



# ClusterNorthH2

The next steps: Getting ready for operational hydrogen infrastructure in 2026

# Going forward in Cluster-NorthH2

The ClusterNorthH2 alliance published their first report in March 2022 showcasing how hydrogen infrastructure can connect storage, producers and consumers in the Middle and Northern parts of Jutland. The conclusion was that the price for transporting hydrogen through 170 km. pipeline system was 1,5 DKK/kg with a 30 year depreciation period corresponding to about 9 % of an expected Danish hydrogen production cost in 2030. The total investment for the establishment of the pipeline is expected to be 1 billion DKK which would be coupled with an investment of 900 million DKK for an underground hydrogen storage with 280 GWh capacity.

## The goal is clear: the first hydrogen should be transported in 100 km. of pipelines from Mariager Fjord towards Skive, connected to storage, by 2026.

Now is the time for the next phase of ClusterNorthH2. This short report briefly summarises what the alliance will work towards in 2022 and 2023. The goal is clear: the first hydrogen should be transported in 100 km. of pipelines from Mariager Fjord towards Skive, connected to storage, by 2026. Read along and understand what we will do in these areas:

- We will analyse the different partners' timelines to see if anything can be done quicker.
- Together with the authorities, we will outline preliminary terms and conditions for the use of the hydrogen cluster.
- We will describe how a market dialogue can identify hydrogen producers and consumers in the future evolution of the ClusterNorthH2 infrastructure.
- We will stop talking and start digging. Partners of the alliance will be testing the very first small-scale hydrogen network at GreenLab Skive to gain insights about establishing, maintaining and connecting producers and consumers of hydrogen.

## *We need a streamlined process for hydrogen infrastructure*

Timing is everything – they say - and for ClusterNorthH2 it is indeed the case. The comparison of timelines shows interdependencies between Financial Investment Decisions (FID), construction, and authority approvals. Being ready at the right time for transporting and storage of hydrogen is essential, however the processes leading there are not developed yet.

The partners in ClusterNorthH2 look forward to work with the relevant regulatory authorities to identify and develop streamlined processes in order to have the infrastructure operational in 2026. This would not only make sure that the first part

of ClusterNorthH2 is operational in 2026 but will pave the way for efficient handling of hydrogen infrastructure across Denmark.

The partners' expected timelines are shown below (page 3) which clearly highlight the interdependencies across infrastructure partners, authorities, producers, and consumers.

## WHO IS CLUSTERNORTH2?

ClusterNorthH2 is an cooperative alliance between Evida, Gas Storage Denmark, Eurowind Energy and GreenLab. The alliance will seek to understand the technical and economical possibilities and challenges related to connecting hydrogen producers, storage and consumers in Mid and North Jutland.



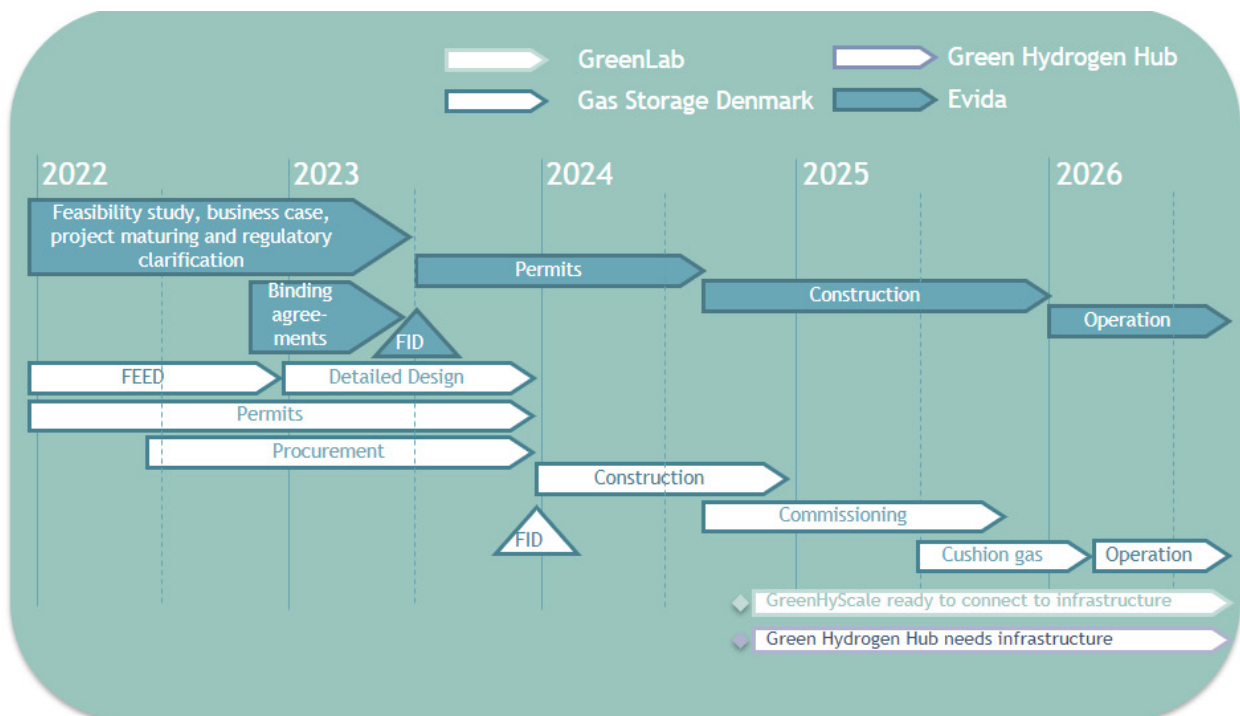


Figure 1: The ClusterNorthH2 partners' timelines and need for infrastructure.

### Going forward with the very first draft for terms and conditions for hydrogen infrastructure

If hydrogen is to be transported and stored in dedicated infrastructure, there needs to be clear terms and conditions for using that infrastructure. The great challenge is to clarify which conditions are useful in the mid-2020s and can also work for future hydrogen consumers and producers. No one knows the future which is why Evida and Gas Storage Denmark will cooperate with the authorities to clarify these conditions for the cluster and ensure that they can be updated in line with development in the Danish Power-to-X sector.

The studies will at least cover the following areas:

- Quality requirements of the hydrogen before entering pipelines and storage.
- Cost of using the infrastructure.
- Clarification of issues around disconnecting and detaching producers or consumers in the cluster.

### Going forward with the evolution of ClusterNorthH2: A market dialogue

As described in the first report the scenario analysed was characterised as an immature market with few customers connected. In the

next phase of ClusterNorthH2, the alliance will investigate the potential for more consumers and producers in the areas close to the pipeline routes.

Evida and Energinet, the two appointed hydrogen infrastructure partners in Denmark, have started a market survey and dialogue to identify the need for hydrogen infrastructure in Denmark. The results are expected in Q4 2022 and will be analysed further in the development of ClusterNorthH2.

Based on the market dialogue ClusterNorthH2 will analyse and illustrate what the evolution of the hydrogen infrastructure cluster will look like from 2025 and going forward. It will be evaluated how ClusterNorthH2 in the mid-2020s should be designed and how it can be expanded in the 2030s to new geographical areas in alignment with the development of hydrogen infrastructure in Denmark.

### Enough talking – let's get digging: Small scale hydrogen network at GreenLab

The ClusterNorthH2 alliance will, in 2023, be testing the first small-scale- hydrogen network in Denmark. Evida will establish a 0,5 km. hydrogen pipeline as a demonstration of a hydrogen cluster network at GreenLab Skive during 2023. The first phase will connect GreenLab



Skives GreenHyScale electrolysis plant built by Green Hydrogen Systems and Vestjyllands Andel's Starfish Factory. Later more hydrogen consumers and producers at GreenLab Skive will connect when they have a need for hydrogen transportation.

This small-scale hydrogen network will give the alliance valuable and unique insights into how hydrogen infrastructure can be established, maintained, and balanced. It will not only provide the alliance with valuable learnings about the

infrastructure but also how producers and consumers can be connected - and how they can interact with the infrastructure in their production and consumption patterns. All the learnings and insights will prepare the alliance for having the first collective and large-scale hydrogen infrastructure operational in 2026. Roles and responsibilities in hydrogen infrastructure are still under development and ClusterNorthH2 looks forward to contributing relevant insights and expertise from further work in the alliance.



Figure 2: Illustration of the hydrogen infrastructure at GreenLab.

# Behind the project



Evida: The States gas distribution company, which contributes with 35 years of knowledge and experience in the establishment and operation of piped infrastructure in Denmark. Evida has more than eight years of experience in connecting biogas plants, which are decentrally located, and balancing a gas network and gas flow with many more sources than before. With an expectation of a similar decentralised deployment with hydrogen, this experience can be put to good use

## Eurowind Energy™

Eurowind Energy A/S is an international company headquartered in Denmark, which over the years has developed into a leading developer and operator of wind, solar and hybrid projects. Eurowind Energy contributes knowledge on the production of green hydrogen by electrolysis directly connected to wind and solar farms. Eurowind Energy wishes to enter into a partnership to create a hydrogen infrastructure with renewable energy sources, as the objective of creating a hydrogen infrastructure is a strategically important enabler for the green transition.

## GreenLab

GreenLab is a green and circular industrial park for companies that want to contribute to the green conversion, a national research centre and a technology catalyst. GreenLab's role is to contribute its experience in working with value chains, and to act as a concrete case that can provide a basis for discussion and learning across the participating parties.

## — GAS STORAGE DENMARK —

Gas Storage Denmark: Gas Storage Denmark, a subsidiary of Energinet, owns and operates Denmark's two existing underground storage facilities. Gas Storage Denmark has more than 30 years of experience in operating critical infrastructure in the form of large-scale underground energy storage. This experience is used in the ClusterNorth2 project. Gas Storage Denmark believes that large-scale hydrogen storage contributes to the security of supply that is essential for the climate-neutral energy system of the future. Because of this, it is precisely this technology, and the goal of equal access for all that Gas Storage Denmark contributes to ClusterNorth2.



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