Position paper

Hydrogen Valley East Netherlands

The development of a hydrogen ecosystem for a resilient and green energy system in East Netherlands

Introduction to the region

In the future, the regional energy system will evolve to become more sustainable, yet it will also grow significantly more complex. This shift will require both small and large energy consumers—across industries, transportation, and buildings—to adopt new low-carbon technologies. With rising electricity demand and the integration of green gas from local sustainable sources, the energy network faces increasing pressure. This dynamic growth of sustainable energy suppliers and consumers highlights the urgent need for a decentralized energy supply approach that can better balance supply and demand.

Meeting these demands will require substantial investments to either strengthen or increase the flexibility of the grid, ultimately balancing the electricity network. Decentralized, scalable, and affordable solutions are crucial to accelerating the energy transition in a sustainable way.

The East Netherlands is addressing this need by establishing decentralized energy systems, known as **Smart Energy Hubs**, starting with ten. These hubs harness renewable energy from solar, wind, and biogas sources within a smart, decentralized system. Integrated with emission-free applications across industry, buildings, and mobility, these hubs are advancing the transition to a resilient and multi commodity energy system.

Integrated within these hubs, **hydrogen** is seen as potential low-carbon technology to offer flexible energy storage and serve as a clean fuel for various applications. Moreover, Hydrogen is a versatile energy carrier that can stabilize the network during peak demand and facilitate emission-free energy use across industry, buildings, and mobility.

Through dedicated programs for rapid implementation, knowledge-sharing, and the promotion of these hubs, the East Netherlands aims to drive a steep learning curve, positioning the region as a leader in adopting sustainable, decentralized, and multi commodity energy solutions that are ready for future demands.

Leading by example

The East Netherlands is and will remain the demonstrator of new technology through the development of Smart Energy Hubs. These hubs are in line with the regional task concerning sustainability and solve bottlenecks such as (the threat of) grid congestion. At the same time, they are demonstrations of new innovations (such as new generation batteries, heat pumps, hydrogen-fuelled central heating systems, electrolyser components, sensors, AI and new generation charging stations) that address the challenge and/or bottlenecks. They are an example of the East Netherlands' approach to integrated decentralised and multi commodity energy systems. In some key technologies, the East Netherlands has an excellent position in knowledge and skills. There is a high concentration of companies specialised in the development and production of materials and components needed for energy carriers.

But also in the field of stack and system integration, electrolysis and energy storage, various Eastern Dutch companies are active ("Electrolysis: Opportunities for the Dutch Manufacturing Industry" and "Hydrogen: Opportunities for Dutch Industry"). This strong base must be able to be utilised and needs launching customership from the government and larger industrial site managers.

Hydrogen Valley

East Netherlands is a living lab for integrated decentralised energy systems. This is where scalable innovations are being developed, that can be applied throughout Europe and beyond.

The ambition of becoming a Hydrogen Valley is therefore complementary on supporting the regions goals to develop decentralized and multi commodity energy systems. The Hydrogen Valley missions for the East Netherlands are detailed in the following chapters.

Smart Energy Hub Program

East Netherlands is committed to opportunities aligned with the strengths of the region, that improve the economic position of the technical industry in the region and preserve the quality of the environment, by focusing on the development and scaling up of integrated decentralised energy systems. The region is fully equipped for this.

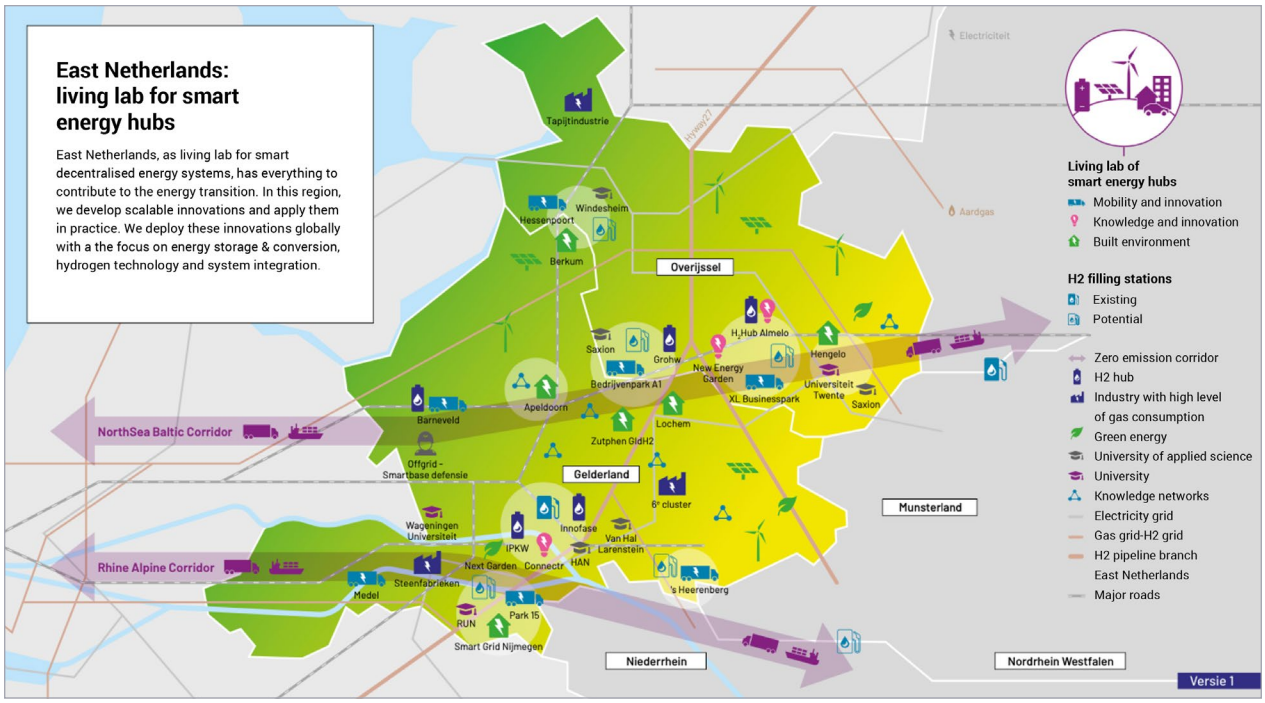
This program will facilitate the development of local multi commodity energy systems, with hydrogen playing a role in several hubs. This initiative aims to integrate hydrogen seamlessly into the region's future energy mix.

"The region East Netherlands is the interregional turntable for energy (natural gas, hydrogen and electricity) and logistical streams (road, water and rail) connecting the North and South of the Netherlands and Benelux and is neighbouring North Rhein Westphalia, the German industrial powerhouse, to the east. The region is therefore in pole position to become the European Connecting Hydrogen Valley."

Patrick Cnubben, CEO Hydrogen Architects

Regional characteristics

East Netherlands offers favorable conditions for developing a Hydrogen Valley. Located on two major transport corridors, the North Sea-Baltic Corridor and the Rhine-Alpine Corridor, in the heart of the Dutch electricity and gas infrastructure, and with the centre of gravity of an innovative (energy related) manufacturing industry, East Netherlands is actively contributing to the energy transition.



Strong manufacturing industry

The region has a robust and innovative manufacturing industry, especially in the fields of stack and system integration, electrolysis and energy storage. The (high-tech) manufacturing industry is strongly represented and various Dutch “gems” are located in the region.

The entire value chain and various strong clusters are present: a test and certification cluster, various storage techniques, a machine building cluster, electrochemistry (hydrogen technology) cluster, smart industries (mechatronics, sensor technology ICT, AI), a number of larger network operators, an electric mobility cluster and a heat cluster.

Crucial Transport Node

The region is conveniently located in North-western Europe along important transport corridors, in the heart of the energy infrastructure and between Randstad, the Northern Netherlands and NRW. This makes cooperation and partnering with other European regions easy.

The region’s strategic position as a crucial transport node enhances its suitability for a Hydrogen Valley:

- **Transport**: the North Sea-Baltic and Rhine-Alpine transport corridors are passing the region, making it a key logistical hub.
- **Electricity & Gas**: The region serves as a node for the national electricity and gas networks. Given the current grid congestion, hydrogen can play a vital role in balancing supply and demand and ensuring a stable energy supply.
- **Hydrogen**: The EU hydrogen backbone is set to pass through the region. Illustrating the potential role the region has for hydrogen distribution and usage.

Human capital

In the region are several educational institutions working hard on educating the needed (future) workforce in the energy sector. These are;

Applied sciences:
HAN
Saxion
Windesheim

Universities:
University of Twente
Radboud University

Fit for the job

The culture, workforce and knowledge infrastructure fit well with the development of practical technical solutions.

Hydrogen Valley ambition

The establishment of a Hydrogen Valley in East Netherlands is a strategic investment in a sustainable future. This initiative enables the region to prepare for integration with the European Hydrogen Backbone, actively support the EU’s hydrogen strategy, and solidify its position as a key transport hub within the North Sea-Baltic and Rhine-Alpine corridors.

The Hydrogen Valley will play a pivotal role in supporting the energy transition of regional industries, offering an essential pathway toward decarbonization and energy resilience. Additionally, by integrating hydrogen solutions, the Hydrogen Valley addresses the region’s critical grid congestion challenges, enhancing the stability and capacity of the future energy infrastructure.

Furthermore, the Hydrogen Valley will drive the development and connection of smart energy hubs across the region. These hubs will strengthen East Netherlands’ pathway toward creating multi commodity energy systems, in which hydrogen plays a critical role as one of multiple renewable energy sources. This approach maximizes flexibility, efficiency, and sustainability in regional energy management.

Lastly, the Hydrogen Valley aims to set up a collaborative network (physical & digital) between different hydrogen initiatives in the region and also with neighboring German border regions of North Westphalia.

By investing in hydrogen innovation and regional collaboration, East Netherlands is positioned to develop a sustainable hydrogen economy, contributing significantly to the broader European energy transition.

“As a developer of energy hubs, we see the Hydrogen Valley application as the opportunity to build an innovative, decentralized energy system in the region East Netherlands, where green hydrogen strengthens the region with renewable energy and energy independence.”

Jasper Heutinck, Project developer Energy and Hydrogen Hydronex

Hydrogen Valley Conditions

Overview of most challenging conditions (based on 2024 call).

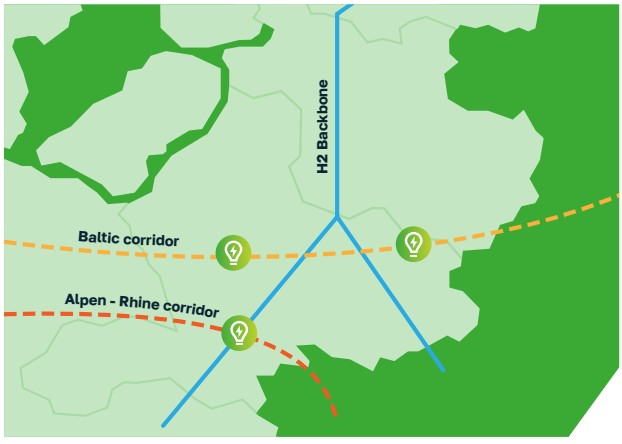
- Max. grant amount of €20 million. While it is not mandatory, an investment plan of approximately €120 million is needed to increase the chances of success.
- Production of at least 4000 tonnes of clean hydrogen per year using new hydrogen production capacity.
- At least two hydrogen applications from two different sectors should be part of the project with a clear focus on energy, industry and transport sectors.
- Demonstration of how financial viability is expected to be reached after two years of operation.

Hydrogen Valley missions

Based on first insights and meetings. Be aware! The location of the (smart) energy hubs and important terminal are indicative!

Mission 1 (2025 - 2030): Boosting local hydrogen ecosystems.

- Support the start-up of local hydrogen ecosystems in 2 - 4 (smart) energy hubs by stimulating the local production to end-use of green hydrogen.
- The combined ambition of the 2-4 hubs is to install approx. 50 MW by 2030.
- The hubs are located near the EU transport corridors and the future hydrogen backbone.

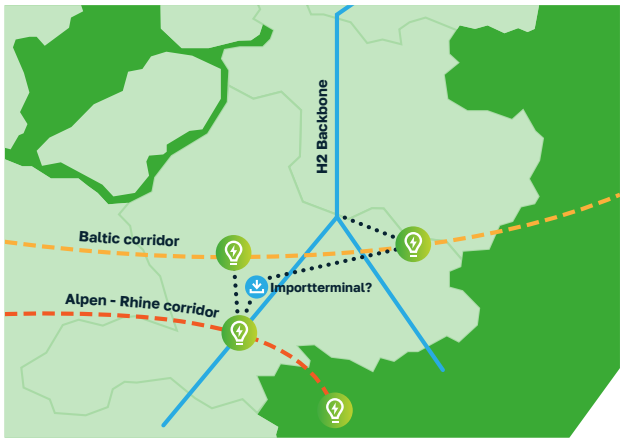


"A future connection to the Hydrogen Backbone, contributes to the European hydrogen strategy. This development not only bolsters the regional economy and energy transition, but also offers strategic advantages in terms of security and energy independence. This is an important strategic economic and environmental step towards the energy transition."

Jan van Dellen, CEO The Economic Board Arnhem – Nijmegen Region

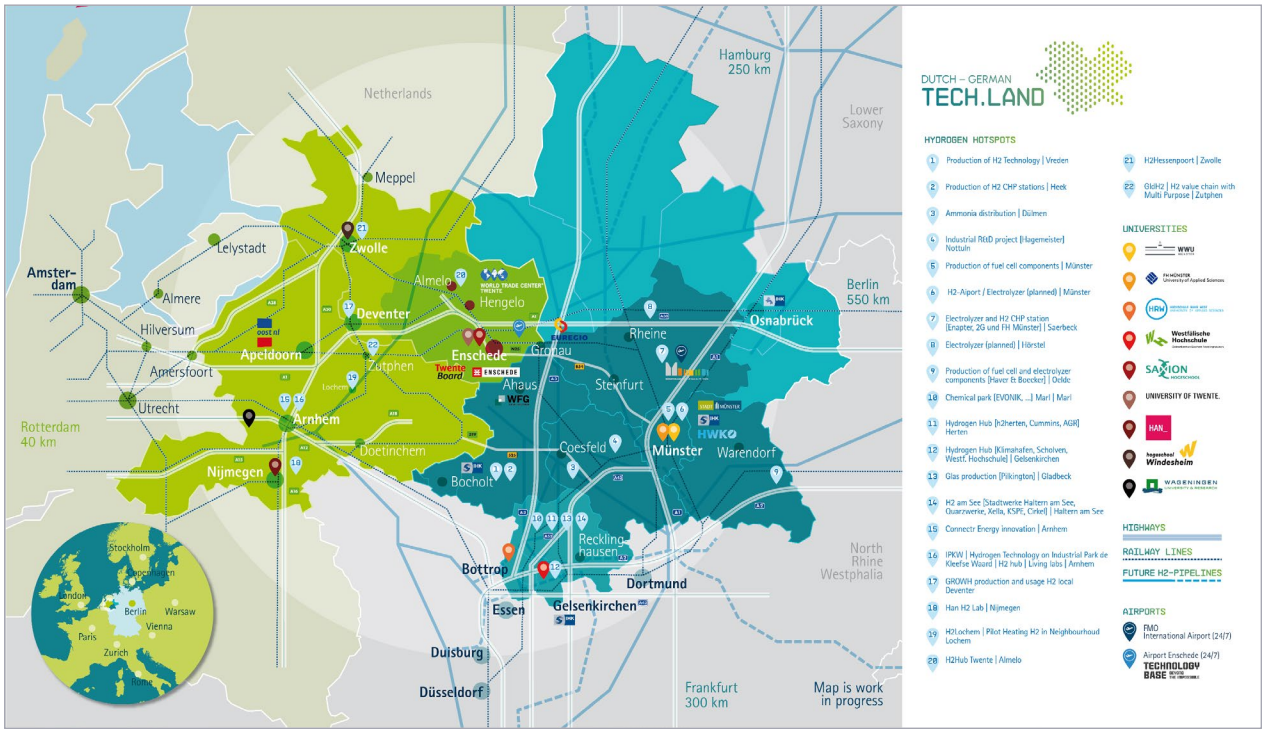
Mission 2 (2025-2030): Strengthening the establishment of a regional hydrogen infrastructure

- Scaling up the local ecosystems into an regional hydrogen ecosystem
- Preparation of regional distribution infrastructure (physical and/or digital) to boost green hydrogen production and end use.
- Regional import strategy
- Collaborative strategy to future Hydrogen Backbone connection and the regions hydrogen ecosystem



Mission 3 (2025-2030): Creating a collaborative interregional hydrogen ecosystem.

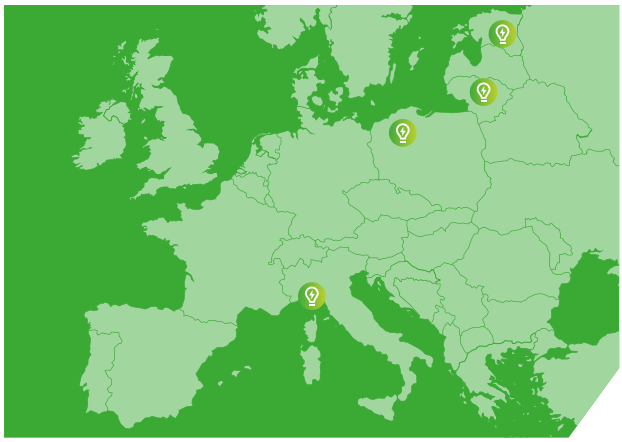
- Supporting the development of cross border hydrogen ecosystems with German border regions, preferably alongside the EU transport corridors.
- Strengthening the development of an interregional hydrogen network (physical & digital). This build forward on the already existing Tech.Land partnership between East Netherlands & North Westphalia.

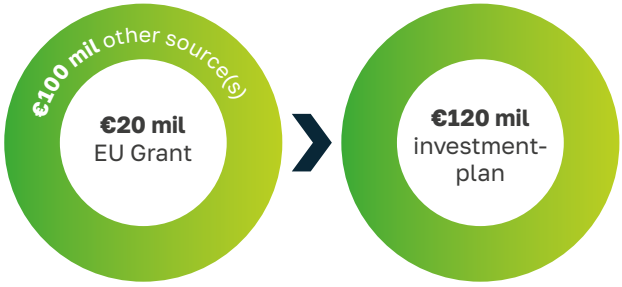


Mission 4 (2025-2030): Replication of hydrogen valley(s) alongside the Baltic and Rhine corridors. The results from mission 1,2 & 3 will be processed into a development strategy on the role of hydrogen in the development of creating resilient, decentralized and multi commodity for outer regions alongside the TEN corridors.

Investment plan (2025 - 2030)

The Hydrogen Valley application requires a comprehensive investment plan for the development of a (inter)regional hydrogen ecosystem for the period 2025-2030.





Given the ambitions of various initiatives, which is shown in the table below, achieving the threshold of at least €120 million is feasible. These figures are preliminary estimates that reflects only the substantial ambition of the hydrogen initiatives in the region.

An initial exploration with four smart energy hubs and two regional distribution companies shows that their projected plans for 2025-2030 carry indicative costs already exceeding €300 million. This shows that the €120 million investment plan is attainable.

Funding Strategy

To secure the additional €100 million required, a solid investment plan is essential. This plan must contain the following components:

- **Regional and Provincial Commitment:** Securing financial commitments from local governments, including regions and provinces, is crucial. Collaborative efforts are necessary to avoid fragmented projects and to ensure the creation of a cohesive regional hydrogen ecosystem.
- **Private Sector Investments:** Engaging with private sector stakeholders, including industrial partners, energy companies, and technology providers, to secure investments. Public-private partnerships (PPPs) will be key to leveraging additional funds and expertise.
- **National Government Support:** Exploring funding opportunities from national government programs dedicated to sustainable energy and innovation. Aligning the Hydrogen Valley project with national energy transition goals can facilitate access to additional resources.
- **Financial Institutions and Investors:** Approaching banks, investment funds, and other financial institutions for loans, equity investments, and other financial instruments. Demonstrating the project's long-term viability and potential returns will be vital in attracting investors.
- **EU and International Funding:** In addition to the EU grant, seeking other European and international funding sources such as Horizon Europe, the Connecting Europe Facility (CEF), and the European Investment Bank (EIB).
- **Revenue Generation and Cost Savings:** Outlining a clear plan for revenue generation through the sale of hydrogen and related services. Additionally, highlighting potential cost savings and efficiencies that the hydrogen ecosystem will bring to the region.

Conclusion

The Smart Energy Hub Program in the Eastern Netherlands is a cornerstone for creating a multi commodity, decentralized energy system that integrates renewable sources like solar, wind, and biogas. Complementary to this program, the **Hydrogen Valley** initiative aims to establish a regional hydrogen ecosystem that not only supports a flexible, sustainable energy supply but also prepares for future connection with the European Hydrogen Backbone, aligning the region with the EU's hydrogen strategy.

This phased approach allows the Eastern Netherlands to build (inter) regional capabilities for hydrogen production, storage, and distribution while addressing critical challenges like grid congestion and enhancing energy resilience. Positioned within the North Sea-Baltic and Rhine-Alpine corridors, the Hydrogen Valley is well-situated to support EU hydrogen goals, foster cross-border cooperation with North Westphalia, and expand hydrogen applications across key European transport routes.

With an investment plan of approximately €120 million, supported by local, national, and EU funding, the initiative ensures both financial viability and scalability. This vision establishes the East Netherlands as a leader in the European energy transition, setting a framework for similar sustainable transformations across other regions.

More information

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