From HEAVENN to Hydrogen Valleys

*Transition to a Hydrogen Economy*

Patrick Cnubben

New Energy Coalition
Where are we located?
Situation in the Northern Netherlands
Situation in the Northern Netherlands

Gas production and cumulative economic impact - baseline

Historic gas production + base scenario (in bn m³, left)
Cumulative impact on economic growth in Northern Netherlands (in %, right)
We have a plan

Green Hydrogen Economy in the Northern Netherlands
A region needs a business
H2 fits as a glove!
Priorities

Infrastructure
- Harbours!!
- Energy
- Transport

Sectors
- Industry
- Mobility
- Built environment
- Net balancing

Human Capital & Innovation
- Design
- Construction
- Maintenance
- Vocational to Academic
The Region as Green Hydrogen Hub

A hydrogen hub in the North Netherlands

From electricity...

...to hydrogen...
Electrolysis: separating water into hydrogen and oxygen

...to storage...

...to consumers
Methanation: CO₂ from the air reacts with hydrogen to form syngas which can be injected into the natural gas network

Blending H₂ into the natural gas network

Conversion into electricity

Hydrogen fueling stations

Underground gas storage Zuidwending: Hydrogen storage in salt caverns

From 2019: cable for surplus Danish wind energy

Green power from Germany

A solution for huge fluctuations between supply and demand
Hydrogen Investment Plan 1.0

New Energy Coalition
Becoming a Integrated Hydrogen Economy
The North: Perfect match

- The region is perfectly positioned and willing to develop an integrated green H2 economy, due to:
  - The large-scale existing and planned supply of renewable electricity (RES), including onshore and offshore wind as well as solar, as well as strong interconnections with larger wind-based areas in Denmark and Germany
  - The existing large-scale chemical industry already experienced in production and handling of H2
  - The existing gas transmission and large-scale underground storage infrastructure
The North: Perfect match

• The potential to scale-up and export green H2 to other EU regions by land and sea

• The ongoing decarbonization of mobility in urban areas

• The strong knowledge and industry-led innovation infrastructure. The political support at local and regional level, e.g. through the three northern provinces (Groningen, Drenthe and Friesland), also support at national level

• A region needs a business
HYDROGEN VALLEY
NORTHERN NETHERLANDS
ENERGY FOR EUROPE
HEAVENN

The consortium
• New Energy Coalition
• 30 entities from 7 EU countries (NL, D, DK, B, UK, ES and E)
• Parties from business: large, mid-sized and SME, associations, knowledge institutions, expert advisories, regional development institutions

Broad national and international support
• Over 60 parties from over 12 countries have given their support to the project via the means of a Letter of Support
• The project also can rely on broad political support covering the whole political spectrum – nationally and EU level
IS SUPPORTED BY:

PATRICK BROUNS
Regional Minister for Economic Affairs of the Province of Groningen

NIENKE HOMAN
Regional Minister for Climate and Energy of the Province of Groningen

TIJSE STELPSTRA
Regional Minister for Climate and Energy of the Province of Drenthe

HENK BRINK
Regional Minister for Economic Affairs and Transport of the Province of Drenthe

NIGEL HOLMES
CEO of the Scottish Hydrogen & Fuel Cell Association (SHFCA)

MANFRED PACHERNEGG & FRANZ STREMPFL
Managing directors of Energienetze Steiermark GmbH, on behalf of the member associations of the European Research Institute for Gas and Energy Innovation (BVCW, BGC, SVGW/VSG, KVGN and ÖVGW)
The first Hydrogen Valley of Europe

https://www.youtube.com/watch?v=L27dkYyg04g
Roll out to mass application

The energy transition requires new forms of infrastructure and intelligent use of existing networks. Gasunie wants to invest in new infrastructure for renewable gases such as hydrogen.

Hydrogen is a clean energy carrier: H₂ combustion yields only water vapour.

Moving towards 2030 and 2050 with hydrogen

1. The earth has warmed up by about 1 °C since 1850
2. If we don’t act, the global temperature will rise by another 4 °C by 2100
3. 20 April 2016
4. Paris Agreement
5. Global warming set at a maximum of 1.5°C. This requires CO₂-reductions in the Netherlands of:
   - 40-50% by 2030
   - 85-90% by 2050
6. Hydrogen as a fuel and as a raw material can help to achieve CO₂-reduction targets
7. Hydrogen pipeline
8. Linking hydrogen industries in Scotland and the Delta region
9. Pilot project hydrotown
10. Converting solar energy into hydrogen in Zuid-Westerveld
11. Wind turbine generating hydrogen
12. ISPT Hydrohub 1 MW test centre
13. Hydrogen refuelling station network, North of the Netherlands
14. G2E Next Hydrogen plant, including a hydrogen fuel station
15. 20-40 MW Electrolyser Green power into H₂, 100 MW in 2024
16. Element 1 Casablanca
17. ThysenKrupp power-to-gas pilot
18. Green Hydrogen value chain with Engie towards 1 MW electrolyser
19. Hydrogen storage in salt caverns
20. Magnum power station first turbine on hydrogen (4 x 500,000 households)
21. 100 MW Electrolyser
22. Ijmuiden
23. Wind farm, possible onshore electrolysis
24. H-visions
25. Large-scale switch to hydrogen for power stations and chemical processes. Capture and storage of CO₂
26. Further deployment H₂- and CO₂-network Zeeland
27. National hydrogen transport network
28. Hydrogen network links major industrial areas Eemshaven, Ijmuiden-Rotterdam, Chemelot, Zeeland and the Ruhr area
29. North Sea Wind Power Hub
30. An island where power from offshore wind farms is partially converted into hydrogen that is piped onshore
Hydrogen Investment Plan 2.0

THE NORTHERN NETHERLANDS HYDROGEN INVESTMENT AGENDA 2.0
THE NORTHERN NETHERLANDS HYDROGEN VALLEY AS BLUEPRINT FOR EUROPE
European Hydrogen Valley’s Platform
Mission Innovation Hydrogen Valley Platform

United Kingdom
- HyNet North West
  England
- BIG HIT Orkney Islands

Netherlands
- HEAVENN
- Hydrogen Delta
- H2 Proposition
  Zuid-Holland/Rotterdam
- Port of Amsterdam region

Germany
- H2Rivers
  H2Rhein-Neckar
- HyBayern
- Norddeutsches Reallabor
  efarm
- Hyways for Future

Austria
- WIVA P&G

France
- Zero Emission Valley
  Auvergne-Rhône-Alpes
- Normandy Hydrogen Deployment Plan
- Hydrogen Territory Bourgogne Franche Comté
  CEOG, French Gaiana

Spain
- Green Hysland
  Mallorca
- Basque Hydrogen Corridor

Italy
- South Tyrolean Hydrogen Valley

Oman
- Green Hydrogen & Chemicals Oman

Japan
- FH2R Fukushima

China
- Pearl River Delta
  (Foshan)
- Beijing-Zhangjiakou
- Ruqiao

USA
- ACES, Utah
- Port of Los Angeles
  Shore to Store Project, California

Chile
- Hydrogen Facility Initiative

Thailand
- Phi Suea House

Australia
- Neon Crystal Brook
  Energy Park
- Eyre Peninsula
  Gateway

https://www.h2v.eu/
Types of Hydrogen Valley’s

Archetype 1: Local, small-scale & mobility-focused

Archetype 2: Local, medium-scale & industry-focused

Archetype 3: Larger-scale, international and export-focused
Hydrogen Valley's perspective

"More of the same"
Hydrogen Valleys can help develop first H₂ projects in new markets and geographies

Connected Valleys
Connecting existing Hydrogen Valleys (e.g., NL and DE) can enable the market

Towards a commodity
Pioneering more mature and innovative de-risking and financing models

A green hydrogen future
Raising awareness and social acceptance at local and regional level
Connect Hydrogen Valley’s

- Estonian H2V
- Blue Danube
- Zero Emission Valley
- H2V
- BIGHIT
- HEAVENN
- GREEN FLAMINGO
- GREEN HYSLAND
- HYWAYS FOR FUTURE
- DENMARK
- Energy Coalition
Join us in Heavenn and Hydrogen Valley’s

Further information
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