

Policy Paper on the European Backbone Talk

Executive summary

This paper is the work of an alliance of regions, transmission system operators and ports. The partners involved are committed to promoting the hydrogen market ramp-up by expanding the hydrogen infrastructure with the European Hydrogen Backbone as its core element. Regions play an essential role in the development of the hydrogen infrastructure, accompanied by specific regional opportunities and challenges.

The alliance has compiled 14 policy recommendations to tackle these challenges and to contribute to the successful hydrogen market ramp-up. These recommendations can be summarized in three overarching fields of action:

- Creating pan-European financing and risk mitigation schemes for hydrogen infrastructure that are aligned with emissions reduction targets
- Integrating the European Hydrogen Backbone and port infrastructure into a European production and import strategy for hydrogen and its derivatives

- Optimising the legal and procedural framework for the rapid implementation of cross-border infrastructure projects

The successful realisation of the European Hydrogen Backbone is crucial for the hydrogen market ramp-up. The project is therefore a key factor in achieving climate targets and securing highly skilled jobs in the industry.



Introduction:

Hydrogen is a cornerstone of the green transformation of the economy, making it an indispensable component to achieve the ambitious climate targets set by the European Union and for future economic growth in Europe. A high-performance European hydrogen infrastructure is imperative to support this transition. The European Hydrogen Backbone (EHB) initiative, led by a consortium of 33 Transmission System Operators (TSOs), has submitted a comprehensive proposal for the development of this infrastructure. This is an important project for all sectors involved in value creation, including hydrogen production, transport, storage, and application, as well as for the regions along the hydrogen pipeline network.

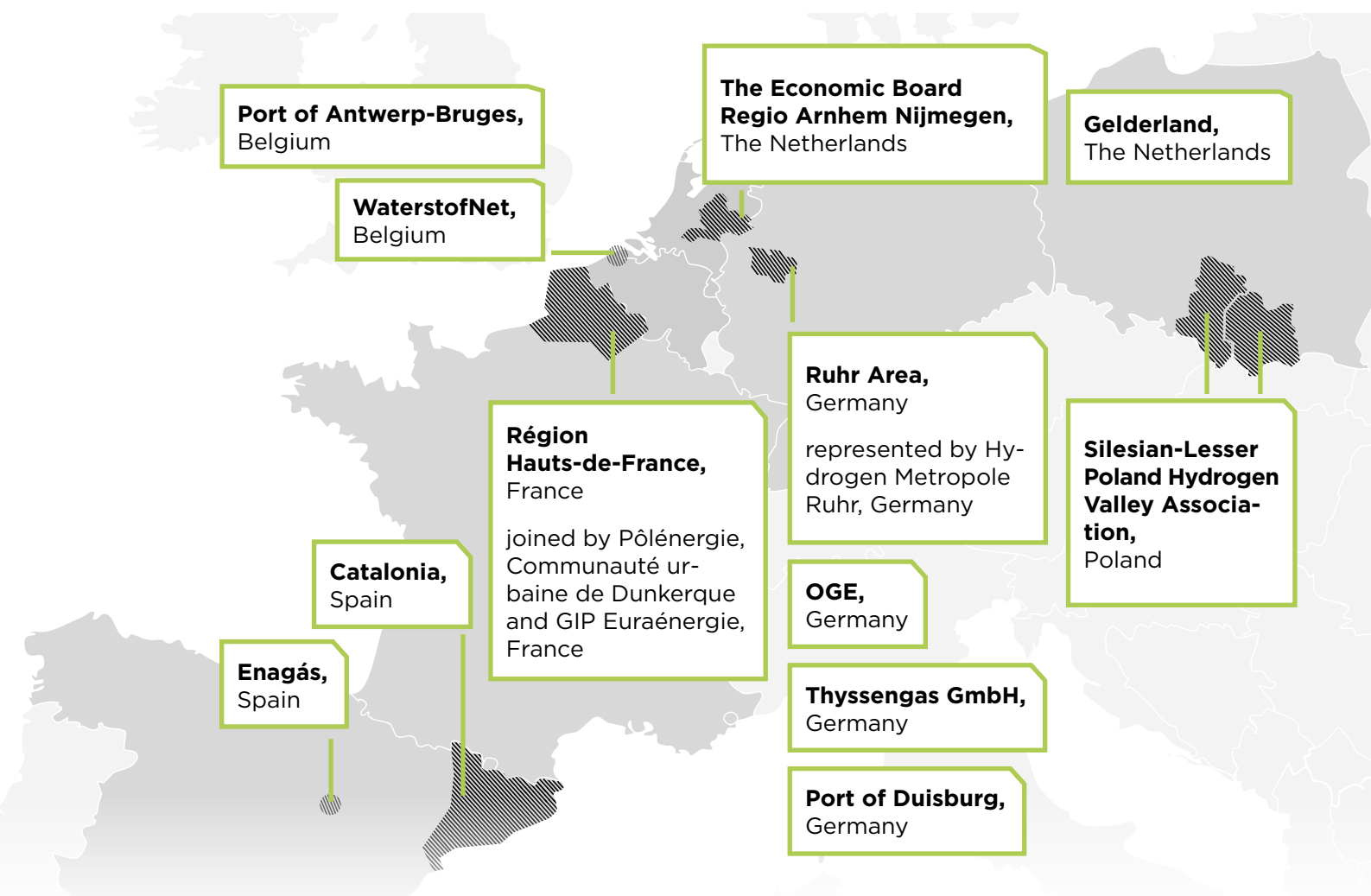
Crucially, European regions play a central role in driving industrial transformation through the development of the hydrogen economy. A transnational alliance of regional stakeholders has jointly formulat-

ed this policy paper, which highlights the pivotal roles of regions, ports, and transmission system operators in these transformation processes. It also focuses on measures to strengthen and expand these roles.

Initiated by Hydrogen Metropole Ruhr, this alliance of stakeholders has been established to develop proposals and solutions to contribute to the successful implementation of the European hydrogen infrastructure. The alliance was kick-started by the “European Backbone Talk - Why Regions matter” event on 5 March 2024 in Brussels which resulted in the following positions.

The stakeholders emphasised the importance of regional players, interregional cooperation and shared learning as essential components in the successful development of the European Hydrogen Backbone. The following Action Plan outlines specific recommendations for European policymakers.

The initiators of the Alliance of Regions are:



The signatories of this paper encourage the next European Commission to make critical decisions in the near future to advance the EHB in key areas. In particular, we have identified three core areas within which additional political decisions from the

Commission and the co-legislators are required to ensure the successful ramp-up of the hydrogen economy and ultimately achieve climate neutrality by 2050. To this end, we present the following list of specific measures.

Creating pan-European financing and risk mitigation schemes for hydrogen infrastructure that are aligned with emissions reduction targets

1. There needs to be clarity regarding investment conditions for all stakeholders across the entire hydrogen value chain (production, transport, application). It is essential to consider both CAPEX and OPEX costs, as well as the impact of regulated market environments on risk returns. As the risk is higher than in a mature market, risk mitigation is essential. At the very least, all stakeholders need clarity regarding medium-term pricing and fee structures.
2. Incentives must be aligned with targets: European emissions reduction targets need to be backed up with appropriate financial support – in particular for the development of the necessary infrastructure. The EU, in co-operation with national governments, should establish a framework of financial guarantees for the transmission system operators and other infrastructure operators in the hydrogen sector. We need to be working towards a cross-border standardised risk management system for transnational hydrogen corridors.
3. A framework with appropriate incentive mechanisms for hydrogen application is required. This must include an incentive to use hydrogen with a focus on maximising emissions reduction. Existing approaches such as the H2Global foundation, that currently sets up a hydrogen import scheme for Germany, should be further developed and be adopted at the European scale.
4. A mechanism for affordable network fees should be established. Viable approaches could include, for example, subsidised network charges for first movers and an intertemporal cost allocation mechanism, which could be similar to the German model including a capped tariff and an amortisation account. Implementing a staggered grid fee model based on the German hydrogen core grid could be an effective option. Nevertheless, flexible solutions should be possible in order to take account of the special features in different European regions and to find customized solutions. This is particularly relevant because the amortization period for hydrogen infrastructures differs significantly from established markets.

The German model

In principle, the German model provides for stretched grid fees in order to cap the costs for first movers. At the same time, it provides for state guarantees for TSOs in order to mitigate the investment risk.

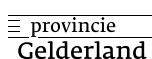
Integrating the European Hydrogen Backbone and port infrastructure into a European production and import strategy for hydrogen and its derivatives

5. In further developing the European hydrogen strategy, a comprehensive approach that extends beyond hydrogen and encompasses derivatives and the transportation of CO₂ needs to be adopted at EU level. In the market ramp-up phase, low-carbon hydrogen should be used alongside renewable hydrogen in order to accelerate the market roll-out of this new energy carrier as quickly as possible and in large quantities. Therefore, both renewable and low-carbon hydrogen should be allowed to be transported via the European Hydrogen Backbone. This requires a clear definition of low-carbon hydrogen for the market ramp-up.
6. Ports, which serve as important nodes for energy production and supply and as regional logistics hubs, must also be integrated, e.g. as sites for ammonia crackers. The strong synergy potential between ports and the EHB must be leveraged here.
7. The European hydrogen strategy should be expanded to include an explicit import strategy, and it is crucial to work actively with seaports and supra-regional value chains in order to strengthen national initiatives. Only a united Europe can be strong on the global market.
8. In addition to the expansion of the European Hydrogen Backbone, it is important to also focus on developing regional and local solutions for hydrogen production and supply. This includes local production units, interconnected local hubs and storage facilities, distribution networks and infrastructure for derivatives and hydrogen. Furthermore, the deployment of transport ships for hydrogen and its derivatives, as well as ammonia crackers, is essential. The advancement of these measures should be spearheaded by the European Union. Providing targeted funding incentives and financial risk protection are instrumental in driving progress in this area. This will enable European regions to develop their own effective project approaches to complement the EHB. Additionally, setting political targets for the expansion of infrastructure at EU level could also be helpful.

Optimising the legal and procedural framework for the rapid implementation of cross-border infrastructure projects

9. National regulation and approval mechanisms can potentially cause delays in cross-border infrastructure projects. To address this issue, we call for cross-border task forces to be established specifically for hydrogen projects, such as the European Hydrogen Backbone. These task forces should include project sponsors, regions and approval bodies to achieve optimum harmonisation of the planning and approval processes for individual projects.
10. The regions in which hydrogen infrastructure projects are to be implemented should be actively involved in developing corresponding projects.
11. The benefits of hydrogen infrastructure for both the economy and climate need to be clearly communicated to the citizens of the European Union. This requires clear and standardised communication at all levels. The EU should therefore support member states and regions in their endeavours by facilitating cross-regional knowledge sharing and providing necessary information.
12. Regional stakeholder management is essential for the successful implementation of projects and requires the necessary support from higher levels. To this end, existing approaches from the regions should be stepped up and strengthened through the expansion of regional funding approaches and exchange formats such as the H2-valleys.
13. There is a need for pan-European coordination for the realisation of a contiguous and functional hydrogen network with the explicit involvement of neighbouring regions. Of particular importance is the interaction between the import strategy and the potential connection of the EHB with neighbouring regions of the EU in the medium/long-term, such as North Africa, Ukraine, Balkans, etc. In addition, the European institutions will need to collaborate closely with Europe's key market players, including ports, transmission system operators, and Member States.
14. The European Hydrogen Backbone project presents exceptional opportunities for all partners to leverage the knowledge acquired through collaborative projects. It is imperative that these opportunities are centrally coordinated and utilised to their full potential. This project has the potential to significantly advance the goals of the European Green Deal while also safeguarding numerous jobs across various industrial sectors. The European Union should play a key role in facilitating and enhancing the existing exchange between stakeholders by promoting initiatives that support the expansion of hydrogen infrastructure.

This Policy Paper is jointly published by:



What is the **European Hydrogen Backbone?**

The European Hydrogen Backbone (EHB) is a project to promote the pan-European transport of hydrogen. The EHB initiative currently consists of 33 transmission system operators (TSOs) from 28 countries. The EHB initiative has proposed building an initial 11,600km hydrogen transportation network by 2030. The hydrogen infrastructure can then grow to become a pan-European network, with a length of 40,000 kilometres by 2040. The buildout will require an estimated total investment of 81 billion euros.

For more on the European Hydrogen Backbone, please visit:

[The European Hydrogen Backbone \(EHB\) initiative | EHB European Hydrogen Backbone](#)

What role does the market play?

Transmission system operators and port operators are currently grappling with a challenging investment decision. The establishment of a robust European hydrogen network and import infrastructure is essential for the widespread adoption of national hydrogen markets. However, any decisions on making the necessary investments currently need to be made against the backdrop of an uncertain market environment in terms of feed-in and feed-out volumes, price, availability, and certification of hydrogen. From a business perspective, it may therefore seem prudent to postpone these investments, especially as fixed transmission fees mean that there is no classic return to match the risk of such investment. Nevertheless, given the public interest in developing the European Hydrogen Backbone and facilitating the transition to a more sustainable economy, it is imperative to improve the market environment to support investment decisions and thus lay the foundations for the climate-friendly transformation of the European economy.

What is the significance of the European Hydrogen Backbone for Europe and the regions?

The success of the hydrogen market ramp-up hinges on the development of a robust and readily available infrastructure. The European Hydrogen Backbone is one of the biggest climate protection projects of the current decade. Various industries rely on hydrogen to decarbonise their operations, making a swift and reliable supply of hydrogen on an industrial scale imperative. The expansion of pipelines plays a critical role in ensuring the supply of hydrogen, especially as demand forecasts make other forms of transport seem unrealistic in comparison. Simultaneously, the need to scale up local production and imports of hydrogen is paramount.

The European Hydrogen Backbone is crucial for achieving the EU's climate targets

There is no technologically and economically viable alternative to hydrogen for the decarbonisation of specific applications, especially key industrial processes. Without the creation of pan-European hydrogen infrastructure in the form of the European Hydrogen Backbone, the widespread expansion of national markets is not feasible. Accordingly, the European Hydrogen Backbone is a fundamental requirement for achieving the goal of a 90 per cent reduction in carbon emissions by 2040. It is to this end that the European transmission system operators have developed a plan to connect the largest import and consumption hubs in Europe with 11,600 kilometres of hydrogen pipelines by 2030, with a further expansion to be completed by 2040.

The European Hydrogen Backbone combines climate protection and job security

The earliest possible development of a European hydrogen pipeline network is crucial for the regions represented by this policy paper. The EHB project is essential for accelerating the decarbonisation of existing industries and ensuring their sustainability. The economic implications place significant pressure on heavily industrialised regions in particular to act, and to act without delay. These regions can only capitalise on the potential of hydrogen if a reliable supply of hydrogen can be secured quickly. This rapid market access can also stimulate additional investment, while new added value and new expertise have the potential to bolster economic growth within the regions, as well as creating a positive narrative for regional transformation efforts. Failure to swiftly implement a hydrogen infrastructure could result in the relocation of industries and jobs. Increased unemployment and the collapse of vital value chains would hit these regions hard. Ensuring a stable supply of hydrogen, along with the rapid development of essential infrastructure and technology leadership, are critical factors in securing Europe's competitive strength and positioning in the global market. In addition to the environmental benefits, the rapid development of the European Hydrogen Backbone should therefore also be supported from an economic and geostrategic standpoint.

What are the next steps?

The regions are already leading the way!

The regions that have created this policy paper are determined to seize the opportunities created by the ramp-up of a hydrogen market. You can find examples that showcase the significant potential for environmentally-friendly transformation through hydrogen in the region profiles.

THE PARTNERS:

Role models for the opportunities created by the hydrogen market ramp-up

The Ruhr Area

About the region

The Ruhr Area is a region in the heart of North Rhine-Westphalia with over 5.1 million inhabitants. It is a distinctive industrial cluster that includes companies from the steel, chemical and glass manufacturing industries as well as metal processing and other specialized heavy industry companies. Given the concentration of current and future hydrogen consumers in this area, it is not surprising that a significant portion of Germany's hydrogen demand arises here. According to data from a market survey

conducted by the Fernleitungsnetzbetreiber Gas, which is the association of the German gas transmission system operators, over a quarter of Germany's hydrogen demand (25.2%) is projected to be in the Ruhr region by 2028. This makes the region a leader in hydrogen usage in Germany and it is already very well connected to the new hydrogen infrastructure in the plans for the German hydrogen core grid ("H2-Kernnetz").

Who represents the region in this paper?

Hydrogen Metropole Ruhr (HyMR) serves as the central coordination office for hydrogen initiatives in the Ruhr region. Established in 2022 by Business Metropole Ruhr GmbH and the Ruhr Regional Association, our mission is to position the Ruhr metropolis as a leading model region for hydrogen

in Germany and thereby become the nucleus of the H2 market ramp-up. We foster collaboration among stakeholders from business, science, politics, and civil society to drive joint projects and advance climate neutrality.

The hydrogen ecosystem

The region has access to significant scientific expertise in the field of hydrogen, including the Hydrogen and Fuel Cell Center ZBT GmbH in Duisburg, the Energy-Institute GWI in Essen and the H2 Application Centre in Herten. A study published in 2023 by the European Patent Office and the International Energy Agency revealed that the Ruhr region is the eighth highest region in the world for hydrogen-related patents. The region has a long history of hydrogen utilization, with 240 km of hydrogen pipeline in operation since 1938. In the currently planned German hydrogen core network, the region is more densely connected than any other in Germany. Although there have been nu-

merous electrolysis projects in the region, a significant amount of the hydrogen will still need to be imported. The Port of Duisburg, Europe's largest inland port, provides an additional advantage due to its proximity to the pipeline connection. In addition to numerous companies in the value chain, such as WEG for the production of electrolysis stacks, thyssenkrupp Nucera for the construction of electrolyzers, PlugPower for the production of fuel cells or Cummins Hydrogenics for the production of fuel cells for trains, many relevant start-ups and the European-wide hydrogen start-up accelerator "H2UB" are also located here.

Lighthouse projects

There are many hydrogen projects being implemented in the region. Below you will find a selection of particularly noteworthy projects in the region.

Project name	Field	Status	Brief description
GET H2	Infrastructure	In realisation	Pipelines for H2 between the Netherlands, Lower Saxony and the Ruhr Region connecting imports, production, storage and application
tkH2Steel	Application	In planning	Construction of a direct reduction plant
H2 cluster Bergkamen	Production	In planning	Construction of an energy hub, including an ammonia cracker
HydrOxy Hub Walsum	Production	In realisation	Construction of a 520 MW electrolyser in three phases of development
Trailblazer	Production	In planning	Operation of a 20 MW electrolyser. Expansion to 30 MW planned
H2 Hamm	Production	In realisation	Construction of a 20 MW electrolyser
HyPerformer	Mobility / production	In operation	Construction and operation of six refueling stations and four related electrolyzers
RWE@Voerde	Production / application	In operation	Construction of an 800 MW (final stage) electrolyser unit and a 900 MWel H2-ready gas power plant
EnerPort II	Infrastructure	In realisation	Climate-neutral container terminal based on hydrogen at the Port of Duisburg

Relevance of the European Hydrogen Backbone

From the perspective of the Ruhr Area, a European pipeline infrastructure is crucial for the long-term, reliable, and cost-effective supply of green hydrogen. A secure hydrogen supply is essential for the local industry and, therefore, for securing tens of thousands of jobs in the region. The European Hydrogen Backbone is a key project for the region in the coming years.

Your Contact

Institution: Hydrogen Metropole Ruhr
 Seat of institution: Essen, Germany
 E-Mail: presse@hydrogen.ruhr
<https://hydrogen.ruhr>

Catalonia

About the region

Catalonia, with a population of 8 million, stands out for its unique identity within the Spanish state, enriched by a robust industrial and entrepreneurial tradition. This region, stretching from the bustling streets of Barcelona to the serene peaks of the Pyrenees, is an economic powerhouse with a vibrant and diversified industrial landscape. Its economy benefits significantly from a competitive industrial sector, contributing more than 20% to the Catalan Gross Value Added. Catalonia's industries range from traditional sectors like textiles to cutting-edge fields such as biotechnology, pharmaceuticals, and

digital technologies, embodying the region's economic resilience and adaptability.

Moreover, Catalonia's role in the national economy is underscored by its ratio of exports to GDP, which surpasses those of Denmark or Sweden, making it responsible for nearly 25% of Spanish exports. This global economic significance, combined with its potential for sustainability and innovation, is further enhanced by Catalonia's strategic geographic location, setting a solid foundation for its leadership in the transition towards a greener economy.

Who represents this paper

This position paper is presented by the Directorate General of Industry in the Catalan Government. Dedicated to promoting the advancement of Catalonia's industrial sector, the Directorate emphasizes sustainable and innovative energy solutions, such as green hydrogen. Through strategic policymaking

and fostering public-private collaborations, these efforts aim to position Catalonia as a frontrunner in the green hydrogen economy, stimulating economic growth and enhancing environmental sustainability across the region.

The hydrogen ecosystem

Catalonia is methodically cultivating a robust ecosystem of public-private collaboration around Green Hydrogen, now encompassing 140 companies with a collective turnover of 426 million euros and resulting in the creation of more than 1,300 jobs. This maturing ecosystem is technologically sophisticated and balanced, with a wealth of talent capable of addressing the decarbonization challenges facing the Catalan industry. It is poised to compete in the emerging energy market, where green hydrogen is expected to be a key player.

This significant industrial base, including sectors like chemicals, metallurgy, and cement, represents a potential demand for hydrogen. A crucial aspect of Catalonia's readiness to embrace green hydrogen is the existing consumption of grey hydrogen,

particularly in the chemical sector in Tarragona, which currently amounts to 400,000Tn per year. The metropolitan area of Barcelona, with its extensive transport network, and the region's major goods corridors, ports, and airports, signify Catalonia's potential as a major user of hydrogen as an energy vector. Moreover, the comprehensive university knowledge system and R&D centers, actively leading hydrogen projects under the European Horizon 2020 program, leverage Catalonia's strategic geographical location and connectivity. These combined assets demonstrate Catalonia's ambition and capacity to lead in the green hydrogen sector, aligning with global energy transition goals and showcasing the region's potential to drive the green hydrogen economy forward.

Project name	Field	Status	Brief description
T-Hynet	Petrochemical	Petrochemical	150MW electrolyzer supplying H2 and O2 to Tarragona's chemical hub
H2Med-CelZa	Transport	In planning	Pipeline connecting Portugal (Celorico da Beira) - Spain (Zamora)
H2Med-BarMar	Transport	In planning	Offshore pipeline connecting Spain (Barcelona) and France (Marseille), and pressure facility in Barcelona port
Lhyfe Valls	Production	In realisation	30MW electrolyser for industrial use
Port of Tarragona	Transport	In planning	Build of facilities for massive ammonia treatment
Hydrogenizing BCN	Production	In realisation	30MW electrolyser + 4-5 HRS for mobility use
TMB Hydrogen	Mobility	In operation	Over 60 H2 buses in Barcelona. There are already 8 + 1 HRS
H2 TGN buses	Mobility	In operation	15 H2 buses in Tarragona + HRS
H2 airport	Mobility	In realisation	0,5MW electroliser + sandbox for airfield technologies

Relevance of the European Hydrogen Backbone

The European Hydrogen Backbone offers a significant opportunity for Catalonia, given its limited renewable capacity for hydrogen production and proximity to regions with greater renewable resources. As a node in the H2Med project, Catalonia is strategically positioned to consume and export hydrogen, meeting its industrial sector's demand and facilitating regional hydrogen trade. Additionally, the ports of Barcelona and Tarragona enhance Catalonia's role in the hydrogen value chain, allowing for the import and distribution of hydrogen

derivatives. In this regard the LNG Terminal located in Port of Barcelona could play an important role in decarbonising the hinterland and also as a multi-molecule platform for new renewable molecules such as ammonia and methanol. This unique positioning (Port of Tarragona and Port of Barcelona) not only ensures a steady hydrogen supply but also establishes Catalonia as a vital player in the European hydrogen economy, aligning with its goals for energy sustainability and economic growth.

Région Hauts-de-France

About the region

With a population of 6 million and a strong industrial culture and history, the Hauts-de-France region has a number of assets to offer in terms of decarbonisation via hydrogen. With its new roadmap adopted on 28 March 2024, the development of a hydrogen industry in the Hauts-de-France is part of REV3, the territory's model for sustainable development and the transition to carbon neutrality.

This collective ambition has been rolled out across the region since 2013. The aim is to move towards a low-carbon, sustainable society that combines energy transition, digital technologies and new economic models in a systemic and innovative way. This model is anchored in the region through the mobilisation of all regional players.

Who represents the region in this paper?

As part of its economic development remit, the Hauts-de-France Regional Council is supporting the development of the hydrogen industry throughout the region. It does so through the Pôlénergie regional cluster, which is dedicated to the region's energy transition and brings together members from across the hydrogen value chain. Its main areas of focus are energy efficiency, decarbonisation

of industry and transport, renewable energies, hydrogen, new synthetic gases, CO₂ recovery and transport. The Communauté urbaine de Dunkerque and the GIP Euraénergie join forces with the Hauts-de-France Region, Pôlénergie and the European partners in this position paper and the initiative.

The hydrogen ecosystem

The Hauts-de-France region has a number of assets that make it an ideal location for decarbonisation through hydrogen. First of all, it has a strong industrial culture, with industries that emit a lot of CO₂, and the priority needs to be to decarbonise. Moreover, in terms of energy, the region's electricity production is already decarbonised, as is its gas infrastructure network, which could potentially be used to transport and distribute hydrogen. Finally, hydrogen could be integrated into the fuel mix used in the regional river network and its ports. A number of emblematic projects have already been launched, and the development of hydrogen technologies in the region has already begun.

The regional hydrogen roadmap was adopted on 28 March. Co-constructed as part of a collective approach involving more than 80 stakeholders

(manufacturers, energy companies, local authorities, researchers, etc.), it prioritises two objectives. The first is to decarbonise industry and its uses as effectively and rapidly as possible, in particular by directing regional investment towards safe and efficient technologies. The Region will be experimenting to learn about the technologies of tomorrow before considering mass deployment. The second objective will be to encourage the development and installation of decarbonised technologies and businesses, industries, know-how and uses that contribute to the region's sustainable prosperity.

Lighthouse projects

The Hauts-de-France region is already home to emblematic projects that have kick-started the development of hydrogen technologies in the region:

- The GHRYD Demonstrator (Gestion des réseaux par injection d'Hydrogène pour Décarboner les énergies - standing for Network management using hydrogen injection to decarbonise energies) in Dunkirk,
- The decarbonisation of Arcelor Mittal with direct iron reduction (DRI) technology in Dunkirk,
- France's first hydrogen-powered buses, by the Syndicat Mixte de Transport Artois Gohelle, in Houdain.
- Hydrogen-powered lifting equipment at Carrefour's logistics centre in Vendin-le-Veil.

Project name	Field	Status	Brief description
DHUNE	Infrastructure	In planning	Pipeline H2 in the Dunkirk industrial zone. It will connect up the low-carbon hydrogen production and consumption projects in this area
SHYMED	Production	In planning	Station of production and distribution of green hydrogen (1,25 MW)
HYLEOS	Production	In planning	Station of production and distribution of green hydrogen
H2V Dunkerque	Production	In planning	Mass production unit for green hydrogen (first phase of 200 MW)

Relevance of the European Hydrogen Backbone

For the Hauts-de-France region, a hydrogen infrastructure harmonised at European level is essential in the medium and long term to develop and structure the economic market, stabilise it thanks to affordable costs, and secure transport between production and import centres and consumption centres. This infrastructure will also provide jobs, firstly for its construction and then for its maintenance. Finally, it is an essential key to guaranteeing energy security across the continent.

Your contact

Institution: Hauts-de-France Region
 Seat of institution: Lille, France
 E-Mail: sebastien.voisin@hautsdefrance.fr
<https://www.hautsdefrance.fr/>

Gelderland

About the region

Gelderland houses 2 million inhabitants and 200.000 companies, mostly in service, health and construction industry. Region Arnhem-Nijmegen is the economic hart. Gelderland is east-west crossed by main rivers (Rhine, Waal, Maas) and the Rhine-Alpine- as well as the Northsea-Baltic-TEN-T Corridor. This means a lot of logistic activ-

ities. Characteristic energy consuming industries are food, paper, waste incineration and the ceramic industry. They all look for CO₂-poor alternatives for energy. A challenge is adequate infrastructure. The Dutch hydrogen backbone is crossing Gelderland in north-south direction, with a connection to Germany planned near Arnhem.

Who represents this paper

The province of Gelderland represents this paper. Some of the leading documents are the climate plan by which we want to achieve 55% CO₂-eq reduction in 2030. With a more specific goal 1,8 Mton CO₂-eq in the industry compared to 2017.

The economic plan, which focusses on digitalization and support of four main innovation themes: health, food, high tech and energy. The Gelderland administration a.o. focuses on green hydrogen to achieve their goals.

The hydrogen ecosystem

The hydrogen ecosystem in Gelderland consists of

- innovative SME's
- locations for developing and testing of (hydrogen) innovations
- progressive entrepreneurs
- local administrations who believe in hydrogen as part of the solution for being future-proof in combination with economic development
- industrial end-users of hydrogen for whom there is no alternative for natural gas (like ceramic industry)
- one of the connections from the Dutch to the European backbone.

Project name	Field	Status	Brief description
European Hydrogen valley	General	In planning	Application of European hydrogen valley status
Local hydrogen infrastructure map	General	In progress	Mapping potential and realistic regional hydrogen infrastructure surrounding the central backbone, in combination with local connections to the backbone, created together with network operator Liander
Rh2ine	Mobility	In operation	Inland shipping on hydrogen with Nijmegen as hub. Gelderland is partner
H2-Nodes (TEN-T)	Mobility	In operation	Building and operating a hydrogen refuelling station (HRS) with grey hydrogen (natural gas). Expanded by creating 2 buses for public transport and a fleet of 70 cars.
Doetinchem-hub (JIVE-2 / REACT-EU)	Mobility	In operation	Using 10 hydrogen busses for public transport, in combination with public hydrogen refuelling station (HRS)
Hydrogen refuelling stations	Mobility	In planning	
Living lab Smart energy hubs	Industry	In operation	local for local, exchange and conversion of energy, where hydrogen is part of the solution in seeking efficiency, tackling net-congestion, price, speed and (in)dependence. A few pilot locations are near the backbone
Creating local hydrogen infrastructure	Industry	Study in progress	Preparing the connection from the dutch backbone to an cluster of 6 ceramic industries (Brick valley)
Inland shipping and local cracking of imported NH3	Industry	Study in progress	Alternative for the ceramic industry -Brick Valley
From coal to hydrogen	Hydrogen production	In development	From a coal fired energy plant, through natural gas to electricity by hydrogen
GldH2	Hydrogen production	In development	10MW production of green hydrogen by local wind, in combination with local users like foundries
From waste to hydrogen	Hydrogen production	In Study	Two incineration plants see hydrogen as new product. Especially because the situated near the backbone and are part of the living lab smart energy hubs.
Small modular reactors (SMR)	Hydrogen production	In study	In the study why, if and where SMR's in Gelderland. Production of hydrogen is one of the issues

Project name	Field	Status	Brief description
H2Lochem	Built environment	In operation	Transporting hydrogen through existing gas infrastructure to houses with locally developed, innovative central heating boiler on hydrogen.
Hospital of the future	Built environment	In operation	Hospital with plenty of solarpanels, using overload of electricity to store it in hydrogen for their own use.
Hydrogen innovation lab	Innovation	In operation	Lab for developing and testing hydrogen innovations, together with HAN University of applied sciences, as part of the Connectr innovation program.
Center for Flexible Energy Solutions	Innovation	In development	Knowledge centre in combination with innovative SME's, as part of the Connectr innovation program
Enerpro	Innovation	Ended	InterregA project on energy innovation with SME's (a.o hydrogen). Winner of Grenzland Award 2022

Relevance of the European Backbone

Part of the Dutch hydrogen backbone will run through Gelderland. One of the planned connections to the east to the German region of NRW is situated in Gelderland (Zevenaar). There are three main regional challenges:

- having perspective for end users in terms of availability in time and price of green hydrogen (assuming that the infrastructure itself is coming)
- how to get from the (central) backbone to local off takers like ceramic industry who are mostly spread out in de region
- how to cope with the nitrogen problem which is created by burning hydrogen? Gelderland is 'rich' in Natura 2000 areas in which deposition of nitrogen is an huge problem.

The Economic Board

Regio Arnhem Nijmegen

About The Economic Board Regio Arnhem Nijmegen

The Economic Board works to reinforce connections in the Arnhem Nijmegen region from its economic strength, emphasizing collaboration from the triple helix. This is the focal point in terms of Energy, Health, and High Tech. Together with businesses, educational, knowledge and governmental institutions, we encourage innovations in these top sectors as well as the crossovers between them. Through collaboration we foster prosperity and wellbeing in the Arnhem Nijmegen region.

The region around Arnhem and Nijmegen is characterized by its strategic focus on sustainability, health and life sciences, energy, and innovation. It wants to profile itself more emphatically as a European hotspot in the energy transition. The presence of research institutions like Radboud University and HAN University of Applied Sciences and a thriving start-up ecosystem bolster the region's economic vitality.

Who represents this paper

This paper represents the region Arnhem Nijmegen, the 4th largest region in the Netherlands with over 800,000 residents and a GDP of around €27B.

The region is a leader in the renewable energy sector, emphasizing sustainable practices and green technologies. Arnhem and energy are inseparable from a historical perspective. Powerhouse companies such as TenneT and Alliander started in Arnhem and are still here. They are major players with enormous expertise in energy for both businesses and private households.

This region has the opportunity to accelerate the development, demonstration, and application of energy innovations. This is not least because of the

innovative entrepreneurs and educational institutions that are already working on this.

Also, positioned near major European corridors and transport routes (by road, water, rail and pipelines), the Arnhem Nijmegen region boasts excellent logistics and connectivity between the surrounding regions in The Netherlands, Germany and Belgium. This enhances its appeal as a prime location for businesses seeking efficient distribution channels and market access.

The hydrogen ecosystem

The hydrogen ecosystem in Arnhem Nijmegen consists of progressive and innovative entrepreneurs and SME's, industrial campuses for developing and testing of energy and hydrogen innovations, and progressive knowledge institutions providing master, bachelor and vocational education.

All in close triple helix collaboration including local administrations strongly believing in hydrogen as part of the solution for being future-proof in combination with economic development.

The region has several industrial end users of hydrogen and is strategically located on the European Hydrogen backbone between the North Sea and Germany and broader Europe.

Project name	Field	Status	Brief description
European Hydrogen valley	General	In planning	Application of European hydrogen valley status
Hydrogen Valley / Hy East Netherlands	Mobility	In progress	Mapping potential and realistic regional hydrogen infrastructure surrounding the central backbone, in combination with local connections to the backbone, created together with network operator Liander
Integratr	Mobility	In progress	Stacking shipping containers with hydrogen forklifts
Smart Energy Hub TPN West/ARN	Industry	In progress	The entrepreneurs of the Binnenhaven have jointly drawn up an Energy Plan for the development of a Smart Energy Hub, in which they collectively ensure that sufficient energy is available for everyone now and in the future.
Smart Energy Hub Innofase Duiven	Industry	In progress	Synergiepark InnoFase is a 66-hectare business park, located on the A12 in Duiven and the location in the East of the Netherlands for companies active in the circular economy. Together with the eleven companies on the site, InnoFase mainly focuses on the reuse of raw materials and energy. This is done through the mutual exchange of incoming and outgoing flows, such as heat, electricity, water, biogas, biomass and residual materials.

Relevance of the European Hydrogen Backbone

Part of the Dutch hydrogen backbone will run through Gelderland. One of the planned connections to the east to the German region of NRW is situated in Gelderland (Zevenaar). There are three main regional challenges:

- having perspective for end users in terms of availability in time and price of green hydrogen (assuming that the infrastructure itself is coming)
- how to get from the (central) backbone to local off takers like ceramic industry who are mostly spread out in the region
- how to cope with the nitrogen problem which is created by burning hydrogen? Gelderland is 'rich' in Natura 2000 areas in which deposition of nitrogen is an huge problem.



Silesian-Lesser Poland Hydrogen Valley Association

About the organisation

The aim of the Association is to support the development of the hydrogen economy and to strive to build a branch of the Silesian-Małopolska hydrogen industry, including hydrogen production based on electrolysis using energy produced from renewable energy installations and its use in energy, including heat, transport and infrastructure, and industry. The Association consists of ordinary members and supporting members. The Silesian-Lesser Poland Hydrogen Valley covers two voivodeships located in the south of Poland with a total area of 27,516 km², which is over 10% of the country's area. The

area is inhabited by nearly 8 million people, with the highest population density per

1 km² in the country. The average for the Śląskie Voivodeship is 366 people per 1 km², for the Małopolskie Voivodeship it is 225 people per 1 km², and for the whole country the average is 123 people per 1 km². In the REGON register: there are almost 650 thousand registered in the Śląskie Voivodeship companies and in the Małopolskie Voivodeship over 445 thousand companies.

Objectives and scope of the Association's activities

- close cooperation to create a business and technological environment for a hydrogen economy in the region of Silesia and Małopolska, including one based on hydrogen production, in particular in the electrolysis process, using energy produced from renewable energy installations, as well as based on biomethane in the reforming process and carbon dioxide capture;
- using the scientific and research potential, in particular of the Region of Silesia and Małopolska, in order to undertake, among others, innovative scientific, technological and industrial projects and investment projects,
- supporting business activities, e.g. by creating business analyses, identifying investment opportunities, creating and implementing technological solutions,
- taking actions aimed at creating in the Region of Silesia and Małopolska, using industrial infrastructure, optimal conditions for conducting business in areas leading to the construction of a hydrogen economy, including using resources
- activating and creating conditions for the re-industry of companies from the so-called mining environment



Achievement of goals through

- social dialogue between different stakeholder groups
- cooperation with local government authorities, government authorities and other organizations of the third sector
- distinguishing the attitudes of people with merits related to the development of the economy and hydrogen technology
- supporting staff education processes for the hydrogen economy and technology sector
- conducting trainings, courses, conferences, seminars, workshops, working meetings and other educational activities related to hydrogen economy and technology
- cooperation in the field of strengthening technology transfer and knowledge exchange in the field of modern hydrogen technologies
- cooperation with scientific, research and educational institutions in the development and implementation of modern solutions in the field of technology and technology related to the hydrogen economy

The potential of the region

- Universities, research institutes, research laboratories
- Technical and infrastructural facilities
- Various investment places
- The highest connectivity of regions in Poland
- The largest and most important motorway junctions
- Two international airports (Katowice-Pyrzowice, Kraków-Balice)
- International Ostrava airport, Czech Republic
- Direct neighborhood with the Czech Republic and the Slovak Republic
- Specialized staff of all levels with high technical culture

About the region

Flanders is a densely populated, highly industrialised region with over 6,6 million inhabitants. The Flanders region is home to the second largest petrochemical cluster in the world. It also houses a large steel factory. In terms of heavy duty trans-

port, Europe's logistics hotspot is formed by the triangle between Europe's largest seaports located in the Scheldt Delta and the Ruhr area, centered on Europe's largest fluvial port Duisburg.

Who represents the region in this paper?

WaterstofNet coordinates the hydrogen industry in Flanders & The Netherlands via the Waterstof Industrie Cluster ('Hydrogen Industry Cluster').

Since 2023, WaterstofNet also coordinates the program office of the Belgian Hydrogen Council. This Belgian Hydrogen council advises the policy makers at the different governmental levels (federal and regional) on their hydrogen strategy and promotes the Belgian industry in other countries. The Belgian Hydrogen council represents more than Belgian 150 companies that are active in hydrogen.

WaterstofNet develops and realises hydrogen projects. For more than ten years, WaterstofNet has coordinated and realized hydrogen projects together with industrial partners, knowledge institutions and governments.

WaterstofNet has a structural collaboration with the Flemish government to support in the structuring and support the Flemish innovation landscape.

The hydrogen ecosystem

Flanders has a lot to offer when it comes to hydrogen. It has an extensive hydrogen and ammonia ecosystem, building on its ports, pipelines, import infrastructure and large industrial users, over several hydrogen technology champions supplemented with a strong hydrogen research base. Additionally, several Flemish companies are using their expertise for developing large scale hydrogen import value chains internationally.

Flanders has four ports, that will play a major role in developing the future hydrogen economy in the EU. Several terminals for the reception of hydrogen carriers and cracking installations for the reconversion back to hydrogen, are under development in the ports. Furthermore, besides already hosting the second largest existing hydrogen pipeline network that connects industrial clusters in France, Belgium and the Netherlands, an open-access hydrogen network is under development in Belgium. This network will connect the different industrial clusters in Belgium, but also in the neighbouring regions, allowing our country to become a hub and gateway

for the import & supply of renewable molecules for the rest of Europe, as we are already doing today for natural gas.

The chemical cluster in Antwerp today already consumes between 400 and 500 Kton of hydrogen every year. The steel sector can become a large new consumer of clean hydrogen.

Despite Flanders'/Belgium's limited renewable energy production potential, some innovative pioneering domestic clean hydrogen production projects are underway. Aside from innovative projects using water and renewable electricity, also industrial projects are focussing on low-carbon-hydrogen (either through byproduct hydrogen or through application of Carbon Capture and Storage (CCS)).

Last not but least, Flanders has a number of important technology players that produce a.o. electrolyser components and systems, hydrogen panels, compressors, high pressure storage vessels, etc.

About OGE

OGE lets gaseous molecules flow. We create and maintain a modern, safe and efficient infrastructure for natural gas, hydrogen and CO₂. Our pipeline network with a length of over 12,000 kilometers is fundamental to Germany's energy supply and secures the prosperity of our society. As the market-leading transmission system operator, we are a pioneer, driver and enabler of the energy transition and climate neutrality. We see ourselves as a trans-

formation consultant and service provider for industry, power plants, distribution system operators and our partners in production and politics. More than 2,000 people find a future-proof and modern workplace at the OGE Group. In the interests of our employees and shareholders, we are constantly adapting our business model to ensure sustainable profitable development.

OGE's German projects

OGE is developing a large regional cluster covering the whole value chain (production, storage, import, consumption) in the northern part of the Ruhr Area, NRW and southern Lower Saxony under the name of "GetH2 Nucleus". This is performed jointly together with Thyssengas and nowega. Parts of this project are already under realization.

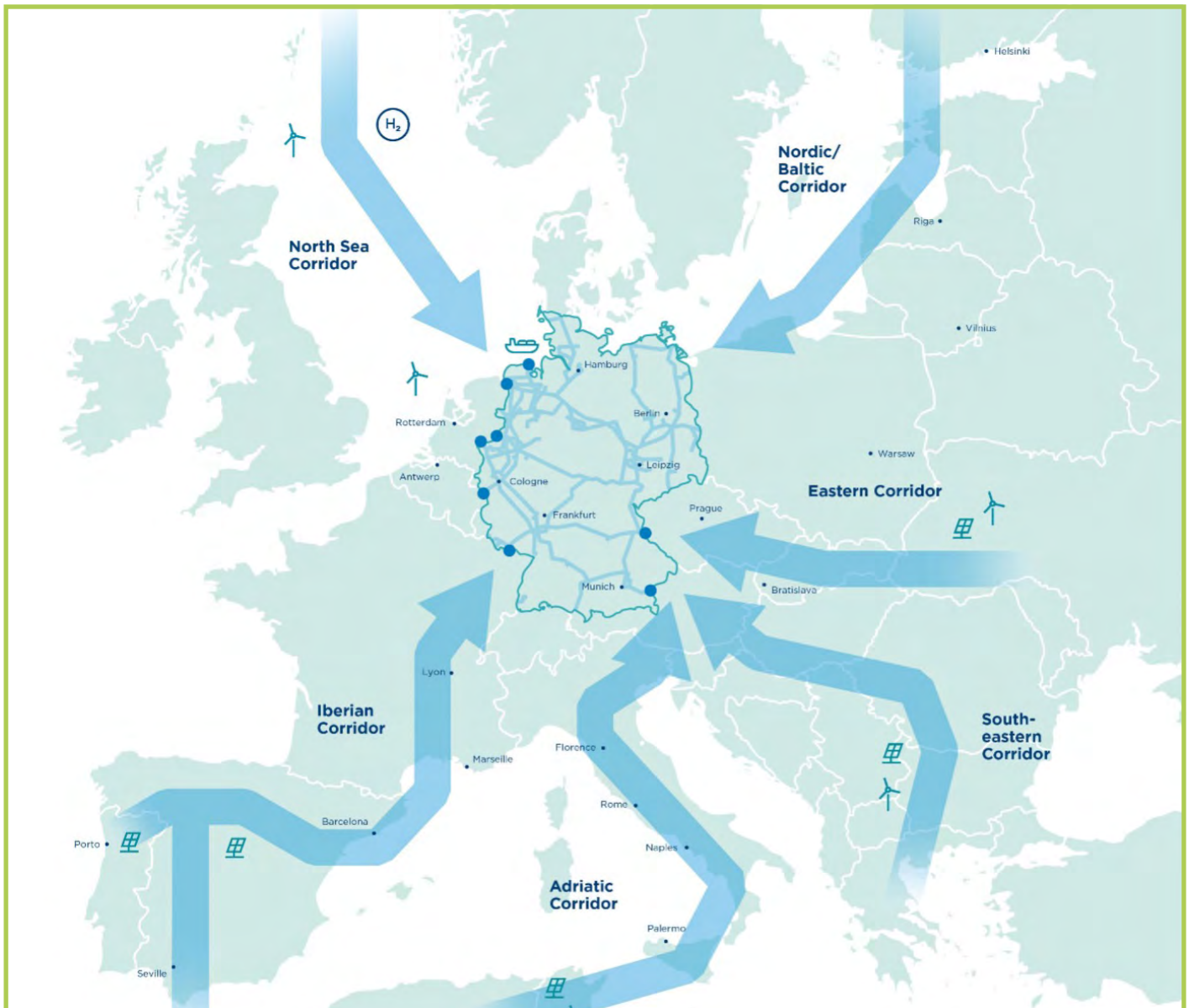
Beyond that OGE is creating a joint national hydrogen backbone for entire Germany, together with

several other gas TSOs. The so-called Core Grid will connect all main demand centers, domestic production sites, storage facilities and import points with each other. OGE's infrastructure projects next to GetH2 are labelled "H2ercules". The investment in these repurposed and new built assets will enable the hydrogen market ramp-up and interlink major regions, ecosystems like GetH2 and import corridors with each other.

OGE's European corridor projects

Imports are essential to satisfy the German hydrogen demand. Therefore, OGE has joined forces with several neighboring TSOs to develop hydrogen corridors from very convenient production regions to the heart of Europe. According to the definition of EU COM six European hydrogen corridors will evolve, which are all connected to OGE's parts of the Core Grid. Projects like AquaDuctus / CHE (NorthSea + Norway), Delta Rhine Corridor (NL), Hydrogen Highway D/B (BE), H2med (POR/ESP /

F), Alpine Hyway (I/CH), sunsHyne (I/CZ), CEHC (UA / CZ), H2EU+store (UA / AUT), CGHI (Baltic Sea / CZ) and SEEHyC (Greece/Bulgaria) are examples to be mentioned in these corridors. Most of these projects have obtained PCI status from production to demand center in Germany and are advancing fast regarding performing of relevant studies, gathering additional political and market-wise support.



Picture: Overview of six import corridors from production regions to Germany.

Your contact

Institution: OGE
 Seat of institution: Essen, Germany
 E-Mail: H2-international@oge.net
oge.net/en/hydrogen/import-projects

Thyssengas GmbH

About Thyssengas

As a transmission system operator (TSO), Thyssengas has been integral in delivering gas to municipal utilities, industrial plants, and power stations for over a century. Based in Dortmund, at the heart of the Ruhr area, we operate with a team of approximately 460 employees across seven locations in western Germany. Our extensive gas pipeline network, spanning approximately 4,400 kilometers, is predominantly situated in North Rhine-Westphalia.

Thyssengas is now advancing to the next stage, actively shaping the future of energy supply and

driving the energy transition forward. With a strong focus on security of supply and meeting climate targets, we are dedicated to facilitating the transport of hydrogen and other green gases through our pipelines in the near future. Our ambition is to emerge as a key player among Germany's leading network operators for hydrogen and other sustainable gases. Moreover, we are strategically investing in forward-looking projects in digitalization and artificial intelligence to further enhance our operations.

Our focus areas for hydrogen

Based on market surveys and in close dialog with customers and local market participants, we have initially identified six regional hydrogen clusters in western Germany:

- Cologne
- Ruhr area
- Lower Rhine
- Central Lower Rhine
- Muenster-Hamm
- Bentheim-Westmuensterland

We believe that these key regions are particularly suitable as nuclei for initiating the development towards an integrated H2 infrastructure. As we progress with our H2 network expansion, our objective is to interconnect planned import routes, production sites, storage facilities, and consumers by 2032. In certain segments, hydrogen will com-

mence flowing even earlier. These initiatives form the cornerstone of our involvement in Germany's "hydrogen core network", currently being established by the country's transmission system operators. Our target is clear: to support the decarbonization efforts of industries and SMEs, paving the way towards a sustainable energy future.

Our H2-Projects

We play a pivotal role across the entire hydrogen (H₂) value chain, facilitating connectivity for all sectors through a reliable hydrogen network. Collaborating with partners like bp, Evonik, Nowega, and OGE as part of the GET H₂ initiative, our goal is to establish a comprehensive and accessible hydrogen infrastructure on both national and international levels.

A specific project within the GET H₂ initiative is the Vliegghuis-Kalle connection. By 2027, we aim to convert our existing gas pipelines between Kalle, Ochtrup, and Vliegghuis to operate on hydrogen, thereby establishing a direct link to the Dutch

network. This initiative marks a significant step towards enhancing cross-border hydrogen transportation and integration.

Beyond that, Thyssengas plays a central role in planning and developing the “hydrogen core network”. Situated at the heart of the Ruhr region, Thyssengas’ extensive gas pipeline infrastructure spans from Dorsten in the north to Grevenbroich in the south, and from Duisburg in the west to Dortmund in the east. This network will form the cornerstone for future hydrogen supply to the region, ensuring robust security of supply.

Your contact

Institution: Thyssengas GmbH
Seat of institution: Dortmund, Germany
E-Mail: h2@thyssengas.com
<https://thyssengas.com/en>

Enagás

About Enagás

Enagás is a Transmission System Operator (TSO) with 50 years' experience in the development, operation and maintenance of energy infrastructure. It has more than 12,000 kilometres of gas pipelines, three underground storage facilities and eight regasification plants. The company operates in eight countries. In Spain it is the Technical Manager of the Gas System and, according to the Royal

Decree-Law 8/2023, Enagás may operate as provisional Hydrogen Transmission Network Operator (HTNO). In line with its commitment to energy transition, Enagás has announced its goal of becoming carbon neutral by 2040, with a firm commitment to decarbonisation and the promotion of renewable gases, especially hydrogen.

Spanish projects

According to the Royal Decree-Law 8/2023, Enagás, as the provisional Spanish HTNO, has submitted to the Spanish Government a proposal for the development of the hydrogen backbone infrastructure with a ten-year horizon. Enagás is promoting the Spanish hydrogen backbone and, to this end, has launched a non-binding Call for Interest to identify production and consumption

centres in Spain. Enagás Renewable, a subsidiary of Enagás, is also involved in more than 30 renewable gas production projects with more than 20 public and private partners. As the Technical Manager of the System, Enagás has also launched the Guarantee of Origin System for renewable gases in Spain from 2023.

European corridor projects

Spain has great potential to become a European hub for renewable hydrogen, meeting its own needs and contributing to the EU's security of supply, decarbonisation and strategic autonomy. The hydrogen corridors are key to building a European hydrogen market and the Iberian Corridor will be the first major green hydrogen interconnector. The hydrogen projects presented by Enagás have been included in the final list of Projects of Common Interest (PCI): the first axes of the Spanish hydro-

gen backbone network and two storage facilities, and H2Med with the two international connections with Portugal —Celza, between Celorico da Beira (Portugal) and Zamora (Spain)— and France —BarMar, between Barcelona (Spain) and Marseille (France)—. H2Med is supported by the governments of Portugal, Spain, France and Germany, as well as the European Commission. Enagás is promoting this interconnector together with TSOs of these countries.

Your contact

Institution: Enagás
Seat of institution: Madrid, Spain
E-Mail: H2MED@enagas.es

Duisport

Gateway to NRW.

Duisburger Hafen AG is the ownership and Management Company of the Port of Duisburg, the world's largest inland port with an annual throughput of abt. 4m TEU and 105m tns of goods on average. Together with its subsidiaries, the duisport Group offers innovative and tailored solutions for the industry and logistics sector at the world's largest inland port.

Its ideal location at the river Rhine and at the heart of Europe's most dense industrial cluster makes the Port of Duisburg the number one logistics hotspot in Europe and Gateway to and from NRW, central and southwestern Germany.

Its full-service portfolio includes customized real estate management with special focus on warehouse and terminal development, the development of integrated port and logistics solutions, intermodal transport services, specialized industrial packaging as well as advisory services for international customers and supply chain engineering.

In addition, Duisburger Hafen AG is also committed to the future of the logistics industry by promoting innovative start-ups through its startport subsidiary.

In cooperation with various partners and institutions from industry and science, Duisburger Hafen AG is actively involved in various R&D projects focusing on innovative in and sustainable solutions for the logistics sector, the region and the Port of Duisburg.

Benefitting from our unparalleled multimodal logistics network across Europe, we are today developing the hydrogen, ammonia, methanol and CO2 infrastructure of the future as backbone for resilient green energy supply chains. Local hydrogen production by electrolyser facilities at the port help decarbonizing public and private local traffic as well as local communities. Transforming port and terminal infrastructure to facilitate climate neutral operation is part of our corporate responsibility.

Port of Antwerp-Bruges

About the organisation

With an overall throughput of 271 million tons freight volume per year, Port of Antwerp-Bruges is an important hub in worldwide trade and a gateway to Europe. No other seaport is more centrally located in Europe than Antwerp and despite our 'inland-location' on the permanently dredged river Schelde, we do receive the largest container-vessels in the world. Zeebrugge's coastal location makes for very easy accessibility. Thus, its central location, extensive connections with global markets and a large part of the European hinterland

combined with an excellent infrastructure make the port with its two platforms an attractive choice for anyone looking to do business.

Port of Antwerp-Bruges strengthens its position as a global player in important cargo flows. The port accommodates the largest integrated chemical cluster in Europe, is the largest throughput port for vehicles worldwide and is the 15th largest container port in the world (in TEU).

Energy transition and clean molecules

The ambition of Port of Antwerp-Bruges is to become an important import hub for hydrogen and clean molecules in Europe and as a major green energy hub already today we want to be climate neutral by 2050.

The port has the necessary infrastructure for receiving and further distributing hydrogen. This includes quays, terminals and pipelines. Nevertheless, we are currently developing new infrastructure and are continuously increasing capacity. We offer existing infrastructure for receiving various hydrogen carriers such as methanol, ammonia and methane already today. Furthermore, we are continuing to build these up for storing larger volumes. For example, Fluxys and Advorio are planning to build an open-access import terminal for green ammonia by 2027.

Another flagship project in the context of the energy transition is the former refinery site in the port area, which is currently being converted into a new hub for green energy. The 105-hectare site of the Vopak Energy Park Antwerp not only offers access to the sea, but also to various transport networks, including inland waterways, roads and railways, as well as to pipeline connections to north-west Europe, via which hydrogen and hydrogen carriers can be delivered to the major economic centres.

In Zeebrugge sustainable ammonia is to be transported via a new terminal to the surrounding industry and the European hinterland. This innovative

project is being operated by the companies Fluxys, Advorio Stolthaven Antwerp and Advorio Gas Terminal and is intended to contribute to the reliable supply of green hydrogen for the whole of Europe.

Also, the French gas group Air Liquide is investing in an innovative pilot plant in the port of Antwerp-Bruges, which enables the conversion of ammonia into hydrogen with an optimised carbon footprint. This demo plant, supported by the Flemish Government Agency for Innovation and Entrepreneurship (VLAIO), will be built on the BASF site and is expected to be operational in 2024.

We are committed to the global supply or importing of hydrogen and its carriers from countries such as Chile, Oman, Namibia, Egypt or Brazil. There is a surplus of green electricity from solar and wind energy there. The global spread of these regions ensures that Belgium and Europe are less dependent on a small number of countries for their energy supplies. We expect the first imports of hydrogen or its derivatives in 2026. To this end, we are joining forces with Deme, Engie, Exmar, Fluxys, and WaterstofNet in the Hydrogen Import Coalition. This focuses on concrete projects that shape the production, transport and storage of hydrogen.

CCUS: a key link for a climate-neutral port by 2050

Port of Antwerp-Bruges' ambition is to become climate neutral by 2050, in part by capturing and storing or reusing CO₂ (carbon capture utilisation and storage). To this end, we are working with several large emitters to jointly shape the value chain and make CCUS possible.

Our focus here is on infrastructure development, weighing in on policy, commercial monitoring and coalition forging. In Belgium, we do not have suitable geological formations for storing CO₂. This is why international collaborations are needed with CO₂ storage projects or empty gas fields under the sea, including with Denmark, Norway or the Netherlands. Eventually, the plan is to connect companies from outside the port platform together and allow them to use the 'exit points', as they are known – the places where the CO₂ leaves for the North Sea to be stored in empty gas fields (Zeebrugge, Ghent and Antwerp). CCS is a necessary intermediate step for some companies (until the rollout of green hydrogen, for example) – mainly for combustion – but also an end goal for some others.

There are some companies that cannot reduce their (process) emissions by any other means, for example cement plants, steel mills or lime companies.

Antwerp@C: Our CCS ambition is becoming very concrete: in a consortium of 8 companies (emitters, technology experts, transport companies and Port of Antwerp-Bruges), we are working together to collect, liquefy and ship the first 2.5 million tons of CO₂ to empty gas fields by 2026. Export by pipeline to the Netherlands (Rotterdam, Porthos) is also still a possibility. This will make us the first port in Belgium (and perhaps even in Europe) to make it possible to export CO₂.

Fluxys C-Grid: As a partner within the C-Grid we are helping to establish a CO₂ infrastructure initially across Belgium with the three exit-points Antwerp@C Marine Terminal (min. 2,5 mtpa), Ghent Carbon Hub Marine Terminal (up to 4 mtpa) and the Zeebrugge CO₂ Highway together with Equinor (30mtpa).

Port of Antwerp-Bruges: world-scale bunker hub for alternative fuels

Alternative fuels are essential in the transition towards sustainable transport at, to and from our port. Port of Antwerp-Bruges wants to make all possible fuels available at its platform, thus boosting the energy transition in the transport sector. This is how we will maintain our global top position as a bunker hub and build sustainable logistics chains at our platform. One asset of our port is the multimodal transport of goods via seagoing vessel, inland navigation, train, truck and pipelines. Currently, the vast majority of that transport runs on fossil fuels, resulting in climate impacts (CO₂)

as well as local air pollution (NO_x, PM). Based on renewable energy, we can achieve more sustainable transport both with alternative fuels and through electrification. At our port platform, we produce and import fuels, provide storage, distribution and final delivery to users. Several actors operate within this chain. The port also plays an important role for the fuel market. That versatility makes it possible to assure our stakeholders, such as shipping companies, barge operators, rail operators and truck operators of the supply of sustainable and affordable alternatives to fossil fuels.

Your contact

Institution: Port of Antwerp-Bruges
Seat of institution: Antwerp, Belgium
E-Mail: richard.schroeter@portofantwerpbruges.com
<https://www.portofantwerpbruges.com>