

Dutch Regions contribute to the North Sea Hydrogen Corridor

In June 2022 the European Commission presented the RePowerEU-plan, with the aim of reducing the dependency on Russian fossil fuels. In this plan, the EC proposes to create three hydrogen corridors, one being the North Sea Corridor, and calls on the EU to produce 10 million tons and import 10 million tons of renewable hydrogen by 2030. We as Dutch regions, located along the North Sea, welcome this ambitious proposal. Yet, this goal can only be reached with the help of the European regions, as regions are on the forefront of hydrogen development, and Dutch regions possess powerful instruments to kickstart the local- Hydrogen markets.

The European Clean Hydrogen Alliance is currently spearheading the development of an ambitious corridor, and as regional and local institutions along the North Sea, we recognize the pivotal role we play in shaping the governance and advancements surrounding this corridor. Therefore, it is our firm belief that our vision on this matter should be integrated into the legislative process. We extend a helping hand to the European Commission, and ask them to work with us in developing the North Sea Hydrogen Corridor.

What do we ask for?

Firstly, we are dedicated to collaborate with stakeholders to further define the future North Sea Hydrogen corridor. By working together, we can unlock unprecedented opportunities for sustainable growth and pave the way towards a greener future. Join us on this remarkable journey as we shape the future of the North Sea Hydrogen corridor.

Secondly, we stand ready to showcase the immense potential our region holds. From our abundant resources to our innovative capabilities, we are ready to make a lasting impact on the hydrogen landscape.

In this paper you will find:

1. Our reflections on how we envision the further process of working together with the EU and other countries in the region towards a North Sea Hydrogen corridor.
2. Our value proposition: what do Dutch regions have to offer in terms of hydrogen developments? This comes accompanied by a set of annexes containing a short summary of what each region has to offer in the field of hydrogen;
3. The preconditions needed to establish a North Sea H2 corridor:
 - The Dutch regions have made big strides towards realizing a hydrogen economy. To take the last step large scale production of green energy at sea will be needed for greening our industries. This can only be accomplished in close collaboration with our neighbors and the European Commission;
 - In our regions there is greater demand for hydrogen than there is production capacity. That is why import is needed and cooperation with our neighboring countries is essential to ensure that there is enough hydrogen available to meet our ambitious transition targets. Import contracts with 3rd countries outside the EU need to take into account fair trade principles and respect human rights so that the export of hydrogen in those countries contributes to regional prosperity;
 - In addition to that, we are planning to reach out to other European North Sea regions to explore the possibilities of collaborating in the Connecting Europe Facility (CEF) Energy;
 - We ask the European Commission and the European Parliament to closely consider the role that the regions can play in the Repower EU process. We need to be included in talks about the type of import (ammonia, LOHC etc.), which infrastructure will be needed and where and to what extent the EU is planning to co-finance such projects.

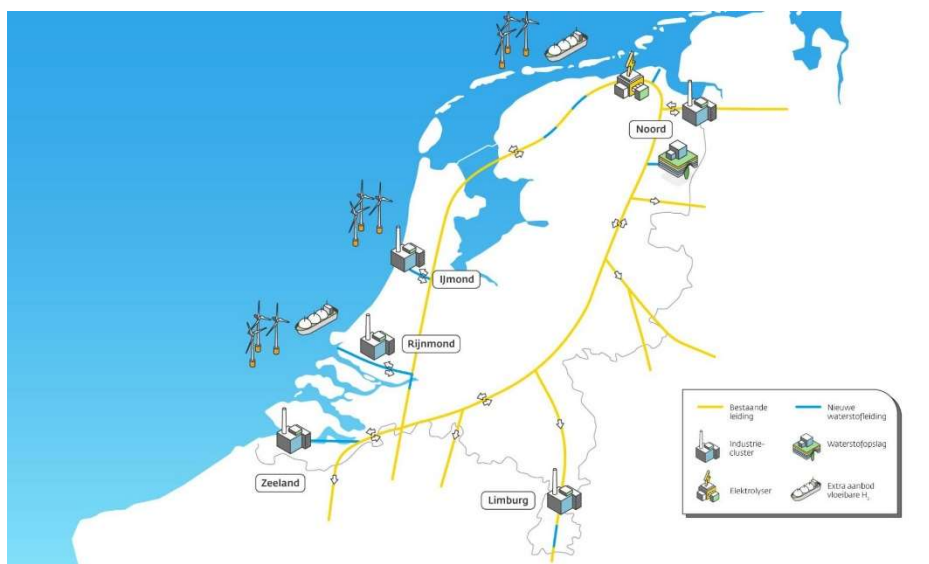
What do Dutch regions offer?

All Dutch regions share the mission of building a carbon free economy, a healthy environment, and to make our industry and transport more sustainable. Hydrogen offers the regions clean air and both economic growth and jobs.

The Dutch provinces of Groningen, Friesland, Drenthe, Noord-Holland, Zuid-Holland and Zeeland are taking big steps towards the adaptation of hydrogen, we are committed and reliable partners to collaborate with. Each of our regions has an ambitious hydrogen strategy, and connecting them will allow us to combine our strengths and develop the Netherlands and North-Western Europe into one of the premier hydrogen hotspots in the world.

Unique location due to sea ports

The Dutch hydrogen regions have a unique advantage in terms of possibilities for transport and storage of hydrogen - their location close to deep sea water and large seaports and industrial clusters. On top of that there is big potential for both offshore wind power production and offshore hydrogen production paired with existing gas-infrastructure that can be repurposed for hydrogen thus connecting large industry clusters in the hinterland to the production sites at sea. The ports of Eemshaven, Delfzijl, Den Helder, Amsterdam, Rotterdam and the North Sea Port can be the start of the energy import and transport corridor.



The full value chain

The completion of a full hydrogen value chain; from production and import of hydrogen, to infrastructure and storage to various usages, is planned in all Dutch regions. We can build on strong ecosystems in our respective regions. There are active triple helix networks in which governments, companies and knowledge institutions are working together. In addition, there is the availability of skilled workers and knowledge institutions that are willing to invest in the training of the workers.

Existing and new infrastructure

The North Sea hydrogen corridor could cover 12.000 km of large-scale hydrogen pipelines by 2030, of which 70% would be repurposed natural gas pipelines. We already have plenty of experience with hydrogen applications in the mobility and transport sectors. Existing infrastructure can be used and expanded. There are already various filling points and new energy hubs are being developed, including hydrogen refueling infrastructure.

Sectors that need hydrogen development

A number of sectors are of particular importance for our regions. Noord-Holland is working on the decarbonization of its steel production by transitioning from the use of gas to more sustainable hydrogen and facilitating the transition to sustainable aviation fuels (SAFs) at Schiphol Airport. Zuid-Holland, on the other hand, is working on the transition of the port industry and on zero emission transport along EU-corridors. Zeeland plays a role in the production of hydrogen and has a strong location as a region at the border with Belgium. The Northern Netherlands are making the transition to move away from the exploitation of natural gas towards a hydrogen economy and are strategically located, next to Germany.

In addition, hydrogen will play an instrumental role in decarbonizing the chemical and manufacturing industries. Also, pilot projects have been started in a number of residential areas where hydrogen is used for heating.

More specific information about ongoing projects can be found in the appendix.

Preconditions for a North Sea Hydrogen Corridor

- Connection to other North Sea Regions:
Make use of already existing platforms for collaboration with regions along the North Sea. More specifically the North Sea Commission of the CPMR-network.
- Opportune state aid rules:
 - Transparency and guidelines about the grounds for an exemption. We must prevent each individual project from being dependent on the legal interpretation of grounds for exemption.
 - Harmonization of technical standards for the hydrogen production and import chain
 - Purchase incentive: in addition to capex financing, also opex financing, for example for industry, but also for SMEs (whether or not as a transitional arrangement for X years to scale up). Or use the IPCEI regime in terms of state aid (also for non-IPCEI projects).
- Open access hydrogen backbone and connections to the hinterland;

To conclude: As North Sea regions, we have a unique location offering sea ports, largely functional hydrogen value chains, existing gas and port infrastructure, and great production potential for offshore wind based green electricity. It is the ideal location to start making industries more sustainable by switching to hydrogen based processes, apply hydrogen for passenger and long distance transport and import hydrogen through our sea ports.

provincie Drenthe

 Provincie
Noord-Holland

provinsje fryslân
provincie fryslân 

 Provincie
Zeeland

 provincie
groningen

 provincie
Zuid-Holland

Appendix: Dutch hydrogen regions

Northern Netherlands (Groningen, Drenthe, Friesland)

Where peat, oil and gas used to dominate the energy landscape, the Northern Netherlands are now developing into a sustainable and versatile energy region.

Regional collaboration

Thanks to the combination of the right innovative projects, knowledge and infrastructure, the Northern Netherlands have been awarded the status of first Hydrogen Valley in Europe. Moreover, the Northern Netherlands are realizing a hydrogen ecosystem based on the Investment Plan Hydrogen for the Northern Netherlands 2020.

Uniqueness

- The Northern Netherlands are unique for their potential in storage facilities in salt caverns which will be connected to regional, national and international refurbished natural gas pipelines. What is more, experiments are being carried out with compressed air storage as a buffer option for sustainable electricity.
- Production: The first phase comprises approximately €850 million in investments, with which they will initiate 5 to 10 PJ of hydrogen production per year until 2025. The Eemshaven occupies a central place as an electricity hub due to the connection to large-scale offshore windfarms. From 2025, in the second phase, the production capacity will grow to approximately 100 PJ per year until the beginning of 2030. This is the equivalent of 6 GW green and 2 GW blue hydrogen production. There is also a diverse industrial ecosystem of large-scale and small-scale initiatives, which also includes SMEs and the (manufacturing) industry are fully involved.
- The national government have our region the green light to start a demonstration project consisting of 500MW offshore hydrogen production.
- Various projects in the mobility sector are already operational or close to that. These include: the procurement of several hydrogen trains and many long-distance busses as well as the setting up of H2 tank infrastructure in our province.

The first Dutch pilot project to test the heating of housing using hydrogen in a residential area.

Knowledge facilities

The Northern Netherlands keep building on the knowledge and expertise basis from the existing (oil) and gas trade in the region that is ceasing operations this year. Notable institutions include the consortium HyNorth, knowledge institutions such as the University of Groningen, various universities of applied sciences, Wetsus, and the Energiecampus Leeuwarden. The Northern Netherlands are determined to further develop this existing hydrogen ecosystem and look for cooperations not just nationally, but also build our network across the border to Germany and to the rest of Europe by means of our Hydrogen Valley Campus Europe and through projects such as 'GreenSkills4Hydrogen' (Erasmus+) with the participation of knowledge institutions from our region

Noord-Holland

Regional collaboration

The hydrogen ambitions of the province of Noord-Holland are concentrated in the North Sea Canal Area (NZKG) and Noord-Holland Noord (NHN) with a strong focus on the production, import, transport and usage of hydrogen.

As one of the world's largest gasoline ports, the Port of Amsterdam has set out an ambitious transition path to transform its fossil cargo flows and to grow in the production, import, storage,

transshipment and distribution of green hydrogen (as raw material or fuel and derivatives). The port of Den Helder is very well positioned for landing large quantities of hydrogen produced off-shore (wind-energy), through the use of existing gas pipeline infrastructure, and it sees opportunities for large-scale onshore hydrogen production.

Uniqueness

What makes Noord-Holland unique is the high demand for hydrogen in the region. Demanding parties such as the TATA Steel factory, industrial (food) companies in the Zaanstreek and Amsterdam, Schiphol International Airport and the shipping industry rely on green hydrogen as a source of energy. It is essential in accomplishing their goals for CO₂ emissions reduction.

The province of Noord-Holland contributes to the Dutch hydrogen value chain with the following:

- Three main industry clusters (steel, aviation, and shipping) will rely heavily on hydrogen (demand of 500 KT in 2035); smaller industries will use hydrogen for heating and feedstock processes.
- Hydrogen production via multiple electrolyzers and the production of e.g. synthetic kerosene, synthetic methane, and synthetic gas oil in chemical plants. For example a 500 MW green hydrogen plant in the Port of Amsterdam, to be realized by HyCC in 2027. Another example is a decarbonized hydrogen plant in Den Helder, a project that bridges the gap between now and the moment when sufficient green hydrogen is available.
- Import and export of hydrogen (LOHCs), via the ports and pipelines
- Hydrogen infrastructure e.g. regional high- and low-pressure hydrogen networks (connected with the national hydrogen network), covering a network of 8 hydrogen fuel stations for freight trucking, and hydrogen bunkering stations for ships.
- Hydrogen for balancing the electricity grid on a national, regional, and local scale.

Knowledge partners

Important knowledge partners and human capital initiatives on the topic of hydrogen in the Noord-Holland region are the TNO Faraday Lab, both Universities in Amsterdam (VU and UvA), Techport, Investa expertise center and the Maritime Emerging Technologies Innovation Park (METIP).

Zuid-Holland

Regional collaboration

The Port of Rotterdam and the surrounding region are developing into Europe's Hydrogen Hub: Zuid-Holland/Rotterdam. Use of hydrogen as a fuel and feedstock in industry finish up the value chain. Making shipping and aviation and heavy duty long-distance road transport more sustainable is also the purpose. These activities are facilitated and enhanced by a supporting ecosystem of manufacturers, business services, traders and schools and universities.

Uniqueness

The Rotterdam region is ideal for the development of a strong hydrogen industry because of the availability of experience in the application of (grey) hydrogen in the Rotterdam-Moerdijk region. Around 200 (hydrogen) manufacturers, but also educational and knowledge institutions, are working on applications for hydrogen. Finally, the potential buyers of this industry are also located in the region.

The Rotterdam region complements the other Dutch regions by offering the following:

- World leader for hydrogen import projects and terminals, aiming for importing 4 megatons of hydrogen in 2030 for making our region and connected regions more sustainable;

- Home to large hydrogen investments, like a 200MW electrolyser ready for production in 2024, and the H-Vision project for blue hydrogen production;
- Existing demand in (petro)chemical industries and transport, and future demand for production of sustainable fuels and chemicals;

One of the most innovative and industrious regions in Europe, meaning that all the technology, knowledge, business services and skilled workers needed for new projects are available here.

Knowledge infrastructure

The hydrogen economy is not only essential in reaching sustainability and climate targets, but also in developing a sustainable future economy and employment opportunities.

Zeeland – cross-border Hydrogen Hub

Regional collaboration

Within the region, the Province of Zeeland, North Sea Port and the industry work closely together in the Smart Delta Resources (SDR) platform. Within SDR's Hydrogen Delta Program, regional stakeholders collaborate on realizing the transition from grey to sustainable hydrogen. Hydrogen Delta is focused on the entire hydrogen value chain: from offshore wind, to production, to connecting infrastructure, to demand and to import of hydrogen.

Uniqueness

As the current largest hydrogen cluster in the Benelux, the cross-border industry cluster in North Sea Port produces and consumes 580 ktons of hydrogen annually. It is expected that the current hydrogen demand (as feedstock and/or fuel) will double in size in 2050. The industrial cluster consists of a diverse set of industries and sectors, like energy, steel, chemicals, refining, fertilizers and food.

Additionally, the Province of Zeeland will contribute to the international hydrogen value chain through the following:

- Existing intensive international collaboration on governance and project level;
- On the electricity side, the region is well positioned for offshore wind connections, has 380kV power stations/grid in place and is home to (future) nuclear power plant(s);
- On the supply side, several large scale green and blue hydrogen projects have been announced, adding up to (multiple) GW-scale;
- An open-access cross-border hydrogen pipeline to Belgium will connect all the supply and demand in and around North Sea Port;
- The North Sea Port area is well positioned for large-scale import of sustainable hydrogen carriers, with several public projects being announced.

Knowledge institutions

Knowledge partners are HZ University of Applied Sciences, Scalda (including a green hydrogen curriculum), and a cross-border collaboration with UGent.

Numbers

	Northern-Netherlands	Noord-Holland	Zuid-Holland	Zeeland
Port industrial cluster	Delfzijl Eemshaven Emmen	Port of Amsterdam Den Helder	Port of Rotterdam & Moerdijk	North Sea Port
Import aim		1 Mton (2030)	4 megatons (2030)	1,5 Mton in 2030
Production	5 to 10 PJ p/y until 2025 100 PJ/y until 2030	500 MW green hydrogen plant (ready in 2027); Decarbonized hydrogen plant Den Helder	200MW electrolyser	580 kton hydrogen produced and consumed by companies annually 380kV power station
Knowledge institutions	University of Groningen Wetsus Energy Campus Leeuwarden Greenwise Campus Hydrogen Valley Campus Europe	TNO VU Amsterdam University of Amsterdam Techport Investa METIP	TNO Delft University Erasmus University Rotterdam Leiden University University of Applied Sciences Rotterdam	Smart Delta Resources HZ University of Applied Sciences Scalda UGent
Application in residential areas	Hoogeveen	The Island of Texel	Goeree-Overflakkee	