Green Hydrogen in the Northern Netherlands

*Power to the molecules*

Harold Veldkamp
New Energy Coalition
Situation in the Northern Netherlands
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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!

Green Hydrogen Economy in the Northern Netherlands
Broader geographic scoping
Priorities

Infrastructure
- Harbours!!
- Energy
- Transport

Industry
- Mobility
- Built environment
- Net balancing

Human Capital & Innovation
The Region as 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

From 2019: cable for surplus Danish wind energy
Green power from Germany

Underground gas storage Zuidwending: Hydrogen storage in salt caverns
Conversion into electricity
Hydrogen fueling stations

Houses
Transport
Industry

A solution for huge fluctuations between supply and demand

Co-financed by the European Union
energystock, gasunie, new energy
Hydrogen Investment Plan
HEAVENN

- H2 Investment agenda
- Whole novel Value chain: Sourcing, Production/Conversion, Logistics, Distribution, Transportation, Use in Mobility, Industry, Energy Applications….
- Infrastructure (spectrum small to large)
- Innovation
- Knowledge & Education
- Societal aspects
- Policy development
- Financing
• 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
HEAVENN

• 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), substantiated by the development of a “Green H2 Economy” roadmap in 2017.
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The consortium
• Stichting Energy Valley, part of New Energy Coalition

• 31 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:

**BILL ELRIK & NICO BOUKAMP**
Executive Director & Technical Programme Manager of the California Fuel Cell Partnership & Frontier Energy California USA

**WILLIAM VAN NIEKERK**
Chairman of Dutch Hydrogen & Fuel Cell Association (NVBA)

**ERIC WIEBES**
Minister of Economic Affairs and Climate Policy of the Ministry of Economic Affairs on behalf of the Dutch Government

**MAGNUS ENGELBREKTSSON**
Executive Secretary of CPMR North Sea Commission

**THOMAS JACOB**
Head International Projects Senatkanzlei Hamburg Germany

**JOAN JOSEP ESCOBAR**
Head Division Energy Management of the Catalan Energy Institute Catalonia

**H. L. DE BOER**
Chairman of VNO-NCW Nederland (Dutch Confederation of Industry and Employers)

**TURI FIORITO**
Chairman of the European Federation of Inland Ports (EFIP)

**JAN BOEVE**
Director of Transport and Logistics Netherlands (TLN)

**FRIES HEINIS**
Director General of Bouwend Nederland (Dutch Construction and Infrastructure Federation)

**EDDY VEENSTRA**
CEO of RENDO

**J.F.M. AARTSEN**
Chairman of the University Medical Center Groningen (UMCG)

**GERRIT SPIJKSMA**
Director of Obuzz (Dutch public transport organisation)

**JONATHAN PALACIOS-AVILA**
CEO of StratoFuel California USA (hydrogen station developer, producer and retailer of renewable hydrogen)

**EIJI OHIRA**
Director General of the New Energy and Industrial Technology Development Organisation (NEDO) Japan

**JAMES BARNEY CROCKETT**
President of HYER

**JUSTINE GILLILAND**
CEO of Taranaki Trust New Zealand (regional development agency)

**LUUK BLOM**
SG Benelux Union

**B. I. KAN ESTEREN**
President of the Economic Board Northern Netherlands

**HELMANN WESSELS**
Mayor of the City Papenburg Germany

**FAIZA OULASHEN**
Campaign leader Climate & Energy of Greenpeace Netherlands

**JACO VANODEP**
Director of the European Federation of Inland Ports

**W. DE VREEZE**
Director of Aedes (association of social housing agencies)

**Pierre MIDROUZ**
Managing Director of Renault Vehicle Innovation

**J. PRINS**
General Director of Sent Waingie (truck dealer for DAF, GINAF and TATRA)

**JAN-JAAR AUÉ**
Director of the Energy Expertise Centre Hanzehogeschool Groningen

**STEVEN HOLTHAUSEN**
Holthausen (Dutch company in hydrogen technology, safety solutions and energy)

**FRANCOIS HEMMERLIN**
Business Development Manager Hydrogen of Holthausen (manufacturer of high-pressure technology)

**ANDRÉ BEUKERS**
CEO of E-trucks Europe (sustainable transport solutions)

**ESTHER DE LANDE**
Member of the European Parliament (MEP) for the CDA/European People’s Party (EPP)

**LAMBERT VAN NISTELOOIJ**
Member of the European Parliament (MEP) for CDA/European People’s Party (EPP)

**WARD KENNEDY**
Member of the Flemish Parliament for CD+V

**HARRY VAN DER MOLEN**
Member of the Dutch Parliament for the CDA

**PETER VAN DALKEN**
Member of the European Parliament (MEP) for the ChristenUnie/Conservative and Reformists Group (ECR)

**BAS BELDER**
Member of the European Parliament (MEP) for the SGP/Conservative and Reformists Group (ECR)

**SOPHY IN'T VELD**
Member of the European Parliament (MEP) for the D66/Alliance of Liberals and Democrats for Europe (ALDE)

**JAN HUIJEMA**
Member of the European Parliament (MEP) for the D66/Alliance of Liberals and Democrats for Europe (ALDE)

**ARNO RUTTER**
Member of the Dutch Parliament for the VVD

**BAS EICKHOUT**
Member of the European Parliament (MEP) for the GroenLinks/Greens/EFA

**ISABELLA DIKS**
Member of the Dutch Parliament for GroenLinks

**MARTA CASTÓN MENAR**
Regional Minister for Economy, Industry and Employment, Aragon, Spain

**EDWARD DOORTEN**
Founder of GreenPlanet (state-of-the-art fuel cell for traditional and sustainable fuels)

**SØREN JACOBSEN**
Managing Director of BioMCN (one of Europe’s largest methanol producers)

**ANNIE SCHREIJER-PIERIK**
Member of the European Parliament (MEP) for the CDA/European People’s Party (EPP)

**WIM VAN DE CAMP**
Member of the European Parliament (MEP) for the CDA/European People’s Party (EPP)

**AGNES MULDER**
Member of the Dutch Parliament for the CDA

**CARLA DÍK-FABER**
Member of the Dutch Parliament for ChristenUnie

**CHRIS STOFFER**
Member of the Dutch Parliament for the SGP

**GERBEN-JAN GERBRAND**
Member of the European Parliament (MEP) for the D66/Alliance of Liberals and Democrats for Europe (ALDE)

**CAROLINE NACATEGA**
Member of the European Parliament (MEP) for the VVD/Alliance of Liberals and Democrats for Europe (ALDE)

**ERIK ZIENG**
Member of the Dutch Parliament for the VVD

**AUKJE DE VRİES**
Member of the Dutch Parliament for GroenLinks

**WIM-JAN RENKEMA**
Member of the Dutch Parliament for GroenLinks

**TOM VAN DER LEE**
Member of the Dutch Parliament for GroenLinks

**WILKO MOL**
Director of CV Bureau Groningen/Drenthe (Public transport organisation)
IS SUPPORTED BY:

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

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

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

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

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

MANFRED PACHERNEGG & FRANZ STREMPFL
Managing directors of Energienetz Steiermark GmbH, on behalf of the member associations of the European Research Institute for Gas and Energy Innovation (DVGW, DGC, SVGW/VSG, KVGN and OVGW)
Industrial feedstock

- Supply of green H2 to methanol production process, full output 20 MW → c. 2,800 tpy of H2

- Supply of green H2 to produce renewable “drop-in” e-fuels for transport applications, full output 40 MW → c. 4,460 tpy of H2

- Total initial industrial H2 demand estimated at 2,800 tpy (going up up to > 7,300 tpy by 2022)

- Minimum of 1.500 tpy
Heat & Power

- Domestic heat (Hoogeveen and Groningen): demand c. 150 tpy
- Industrial heat (Emmtec, Emmen): estimated 150 tpy initially, going up by 3% v/v annually during project period
- Back-up power (Bytesnet deployment): Datacenter 100kW fuel cell-based back-up power supply based on green H2 consumption of c. 5 tpy H2
- On-shore auxiliary power for inland boats/barges (Delfzijl): estimated green H2 consumption of 10 tpy H2
- Total heat & power H2 demand: initially 315 tpy, (expected to increase to >500 tpy)
- Minimum 300 tpy
Mobility

- 10 buses in Emmen: c. 90 tpy (plus 20 additional buses in Groningen externally funded but facilitated by the deployment of two HRS to supply)
- Passenger and light duty: 105 FC passenger cars and 10 vans respectively. In total an estimated H2 consumption of c. 65 tpy
- Heavy duty: 4 refuse trucks and 8 HDVs: approx. c. 105 tpy
- Maritime/inland barges: c. 80 tpy for one fuel cell-powered salt barge
- Total mobility H2 demand: a minimum of 340 tpy with new applications directly deployed by HEAVENN; estimated 680 tpy taking relevant developments into account.
- **Minimum: 300 tpy**
Storage & Infrastructure

- Deployment of underground gas storage system at HyStock in Veendam
- Repurposing of existing pipelines e.g. realisation of the polymer-based pipeline connections on the Delfzijl Chemical complex.
- Deployment of new H2 pipeline between GZI site and the Emmtec Industry Park
- Distribution of H2 across the region via virtual gas pipelines i.e. trailers
- Studies & preparatory work for the deployment of repurposed and new H2 pipelines
Roll out to mass application
Join us!

Harold Veldkamp
New Energy Coalition
+31 6 52840393
h.veldkamp@newenergycoalition.org