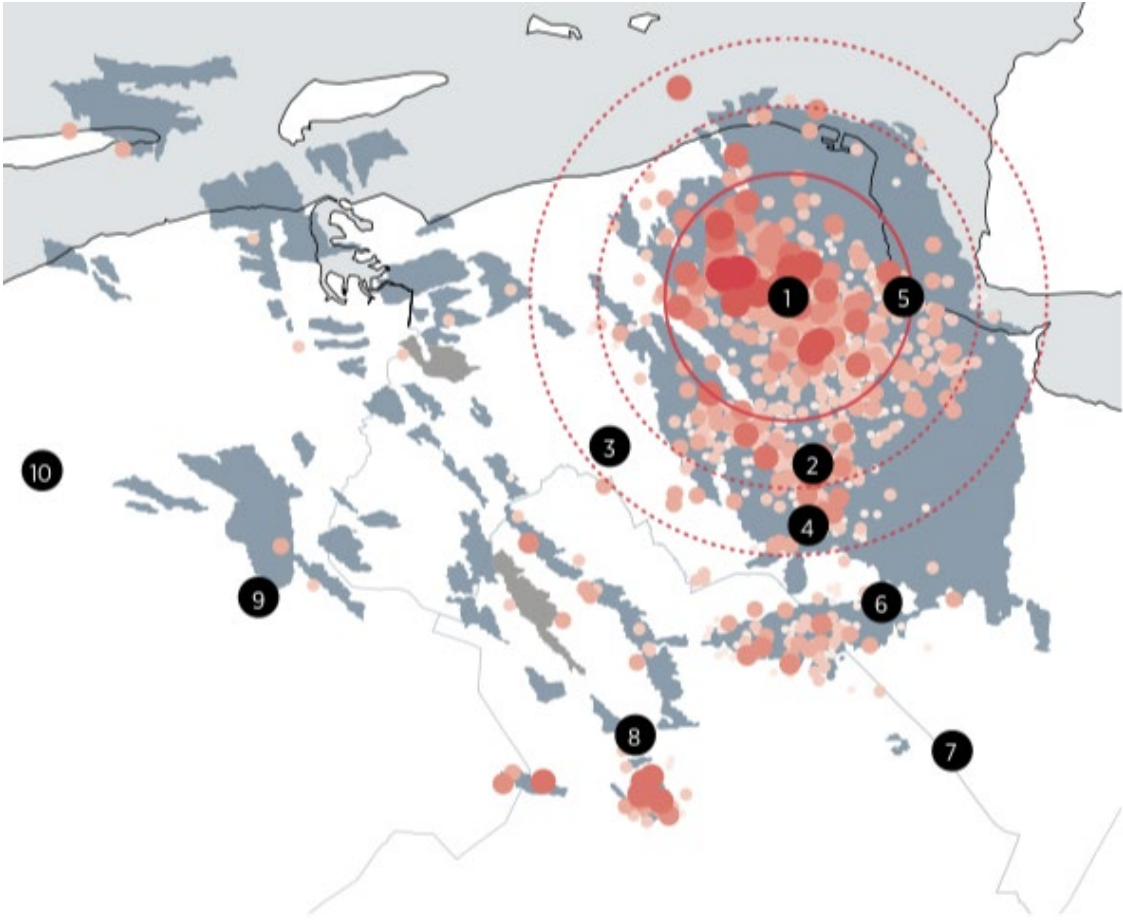


Green Hydrogen in the Northern Netherlands

Power to the molecules

Harold Veldkamp
New Energy Coalition

Situation in the Northern Netherlands



Situation in the Northern Netherlands



Gas production and cumulative economic impact - **baseline**

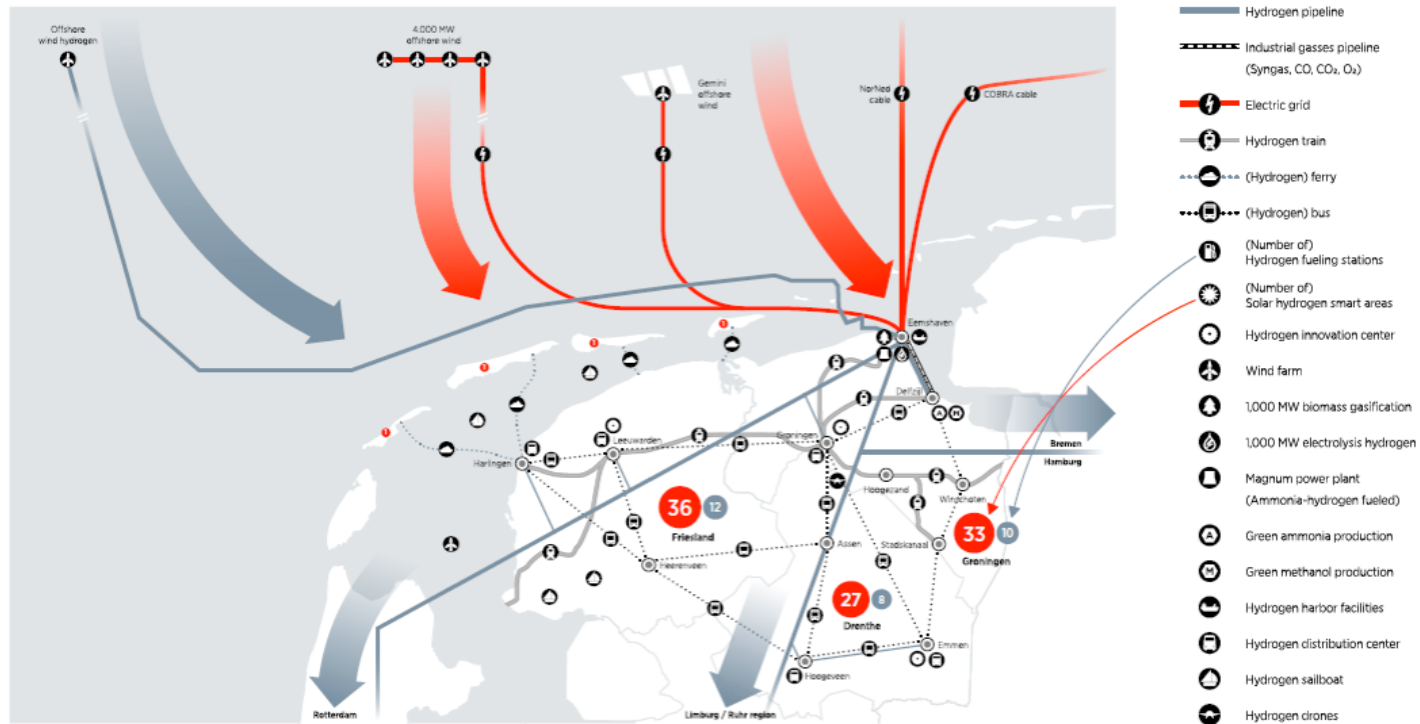


We have a plan

**Green Hydrogen
Economy in the
Northern Netherlands**

A region needs a business H2 fits as a glove!

Green Hydrogen Economy in the Northern Netherlands



Green Hydrogen Economy In the Northern Netherlands

Broader geographic scoping



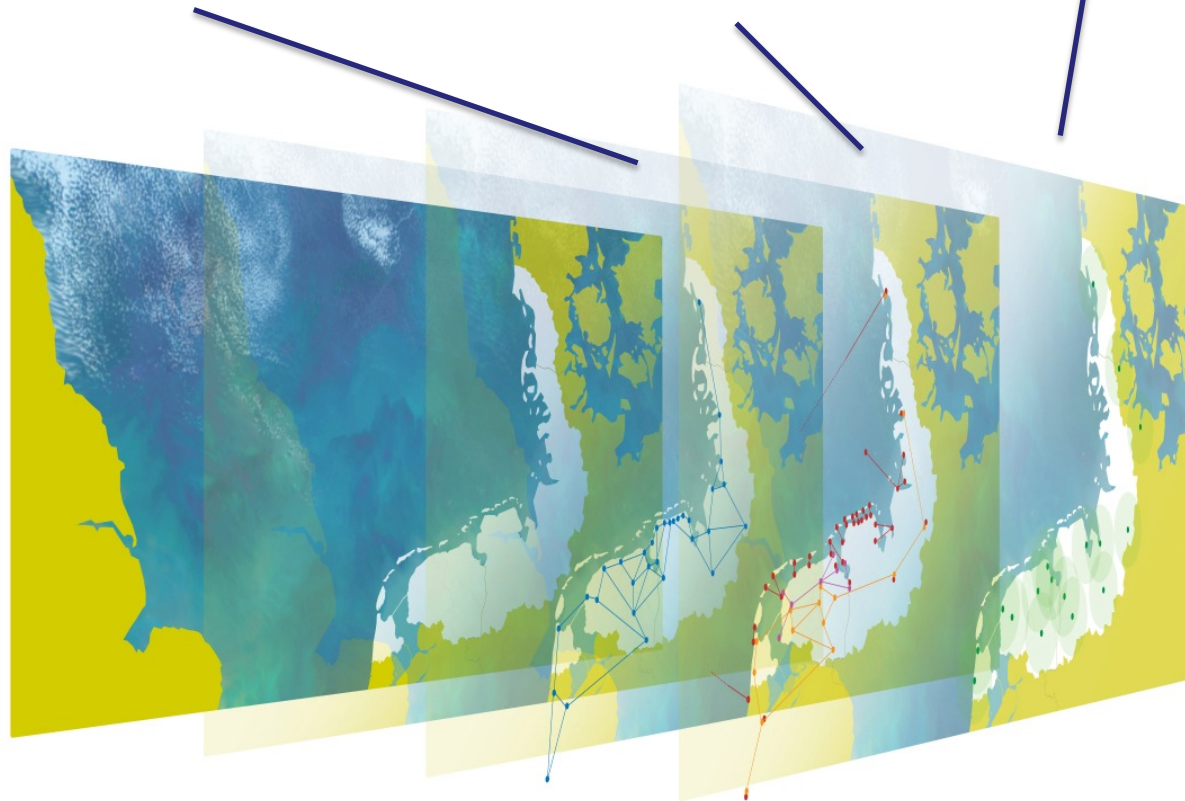
Priorities

Infrastructure

- Harbours!!
- Energy
- Transport

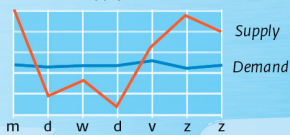
- Industry
- Mobility
- Built environment
- Net balancing

Human Capital & Innovation

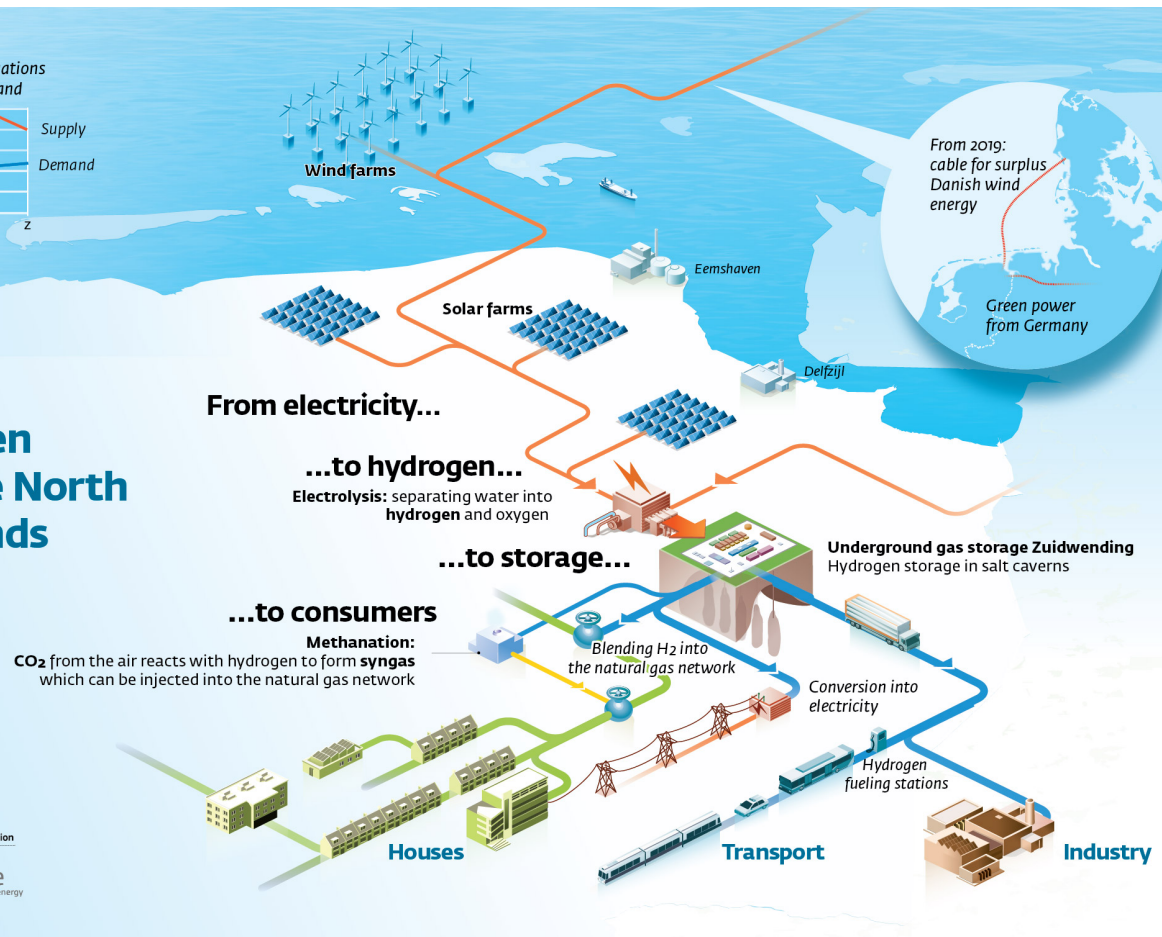


The Region as Hydrogen Hub

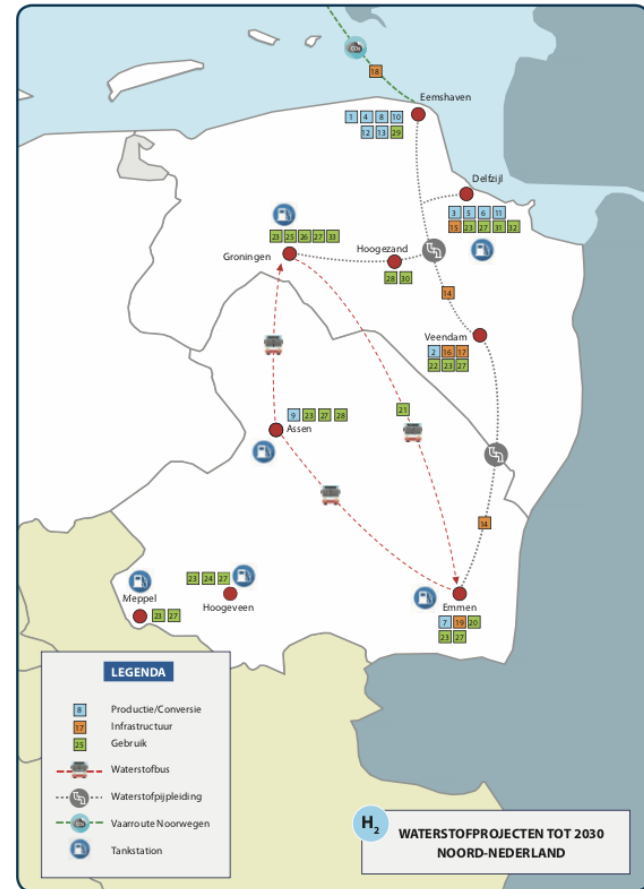
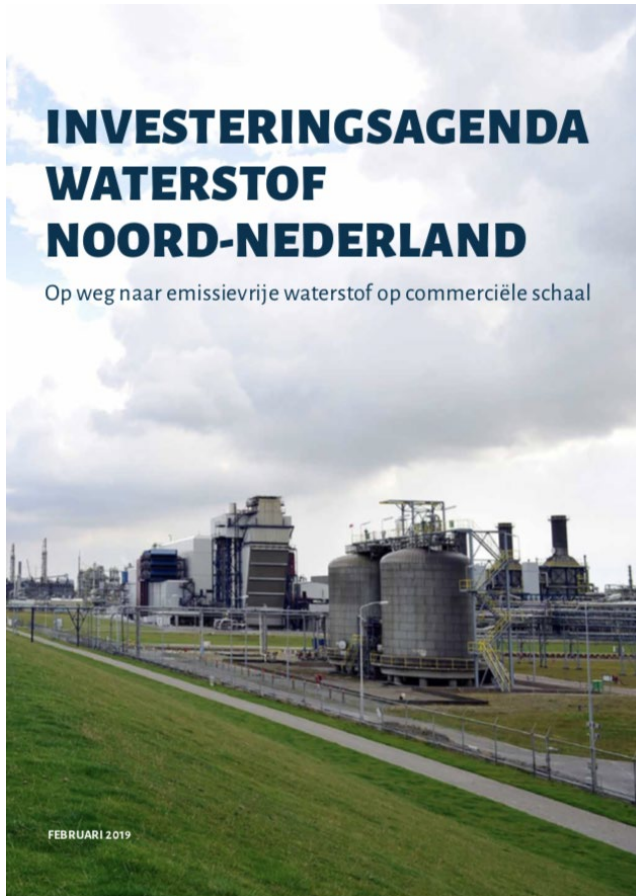
A solution for huge fluctuations between supply and demand



A hydrogen hub in the North Netherlands



Hydrogen Investment Plan



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- 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

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- **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

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- 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

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New
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Coalition



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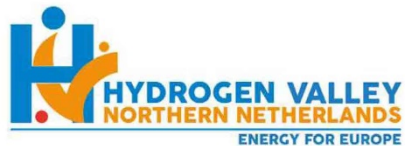
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NIGEL HOLMES
CEO of the Scottish Hydrogen & Fuel Cell
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**MANFRED PACHERNEGG &
FRANZ STREMPFL**
Managing directors of Energienetze
Steiermark GmbH, on behalf of the
member associations of the European
Research Institute for Gas and Energy
Innovation (DVGW, DGC, SVGW/VSG, KVGW
and ÖVGW)

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

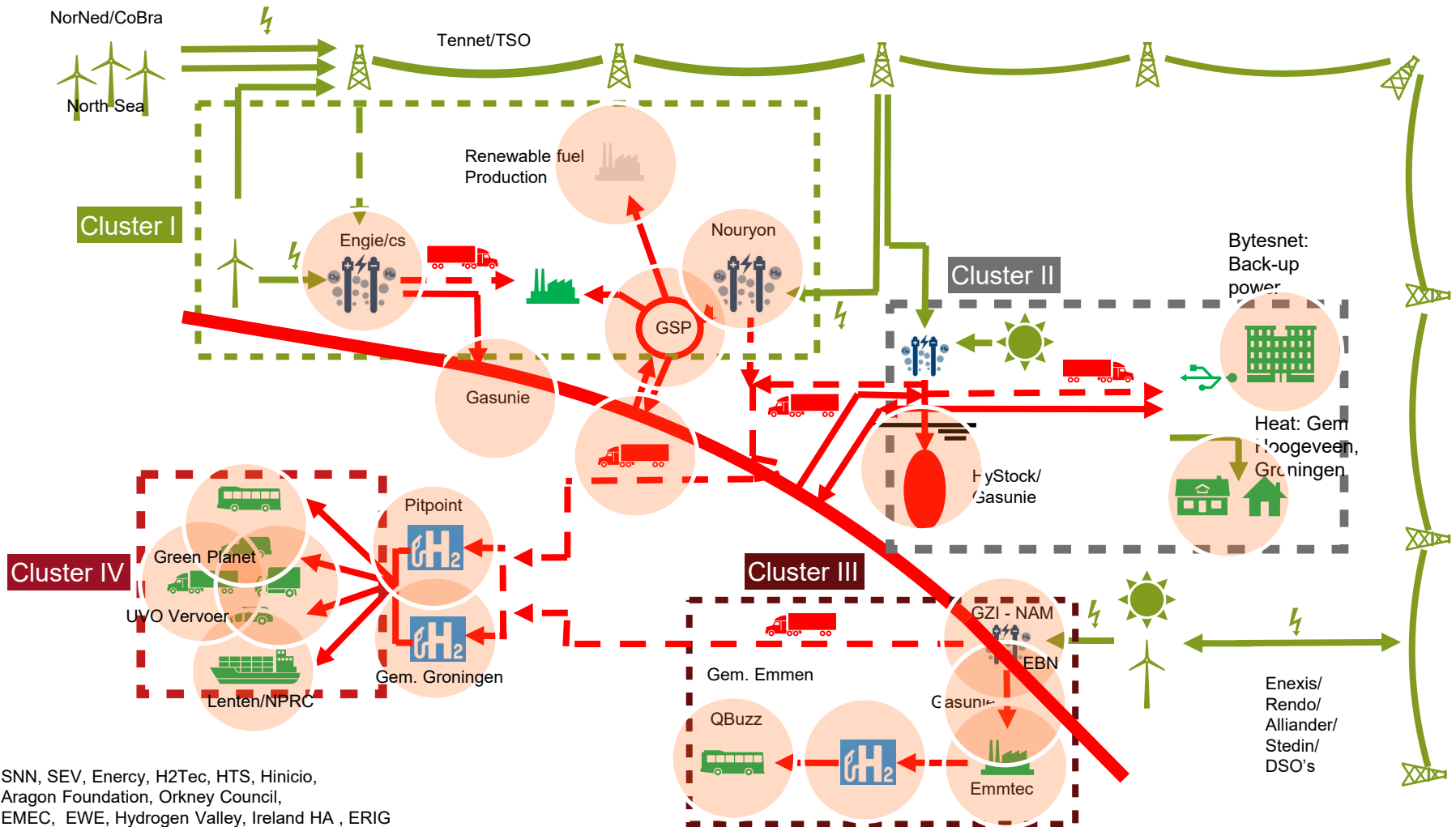
Mobility

- 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

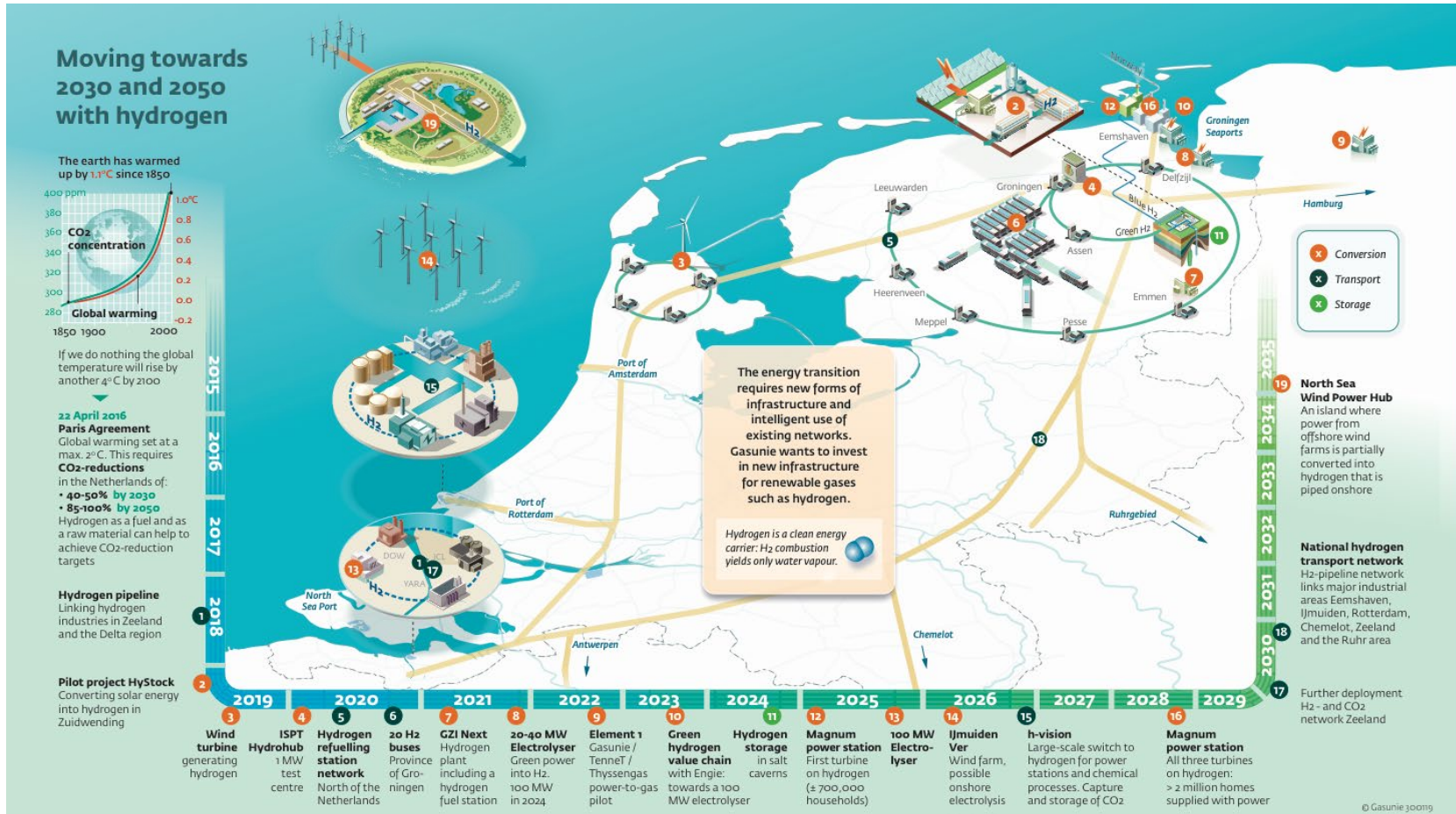
- Deployment of underground gas storage system at HyStock in Veendam
- Repurposing of existing pipelines e.g. realisation of the polymer-based pipeline connections on the Delfzijl Chemical complex.
- Deployment of new H2 pipeline between GZI site and the Emmtec Industry Park
- Distribution of H2 across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

HEAVENN



SNN, SEV, Energy, H2Tec, HTS, Hinicio, Aragon Foundation, Orkney Council, EMEC, EWE, Hydrogen Valley, Ireland HA, ERIG

Roll out to mass application



Join us!



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