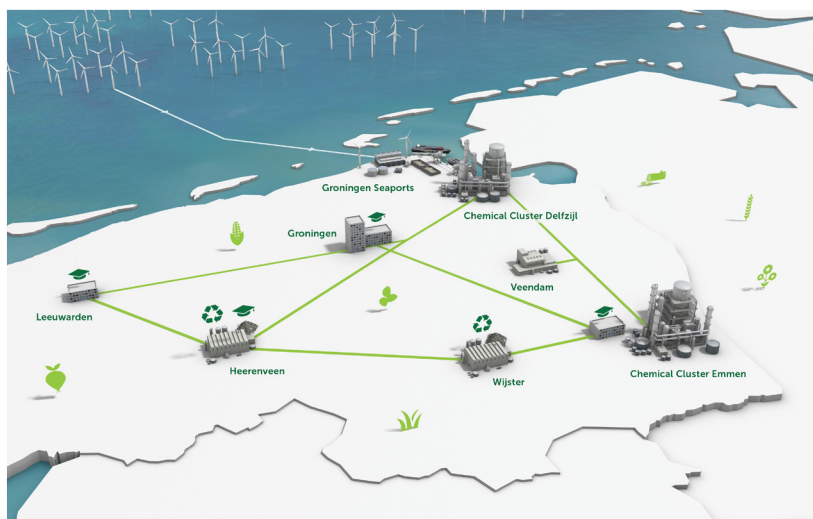


The world faces fundamental transitions in production of energy and goods, to be realised through the adoption of renewable energy and a biobased circular transition. The Northern Netherlands, spanning the provinces of Friesland, Groningen and Drenthe, provides all the ingredients for this transition.

**A comprehensive description is given by Johanna Thomann, André Heeres and Errit Bekkering in the Journal of Business Chemistry.**

This is the executive summary of that paper and describes the four ingredients that are vital to these transitions :

1. Green energy
2. Renewable feedstock
3. Infrastructure
4. Knowledge



## 1. Green energy

The province of Groningen has provided the country with natural gas for the last 60 years. Now, the Northern Netherlands can lead in the transition to green energy, crucial for a sustainable economy, as it is well connected to wind parks in the North Sea. Off shore wind energy production targets are 20 GW in 2030, with an additional 20 to 40 GW by 2050. This can power an electrified industry. For the short term, electricity producers in Eemshaven plan to incorporate capture of CO<sub>2</sub> emissions into their operation for usage in other sectors (Carbon Capture and Utilisation) or storage in

empty gas fields or salt caverns (Carbon Capture and Storage).

Furthermore, the Northern Netherlands have been designated a 'Hydrogen Valley' by the European Union. Hydrogen links the energy sector with the chemical sector functioning as both energy carrier (Power2Gas) and renewable feedstock (Power2Chemicals). In a recent study, the suitability of the existing gas infrastructure was examined for the transmission of hydrogen, with a positive outcome.

## 2. Renewable feedstock

The agricultural setting of the Northern Netherlands provides a sizeable input of agricultural products and residual streams for the chemical industry. Indeed, there is a long tradition of processing sugar (Cosun Beet Company) and starch (Avebe) in the region. New companies in the region, like Avantium, are able to produce non-traditional products like plastics from biomolecules.

However, agricultural sidestreams are not the only feedstock. Green hydrogen and carbon capture can be used to produce a range of drop-in chemicals for many industries. And plastics can be transformed to new basic building blocks, such as aromatic compounds (BioBTX) through chemical recycling. Other options are chemical recycling of e.g. end-of-life PET (CuRe-consortium in the Emmen chemical hub).

### 3. Infrastructure

Apart from the two main chemical hubs (Delfzijl and Emmen) and recycling facilities in Heerenveen, there are a number of facilities in the region for developing products at all TRLs, such as the Zernike Advanced Processing facility (TRL 3-6) and the Chemport Innovation Centre (TRL 6-8).

Different industrial areas offer space for production facilities.

In many areas, companies are already integrating their processes to allow e.g. the use of waste heat, or residual streams.

There are plans to refurbish the existing pipeline system for natural gas for hydrogen transport. The NorthH2 project will use off-shore wind energy to produce 800,000 tons of green hydrogen per year by 2040.

### 4. Knowledge

The University of Groningen provides fundamental knowledge and - jointly with the Universities of Applied Science NHL Stenden and Hanze - more applied research into circular, biobased technologies. Together with the many schools for secondary vocational training, these institutes also provide a steady stream of well-trained staff at all levels. The high level of expertise

in chemistry, biotechnology and biorefinery present in combination with a strong collaboration with private and other public partners is a strong basis for success. Knowledge on green production processes are being developed, optimized and applied in the main chemical hubs in Delfzijl and Emmen, and the wider Chemport Europe ecosystem.

The integration of these four ingredients, combined the sea harbours and decades of experience and cutting edge new technologies make the Northern Netherlands region a powerhouse in the biobased circular transition.

**This is an executive summary of:  
The Northern Netherlands: Transformation of a gas-producing region  
into a forerunner in the biobased circular transition,  
Journal of Business Chemistry February 2023**

**Read the full article:**

<https://miami.uni-muenster.de/Record/84691c66-c9d7-4127-9bf2-1493d047420b>

Chemport Europe is an innovative ecosystem for chemicals and materials in the Northern Netherlands. Companies, government and knowledge institutes work together towards a green, sustainable chemical sector. Our ambition is clear: To be the first European chemical cluster with zero CO<sub>2</sub> emission and minimal environmental impact. In 2050, the entire Chemport Europe industrial cluster will only use renewable energy and non-fossil feedstock.

More info  
[www.chemport.eu](http://www.chemport.eu)

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