, storage and usage facilities, will offer a hydrogen transportation capacity of 192 GWh/d (LHV) by 2030. The transmission network will give access to multiple users and offers a total transport capacity of more than 70 TWh per year (around 2 Mt/y).



HY-FEN will interconnect with BarMar project at Fos-sur-Mer and cross Provence-Alpes-Côte d'Azur, Auvergne-Rhône-Alpes, Bourgogne-Franche-Comté and Grand Est regions in France to connect with the German hydrogen system at Obergaillbach - Medelsheim interconnection point, namely with the MEGAL transmission system, jointly owned by OGE and GRTgaz, via its subsidiary GRTgaz Deutschland.



HYFEN project study area

HY-FEN connects with industrial basins to supply demand and possibly evacuate exceeding production. They are the following:

- **Hynframed:** currently planned 180 km of new H2 pipelines in close proximity of Fos-sur-Mer linking major players of refining, chemistry and steel industry and local production;
- **MidHY:** about 200 km of pipelines connecting Saint-Martin-de-Crau to Cruzy and further to South-West via HySoW project, developed by Teréga (about 600 km of H2 pipelines and 500 GWh of H2 storage capacity);
- **Vallée de la chimie (Chemical valley):** about 40 km long pipeline connection of major chemical companies in the South of Lyon with HY-FEN;
- **RHYn:** a network of about 100 km in the Grand Est region, connecting local production with major chemical players in Chalampé - Ottmarsheim area, as well as with cross-border consumers in Baden-Württemberg via RHYn Interco project and, in later stages, with Switzerland;
- **mosaHYc:** a 90-km, mostly repurposed, network between Moselle and Sarre regions, scheduled to be put in service by 2027, a dynamic ecosystem driven by the need of steel mills to decarbonize their production;
- **HY4Link:** about 230 km pipeline system connecting mosaHYc with Luxembourg, local industrial players and H2med

At a longer-term horizon, other interconnections will be studied and developed by GRTgaz and Teréga, in order to allow all interested industrials to get access to hydrogen to facilitate their decarbonization. Market players are invited to express their interest for any other particular connection points in the Call for Interest form.

#### Interconnection with storages

France disposes of important potential of storage in salt caverns. There storage projects are developed across the French territory in the South of France, in the center and in the North-Est of French territory as well as in Southwest by several storage operators. For the future hydrogen market, these salt caverns represent an important flexibility option, important for the market players. The cooperation between transmission and storage system operators is therefore ongoing and several interconnections of these two systems are planned.

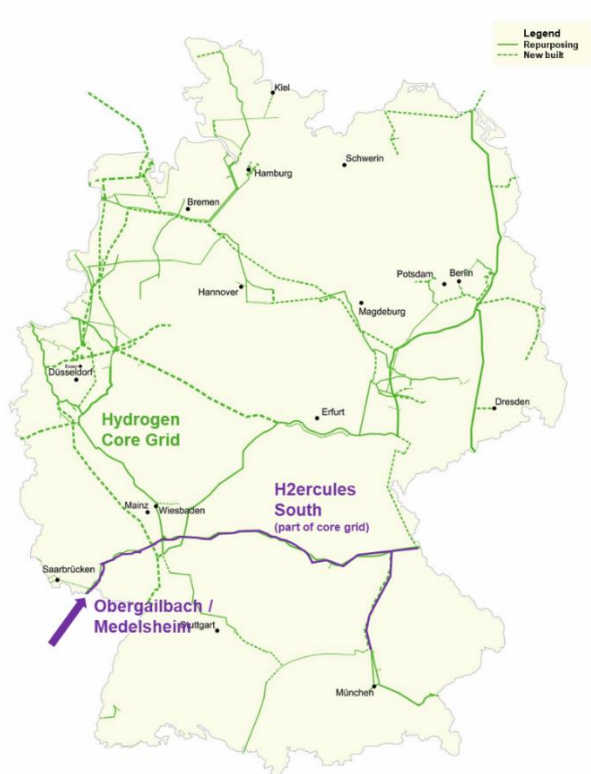
## Future hydrogen infrastructure in Germany

In Germany, a nationwide approach to connect demand with production, storages and import routes is being followed: the creation of the hydrogen core grid. To realize this grid, the German network operators including OGE together with the German Ministry of Economic Affairs and Climate Action, discussed and designed a grid, which fulfills the above-mentioned requirements.

The German network operators submitted these measures to the Federal Regulatory Agency (BNetzA), who intensively assessed the proposal and discussed it with the market. On October 22 BNetzA approved most parts of the core grid with about **9,040 km**. It consists mainly of **converted natural gas pipelines (approx. 60%)**. The

investment costs amount to **€ 18.9 billion**. The feed-in and feed-out capacities amount to **around 100 GW and 87 GW respectively**.

By BNetzA's approval the German TSOs are entitled to implement the core grid infrastructure and furthermore are obliged to realize the infrastructure, relevant FIDs already taken.



*Graphic representation of the hydrogen core grid approved by BNetzA (published by FNB Gas e. V. on 22 October 2024)*

With the core grid all main demand centers in Germany can be accessed from any entry point, like from Medelsheim at the French-German border, where the connection to the H2med corridor is located. OGE's pipeline system is directly connected there and allows for transports deep into Germany due to its preferred geographical location and its many connections in the core grid with other network operators' grids.

As part of the core grid OGE develops several hydrogen pipeline projects, named "H2ercules", i.a. connecting France via the H2ercules South project (PCI 9.1.6) to:

- The Rhein-Main-Area
- Frankfurt region
- Cologne region
- Ruhr Area
- Karlsruhe
- Nuremberg
- Ingolstadt / Munich

and beyond to all other relevant industrial clusters in Germany through other network operators in Germany.

# 6. Regulatory environment in H2med countries

## Portugal

In Portugal, the framework for hydrogen network operation relies on 4th gas package published in July 2024 by the European Union. This EU legislation implies the update of existing Portuguese law for 100% H2 network development, construction and operation, as well as the definition of the rules for tariffs establishment and third-party access to the network, including mandatory regulation of hydrogen infrastructure at the latest from 1 January 2033.

The Portuguese Government must also designate the Portuguese NRA for hydrogen, as it already exists for electricity and gas, which is the Entidade Reguladora para os Serviços Energéticos.

Aiming to accelerate this process, REN already asked to Portuguese Government to kick-off the process of REN Gás nomination as HTNO, having also required to be indicated as indicative HTNO in order to have mandate to develop the Portuguese PCI projects and represent Portugal on ENNOH creation.

## Spain

The Government of Spain has transposed the European energy policy framework to the national context. In this sense, and in coherence with the European Green Deal, Spain disposes of the Strategic Framework for Energy and Climate since 2019, which constitutes the key tool to achieve the fundamental objective of decarbonizing the Spanish economy, and by means of which a regulatory and legal framework is provided to the measures that facilitate the change towards a sustainable and competitive economic model that contributes to mitigating climate change. The main elements of this Framework are: the Law of Climate Change and Energy Transition, the National Integrated Energy and Climate Plan (PNIEC), the 2050 Long-Term Decarbonisation Strategy (ELP), the Strategy Against Energy Poverty, and the Just Transition Strategy. These elements are reinforced by a series of strategies and roadmap sectoral initiatives, such as the Renewable Hydrogen Roadmap.

The scenario portrayed in Long-Term Decarbonisation Strategy (ELP) determines a roadmap towards reduction of GHG emissions in all sectors of the economy, in order to reach climate neutrality by 2050. In particular, the ELP presents hydrogen as the major renewable fuel for decarbonisation of industry, foreseeing half of the industrial energy demand will be satisfied by hydrogen by 2050. It will also play a fundamental role as an input for the preparation of RFNBOs, which will enable the decarbonisation of the mobility sector.

The PNIEC 2023-2030 aims at making concrete plans towards hydrogen implementation by 2030, with an expected electrolyser capacity of 12 GW to be deployed by that date. The supply of power for these should mainly come from wind and solar energy. Therefore, the objective is to replace 74% of the current grey hydrogen being utilised in industry, as well as implementation of RFNBOs for the mobility and aviation sectors.

Law 7/2021, of 20 May 2021, on Climate Change and Energy Transition establishes the legal basis to ensure that Spain complies with the objectives of the Paris Agreement, facilitating the decarbonisation of the economy and promoting a sustainable development model. In particular, this Law includes as strategic planning instruments to address the energy transition, the ELP and the PNIEC, consolidating in the national legislation the energy planning tools included in the Regulation (EU) 2018/1999 of 11 December 2018 on the Governance of the Energy Union and Climate Action. In this way, the EU objective of achieving climate neutrality before 2050 and the international commitments acquired by Spain in its PNIEC are confirmed at the legislative level.

The Spanish Royal Decree-Law 8/2023, of December 27, 2023, through its additional provision 9, furthermore enables the TSOs of the natural gas transmission network to provisionally exercise, by agreement of the Council of Ministers, the functions for the development of the hydrogen backbone within the framework of Projects of Common Interest (PCI) by means of a legally separated horizontal entity. On July 30th 2024, the Council of Ministers approved the agreement authorising the Project Coordinator of this Action, Enagás Infraestructuras de Hidrógeno (EIH), to provisionally exercise the functions of developing European Projects of Common Interest

(PCI) for hydrogen networks. These functions are the application for authorisation, construction, commissioning, operation, monitoring and maintenance of the hydrogen transport and storage infrastructures recognised as PCIs. This regime will be provisional until the final designation of HTNOs (Hydrogen Transmission Network Operators), according to the conditions to be established in the transposition of the recently approved EU Hydrogen and Decarbonised Gas Market Package and Regulation (EU) 2024/1789 into Spanish law by 2026.

By virtue of the provisions of the aforementioned Royal Decree-Law 8/2023, Enagás has been designated to prepare a non-binding proposal for the development of the Spanish Hydrogen Backbone with a ten-year timeframe (out to 2033). This proposal was presented to the Spanish Ministry on April 29th 2024.

At the national level, the proposal is consistent with the Strategic Framework of the Government of Spain, Law 7/2021 on Climate Change and Energy Transition in relation to the promotion and objectives of renewable gases, including hydrogen, which is provided for in Article 12, and is carried out in consistency with the objectives included in the draft update of the PNIEC 2023-2030 and in the Spanish Long-Term Decarbonisation Strategy 2050.

## France

In France, the framework under which the hydrogen network will be operated stems from the 4th gas package published in July 2024 by the European Union. This set of texts foresees a certain number of rules regarding notably tariffs and third-party access to the network, including mandatory regulation of hydrogen infrastructure at the latest from 1 January 2033.

In light of the rules set out in the 4<sup>th</sup> package and in anticipation of its implementation, the French NRA for electricity and gas (Commission de régulation de l'énergie – CRE) published in September 2024 a document outlining its vision of the development of regulation of the hydrogen sector. Among its main recommendations, CRE considers that tariffs should encourage long term commitments of the first hydrogen producers and consumers in order to support the development of hydrogen infrastructure. For instance, fixed tariffs or tariffs with a capped evolution are considered relevant for first network users within regional hubs.

As far as tariff structure is concerned, CRE is in favour of an approach divided into two levels: one for each of the regional hubs on the one hand, and one for the main network connecting hubs, storages and neighbouring countries on the other hand. This dual tariff structure can be likened to that prevailing for the French gas transmission network (main network level and regional network level).

On the topic of network development, CRE considers that, in addition to the assessment of the hydrogen TYNPD, it should be granted the power to approve the annual investments programs of the hydrogen network operators in the same way that it is already within its remit to approve the investments of the gas TSOs. This aims notably at ensuring control over investments in transnational pipelines whose sizing cannot be directly linked to local industrial demand.

Broadly speaking, it appears that CRE is overall in favour of the regulation of hydrogen transmission. This topic will likely be discussed in the coming months among French authorities to specify the extent of this regulation.

## Germany

In Germany, the Energy Industry Act was amended with a regulatory framework for the transport of hydrogen and provisions for a combined natural gas/hydrogen network development plan. This framework lays the basis for the transport of hydrogen as an energy carrier in Germany. The Energy Industry Act also provides for the construction of a hydrogen core grid by the existing natural gas TSOs and other network operators, as well as for the implementation of a financial guarantee mechanism by the German state.

The TSOs designed the core grid in line with market signals and surveys and filed a corresponding application to the Bundesnetzagentur (German federal regulatory authority) in July 2024. Approval of this application by the Bundesnetzagentur was issued on 22 October 2024 with only minor changes to the initial planning. This approval entitles and obliges the TSOs to build the planned core grid. All pipelines included in the core grid will benefit from the public financial guarantee mechanism, which enables a capped transport tariff at the beginning while granting coverage of regulated costs of the TSOs at the same time.

Together with the market, the TSOs and the Bundesnetzagentur will subsequently update the core grid every two years through the network development plan. The process for the combined natural gas/hydrogen network development plan is organized similarly to the former natural gas network development plan. It sufficiently ensures that market signals determine the future development of the natural gas and hydrogen grids.



The future transport tariff for the hydrogen core grid will be a post stamp tariff for entry or exit capacity. The exact amount for the first regulatory period is currently being determined by the Bundesnetzagentur and will likely be published until the end of 2024.

## 7. Hydrogen specification proposal

Hydrogen quality specifications will apply to hydrogen injected into the transport infrastructure, as well as to deliveries to end-consumers. The gas industry is currently working to propose standardised hydrogen specifications at European level. The European Committee for Standardisation (CEN) published a European technical specification in November 2023 (XP CEN/TS 17977), which is a benchmark.

This specification defines the quality of gaseous hydrogen (i.e. its parameters and limit values) which is intended to be transported, injected into storage, extracted from storage, distributed and used in fully and/or partially converted gas infrastructures and in connected applications, all in complete safety.

To date, the Promoters adopted these XP CEN/TS 17977 specifications, summarised in the table below, as those that will apply to the proposed transmission infrastructure.

They may be subject to change as a result of further work carried out in several working groups on the subject at European level (EASEE-gas, marcogas, GIE, CEN, ENTSOG), and of advances in technical knowledge of the sector. In particular, discussions are underway to determine the minimum hydrogen content for the sector, currently set at 98 mol-% in CEN/TS 17977. Stakeholders are considering setting this threshold at 99.5 mol-%.

Parameter	Unit	Value
Hydrogen	mol-%	≥ 98
Wobbe index	MJ/m <sup>3</sup> (15°C/15°C)	42,0 - 46,0
The content and composition of the further quality parameter (e.g sum of inerts) shall satisfy the Wobbe Index value above.		
Water	µmol/mol	≤ 250 ≤ 60 (a)
Hydrocarbon dew point (HCDP) (b)	°C	< -2 °C at 1 < p < 70 bar
Sum of inerts (N <sub>2</sub> , He, Ar)	mol-%	≤ 2
Gaseous hydrocarbons (b)	mol-%	≤ 2
Oxygen (O <sub>2</sub> ) (c)	mol-% µmol/mol	≤ 0,1 (d) ≤ 10
Carbon monoxide	µmol/mol	≤ 20
Carbon dioxide	µmol/mol	≤ 20
Total Sulfur (b)	µmol/mol	≤ 7 (e)
Ammonia	µmol/mol	≤ 13
Halogenated compounds	µmol/mol	≤ 0,05
Max particulate concentration (b)	mg/km	Technically free
Contaminants	The gas shall not contain constituents other than listed in this table at levels that prevent its transportation, storage and/or utilization without quality adjustment or treatment	

(a) 250 µmol/mol at MOP less or equal to 10 bar, 60 µmol/mol at MOP over 10 bar.

(b) These components most likely have their source in the previous use of the pipework.

(c) Rolling 24h average.

(d) Max 0,1 mol-% in grids with no exit point to UGS or to sensitive customers, otherwise max 10 µmol/mol.

(e) Non-odorised hydrogen.

*Summary table of technical specifications XP CEN/TS 17977*

## 8. Practical information for responding to the Call for Interest

All market players interested in connecting to this future infrastructure, either as hydrogen producers, consumers or marketers of hydrogen (whether as traders, suppliers, aggregators or different combinations of the previous), are invited to respond to the non-binding first phase of the Call for interest H2med.

Interested parties are invited to complete the questionnaires on the H2med platform accessible on the following links: <https://h2medproject.com/> and <https://www.h2-digital.com/h2med/join>.

Interested parties will be asked to specify certain information about their hydrogen projects and mainly about their interest in transportation capacities across the H2med corridor. The information will be expressed in tons and recalculated by the platform in order to obtain capacity information in MWh (at high calorific value).

**The Call for Interest will be open from 7<sup>th</sup> November 2024 and will close on 18<sup>th</sup> December 2024.**

### Contact details

In case of questions, you can contact us on the e-mail addresses below:

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OGE	<a href="mailto:h2-international@oge.net">h2-international@oge.net</a>

## 9. Confidentiality

By participating to this Call for Interest, it is understood that any previously concluded confidentiality agreement with any of the Project Promoters does not withdraw the consent of the Player to submit information to the platform for the Call for Interest. All rules related to confidentiality can be found on the Terms of Use of the Platform.