

Hydrogen heads home to challenge oil and gas as local energy supply

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Credit: AI-generated image ([disclaimer](#))

Hydrogen is carving out its place in the world of renewable energy. Regional developments like hydrogen valleys and hydrogen islands are serving as blueprints for larger ecosystems to produce and consume this versatile fuel locally.

The Northern Netherlands region used to be prime gas country. One of the largest gas fields in the world was found underfoot in Groningen province. Gas extraction from the territory helped bankroll the Netherlands for decades. But times are changing.

"Gas production is winding down," said Jochem Durenkamp, [hydrogen](#) project manager at New Energy Coalition. "Which would mean the north would lose many jobs. Hydrogen turned out to be a perfect replacement."

With [gas extraction](#) and related jobs coming to an end, these [northern regions](#) are seeking alternatives. Furthermore, shifts in the soil from drilling for gas are causing minor earthquakes, with 72 registered in 2021 alone. This has significant economic repercussions, particularly when it damages houses in the area. As much as €1.2 billion has been paid out in compensation for earthquake damage since 1991.

The Northern Netherlands region is setting out to become a so-called "Hydrogen Valley." The [HEAVENN](#) project, coordinated by the New Energy Coalition, is at the helm. The region is tapping European support to develop the infrastructure necessary to adopt green hydrogen as a locally produced [energy supply](#).

The European Union has an eventual target of 100 of these hydrogen valleys. Currently there are 23 in Europe at various stages of development, with the ambition to double this total by 2025. Dozens of projects have commenced all over Europe and in 20 countries worldwide, in a rapidly evolving clean energy investment trend worth billions. Follow the link for [a map of hydrogen valleys](#).

The strategy is to provide a regional economic impetus while also fighting the main driver of climate change, the burning of fossil fuels. Eventually, when enough regions emerge, they will join up to create a

wide-scale hydrogen-based economy founded on a clean, secure energy supply.

Green hydrogen

The Northern Netherlands is in an ideal position to take advantage of the hydrogen opportunity. Located close to [the rapidly expanding offshore wind farms of the North Sea](#), it has a direct line of renewable energy to manufacture green hydrogen. On top of that, the previous gas exploitation in the region has created a body of knowledge and skills that easily transfers to the production, distribution, storage and consumption of hydrogen in the local economy.

The idea behind hydrogen valleys is to create a self-sufficient hydrogen ecosystem from start to finish. In the case of HEAVENN, that begins by identifying sites where the electrolysis process can be used to separate water into hydrogen and oxygen by use of electricity.

A Hydrogen Valley is a medium-sized area where clean hydrogen is produced locally and consumed by homes, vehicles and industry. The goal is to initiate a hydrogen economy at the community level. Eventually the regional hydrogen valleys will join up to create wider economic zones powered by hydrogen.

When this electricity is derived from [renewable sources](#), like [offshore wind](#) in the case of HEAVENN, the hydrogen is considered to be a green energy source. Most usually stored as a gas, this zero-emission energy carrier is used to fuel everyday applications such as in transport, heating and industry.

HEAVENN, for example, invests in projects for hydrogen-based mobility with a number of hydrogen filling points for every kind of hydrogen powered vehicle—from cars to trucks and buses. Hydrogen

will also be used to power a datacenter and to heat residential neighborhoods.

Building energy ecosystems is not easy. "The project includes thirty partners," said Durenkamp. "It's a big challenge to coordinate what they do, but building this ecosystem is key for hydrogen."

Beyond the partners, the local community is also an important player. "It's very important that inhabitants are consulted," said Durenkamp. "Where before, energy was extracted from underground, it's now very visible in the landscape with [wind turbines](#), solar panels and large electrolysis facilities. Whenever something is done in the project, it's done together with the local inhabitants."

Clean energy islands

Another region unlocking hydrogen's potential is the Spanish island of Mallorca, which styles itself as a "Hydrogen Island."

"The idea of the project came when CEMEX, a cement manufacturer, announced it would close its plant on Mallorca," said María Jaén Caparrós. She acts as coordinator of hydrogen innovation at Enagás, the Transmission System Operator of the national gas grid in Spain. "With hydrogen, we want to re-industrialize the island and decarbonize the Balearic region."

Known as [GREEN HYSLAND](#), the project will create an ecosystem of hydrogen producers and users across the Mediterranean island. Achieving this will cut down on expensive energy imports and eliminate harmful emissions.

Central to this is an electrolysis plant that produces hydrogen from energy supplied by two newly built solar-power plants. This hydrogen is

then used in a range of different applications in the locality. For example, the public transport company of the city of Palma de Mallorca is rolling out hydrogen-powered buses. Another use-case is to power the island's vital ferry port and even to provide energy for a hotel. But community energy needs community support.

Renewable diversification

"It's key to have the support of society," said Jaén Caparrós. "Hydrogen is something new for the Balearic Islands. This project will not only promote reindustrialization based on renewables, but will also provide knowledge, research and innovation. It is a milestone that the Balearic Islands must take advantage of, in order to promote the diversification of the production model with new, stable and quality jobs."

The second related objective of GREEN HYSLAND is to reduce the emissions from the use of natural gas. They will inject part of the hydrogen into the gas grid, according to Jaén Caparrós. They are compatible sources of [energy](#). "We will build a hydrogen pipeline to transport it to the injection point," he said, "Which we will use to partly decarbonize the natural gas grid." They plan to commence this phase by the end of 2022.

In this way, hydrogen can be mixed into the existing gas infrastructure used to heat homes, hotels and industry or generate electricity. The resulting blend of gas and green hydrogen has a lower emissions footprint than just using gas by itself, a step toward complete decarbonization.

Hydrogen blueprints

GREEN HYSLAND even joined up with parties from outside of

Europe. "We are 30 partners from 11 countries including Morocco and Chile," said Jaén Caparrós. "They also want to develop green hydrogen ecosystems, and hydrogen valleys have an added value if we can connect with regions inside and outside of Europe," she said.

"Hydrogen valleys create new jobs, re-industrialize and create new economic activities," said Jaén Caparrós. "And on top of that they decarbonize. It serves the entire society."

Once this infrastructure-building and experimentation phase is complete, the lessons learned will also need to scale up. Both HEAVENN and GREEN HYSLAND want to share what they learn. "We want to be a blueprint for other regions across the world," concluded Durenkamp. "If this project is a success, we want to share it."

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