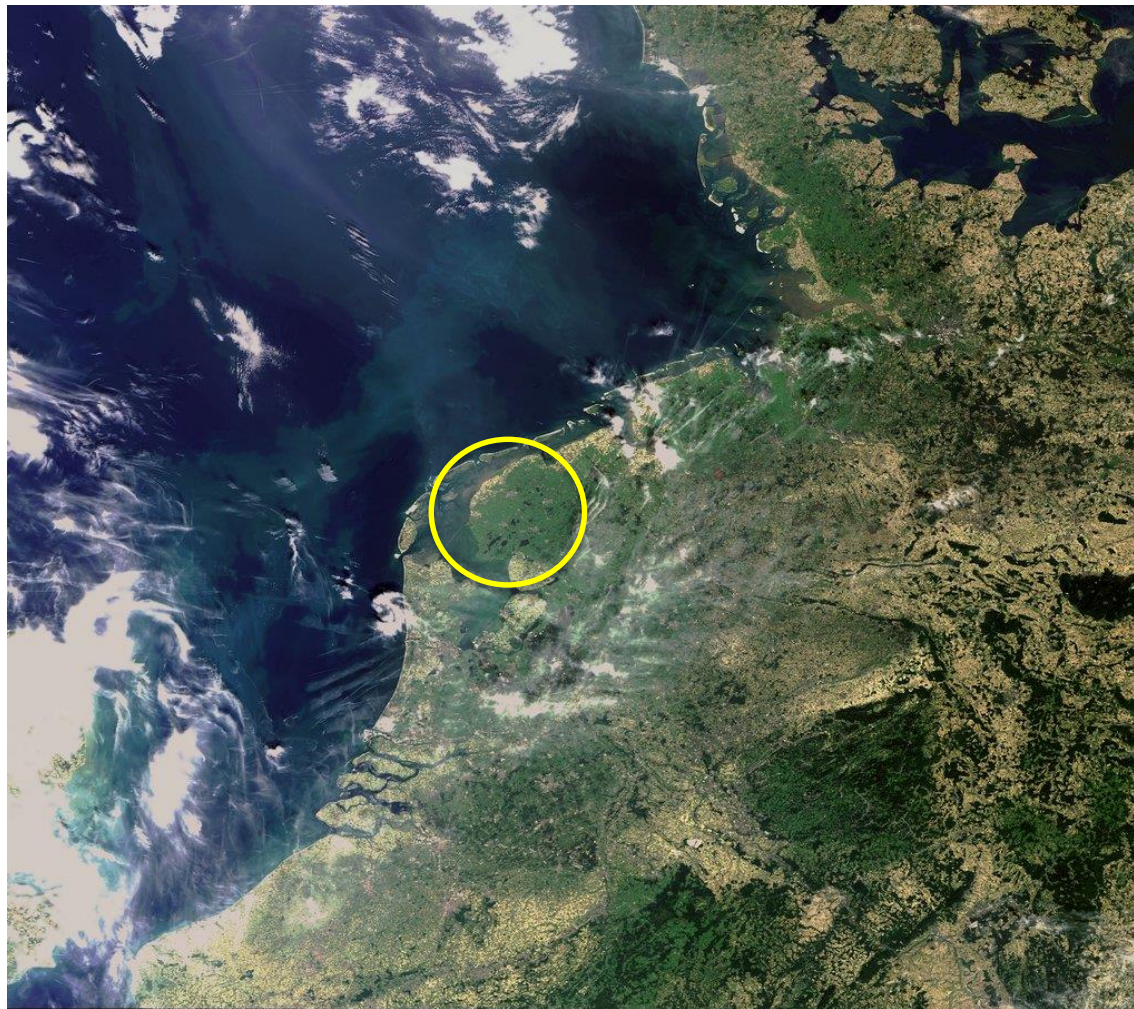


Green Hydrogen in the Northern Netherlands

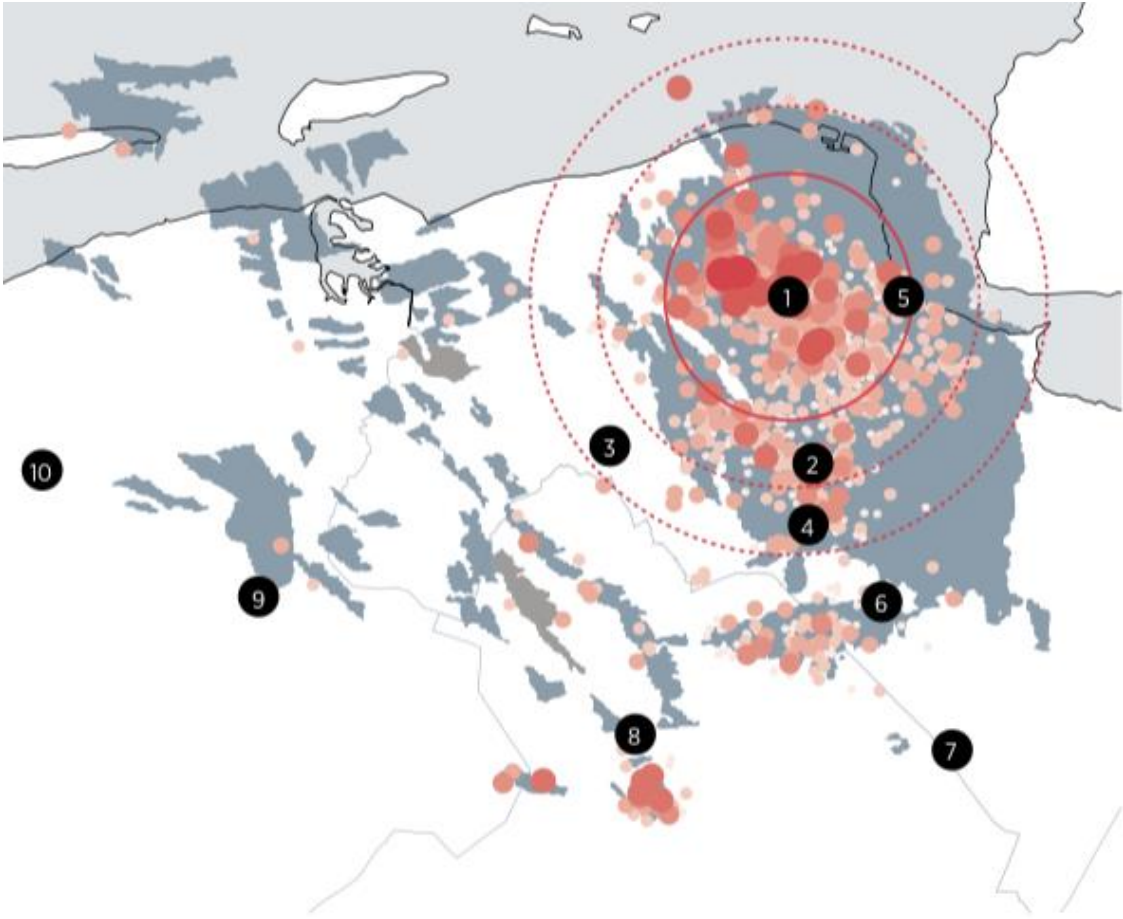
Power to the molecules

Patrick Cnubben
New Energy Coalition

Where are we located?



Situation in the Northern Netherlands



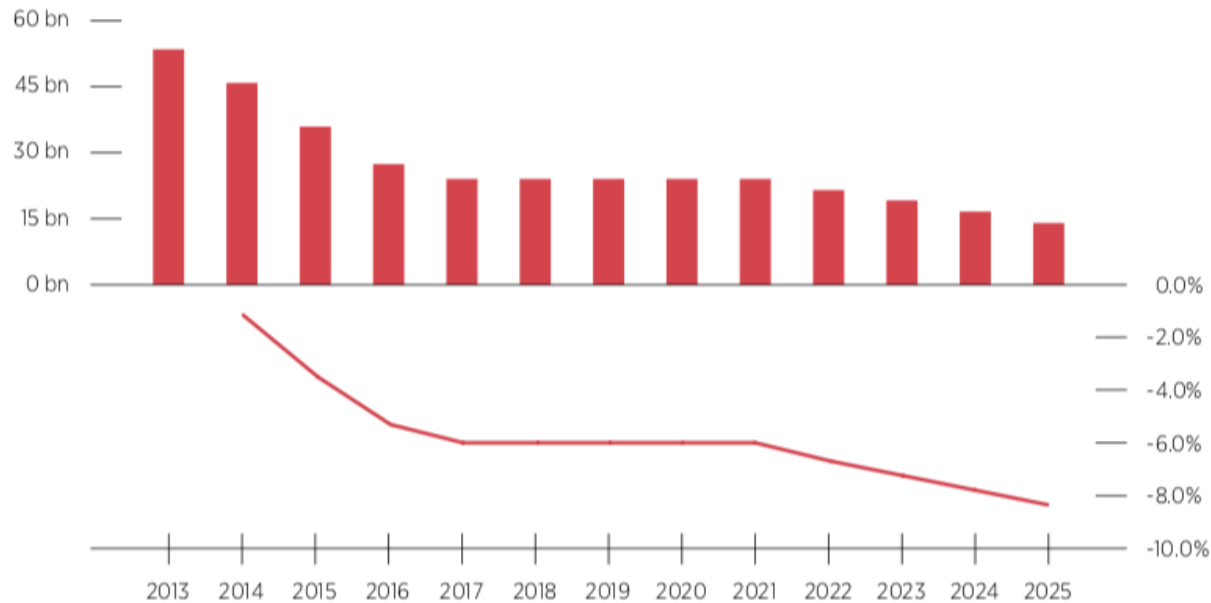
We have a plan

**Green Hydrogen
Economy in the
Northern Netherlands**

Situation in the Northern Netherlands



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

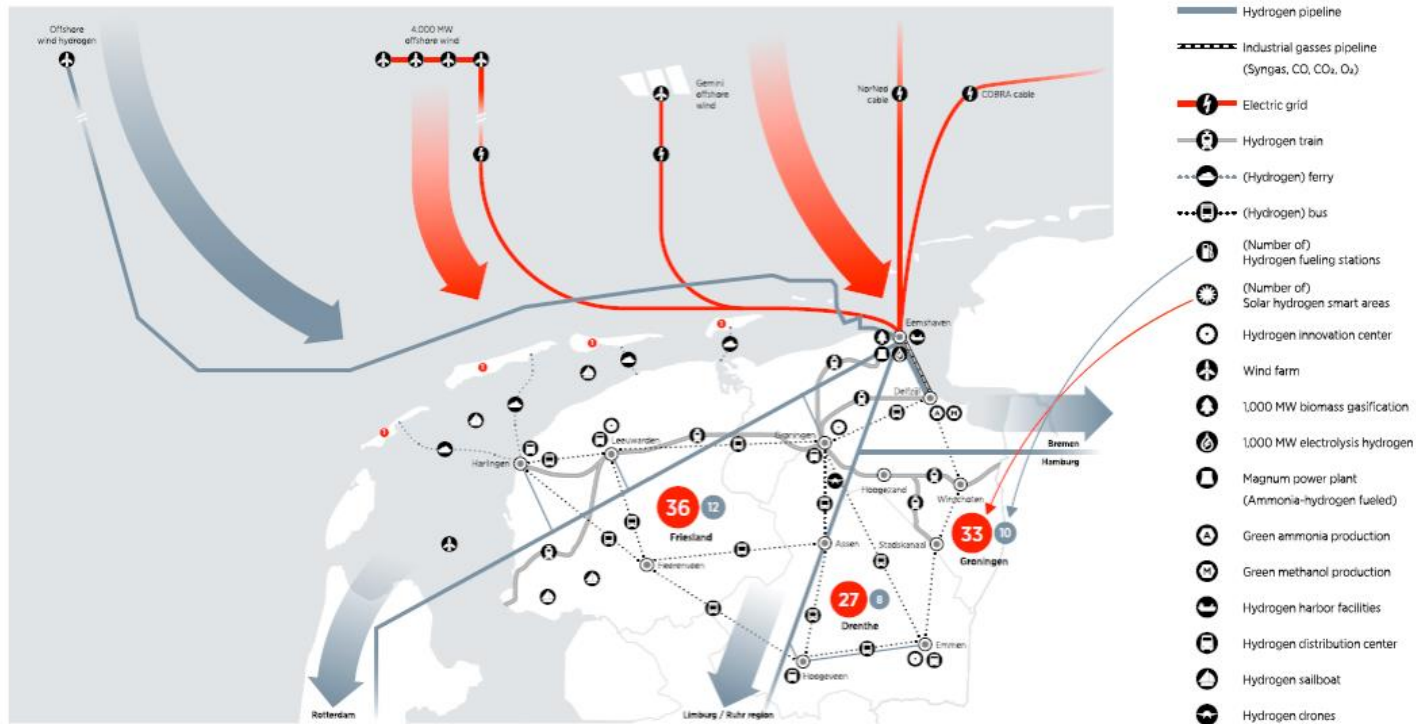


■ Historic gas production + base scenario (in bn m³, left)

— Cumulative impact on economic growth in Northern Netherlands (in %, right)

A region needs a business H2 fits as a glove!

Green Hydrogen Economy in the Northern Netherlands



Green Hydrogen Economy In the Northern Netherlands

Priorities

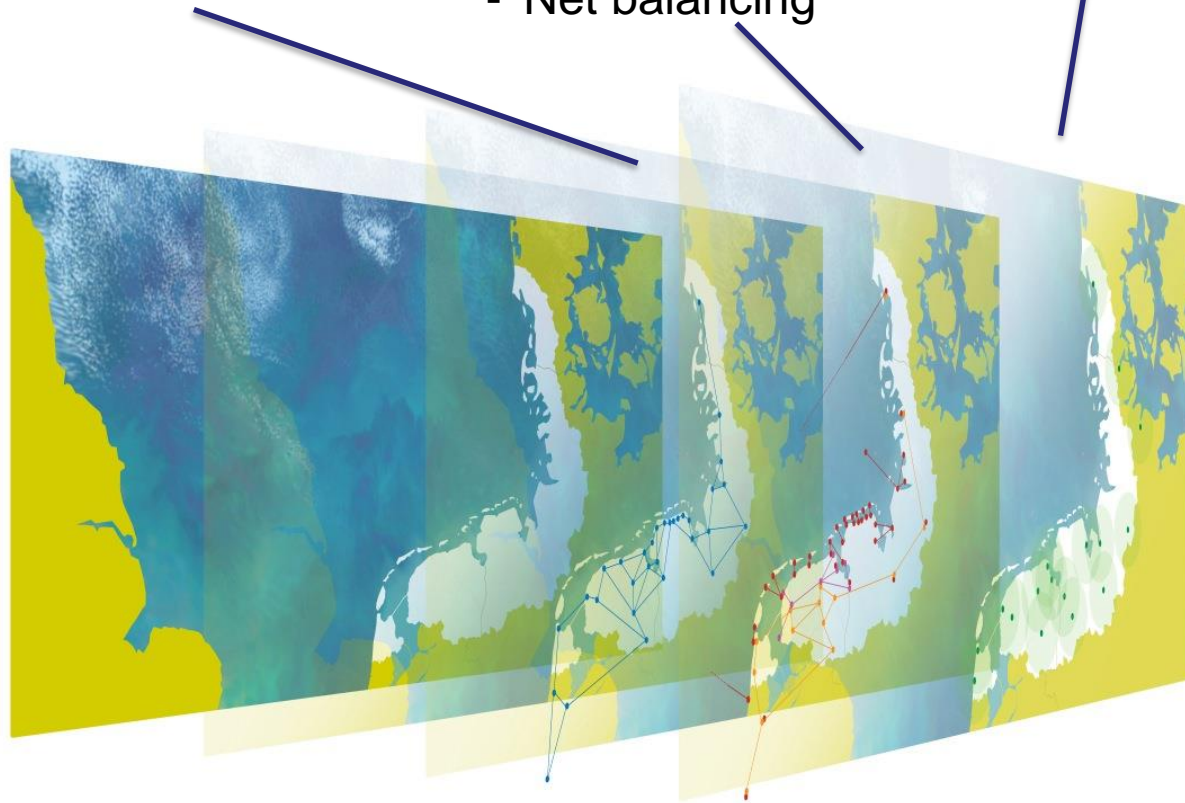
Infrastructure

- Harbours!!
- Energy
- Transport

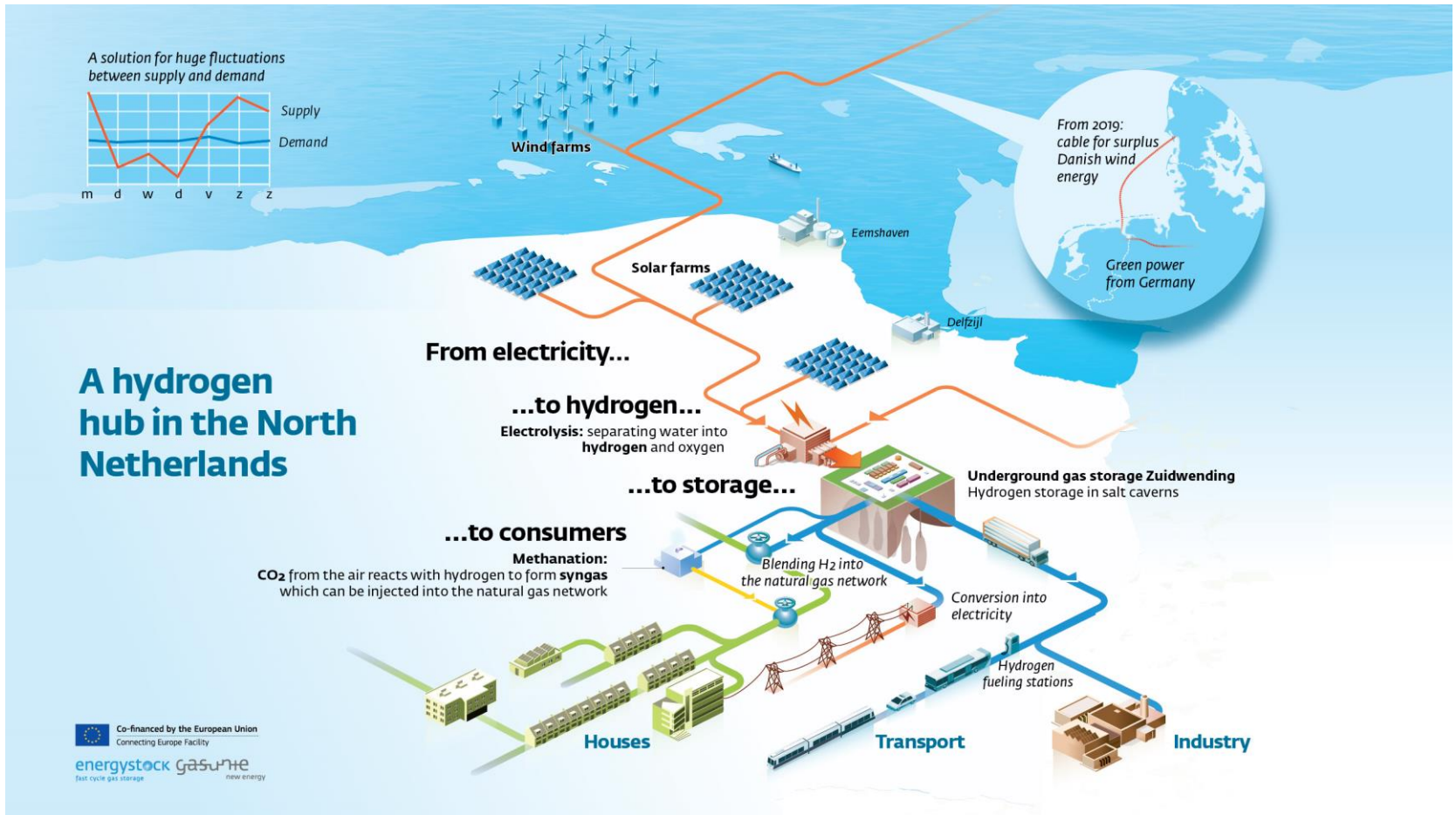
Sectors

- Industry
- Mobility
- Built environment
- Net balancing

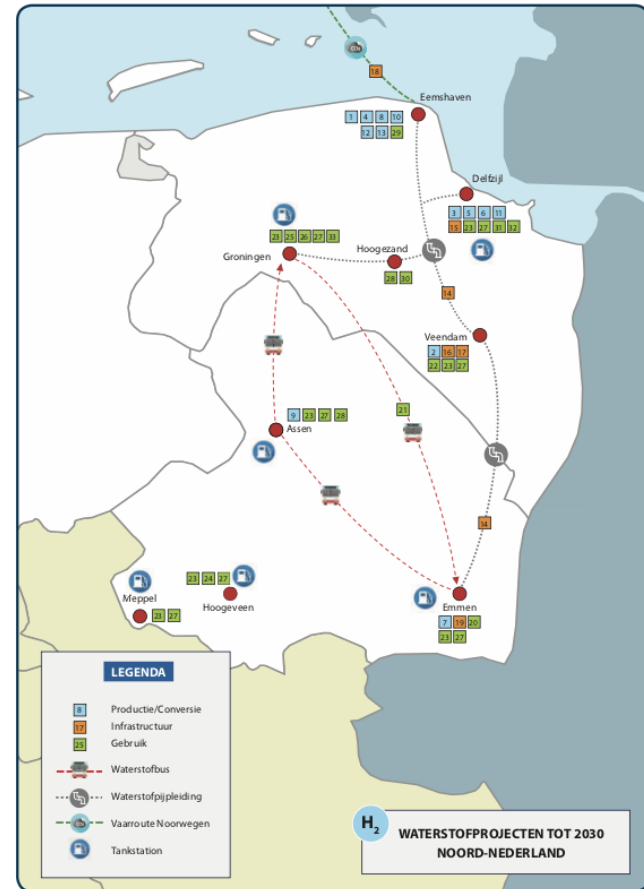
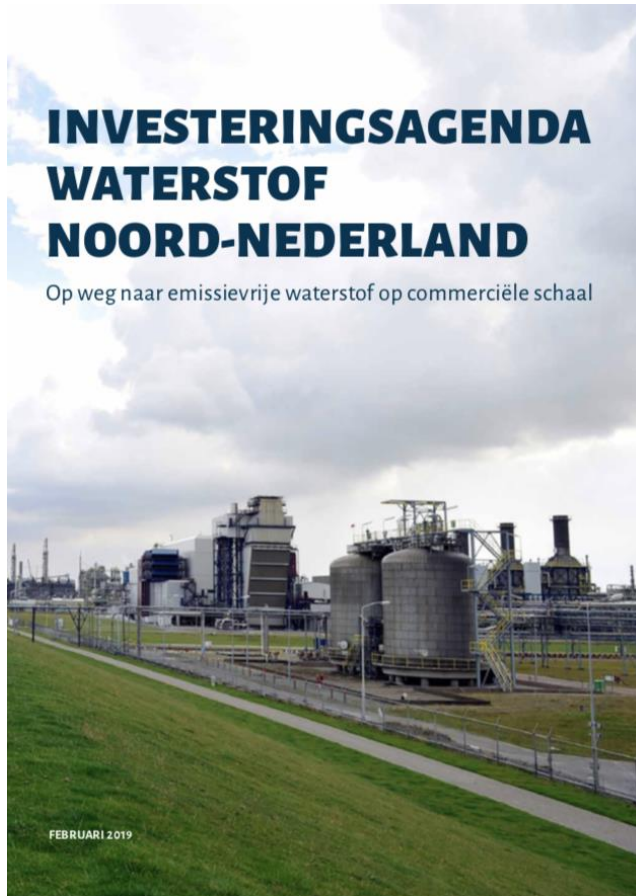
Human Capital & Innovation



The Region as Hydrogen Hub



Hydrogen Investment Plan

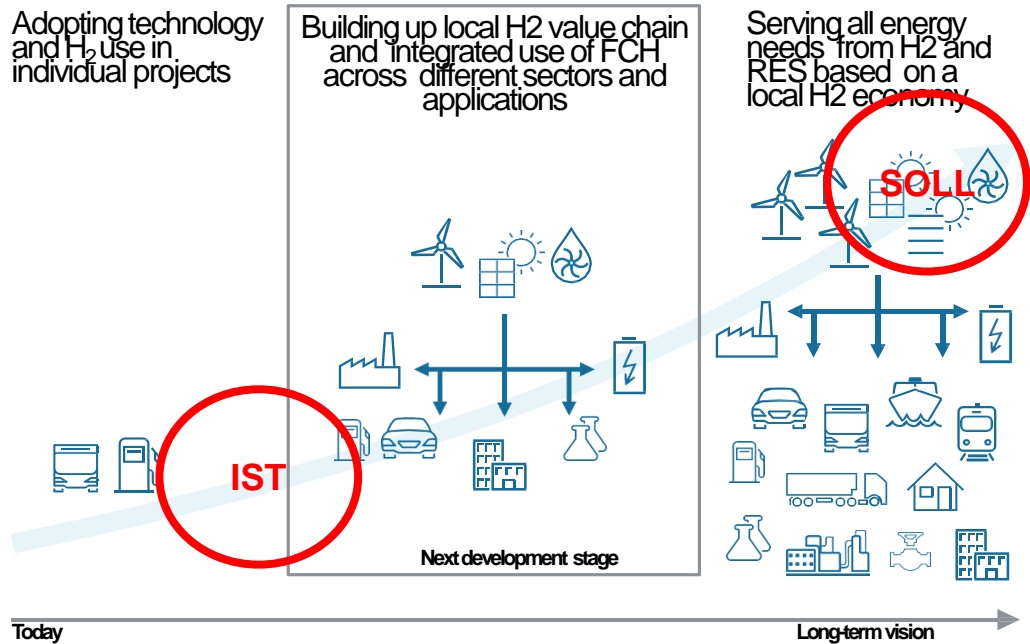


Becoming a Integrated Hydrogen Economy

Adopting technology and H₂ use in individual projects

Building up local H₂ value chain and integrated use of FCH across different sectors and applications

Serving all energy needs from H₂ and RES based on a local H₂ economy



- By linking individual projects and developing local H₂ infrastructure, establishing H₂ Valleys represents the next development stage towards a local H₂ economy in the long term
- H₂ Valleys should establish local H₂ nuclei or from which further roll-out and uptake of local H₂ use can be started
- Implementing H₂ Valleys should be part of a clear local strategy to start a long-term green energy transition and be backed up by respective political commitment

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), substantiated by the development of a “Green H2 Economy” roadmap in 2017.

MOVIE

- <https://newenergycoalition.org>

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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
Energy
Coalition



IS SUPPORTED BY:



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 Executive Director & Technical Programme Manager of the California Fuel Cell Partnership & Frontier Energy California USA



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J. PRINS
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NIENKE HOMAN

Regional Minister for Climate and Energy
of the Province of Groningen



TJISSE STELPSTRA

Regional Minister for Climate and Energy
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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 (DVGW, DCC, SVGW/VSG, KVG
and ÖVGW)

Industrial feedstock

- Supply of green H2 to methanol production process, full output 20 MW
- Supply of green H2 to produce renewable “drop-in” e-fuels for transport applications, full output 40 MW
- Total initial industrial H2 demand estimated going up up to > approx 7.000 tpy by 2022

Heat & Power

- Domestic heat (Hoogeveen and Groningen)
- Industrial heat (Emmtec, Emmen)
- Back-up power datacenter 100kW fuel cell-based back-up power supply based on green H2 (Groningen)
- On-shore auxiliary power for inland boats/barges (Delfzijl)
- Total heat & power H2 demand: expected to increase to >500 tpy

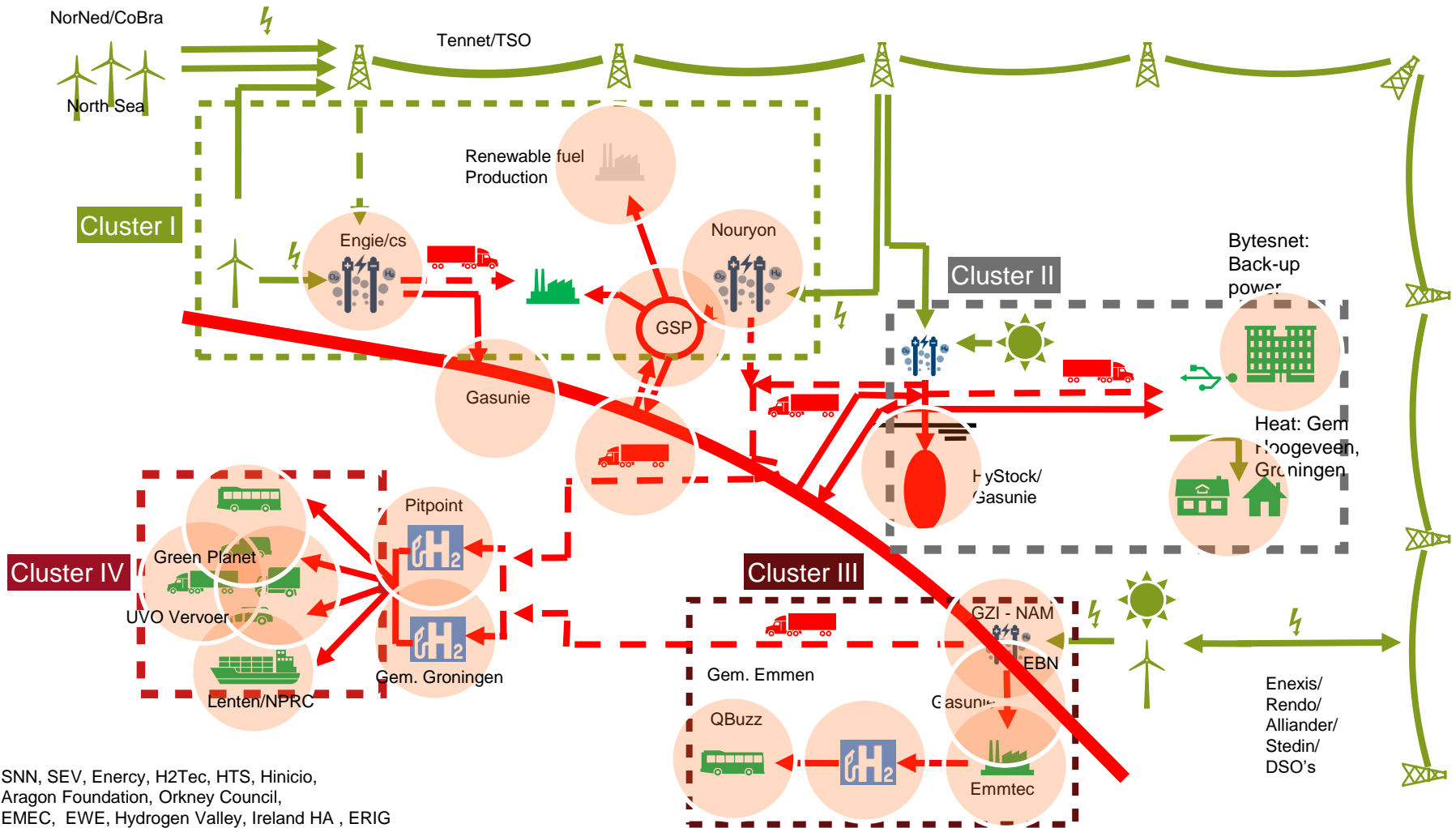
Mobility

- 10 FC buses in Emmen and 20 FC buses in Groningen
- passenger and light duty : 105 FC passenger cars and 10 vans respectively
- heavy duty : 4 special trucks and 8 HDVs
- maritime/inland barge
- Total mobility H2 demand: estimated 680 tpy

Storage & Infrastructure

- Deployment of underground gas storage system
- 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

20+ H2 busses

New
Energy
Coalition



 ov bureau groningen drenthe

Qbuzz

More wheels!

New
Energy
Coalition

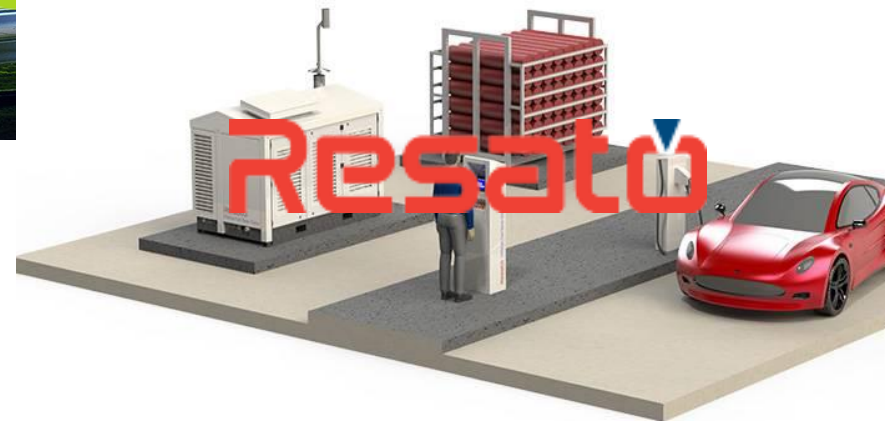


Value chain solutions

New
Energy
Coalition

ov bureau groningen drenthe

Qbuzz



Equipment



Built environment

**MET
VERENIGDE
KRACHT,**



Fase 1: **Nijstad Oost**
100 woningen



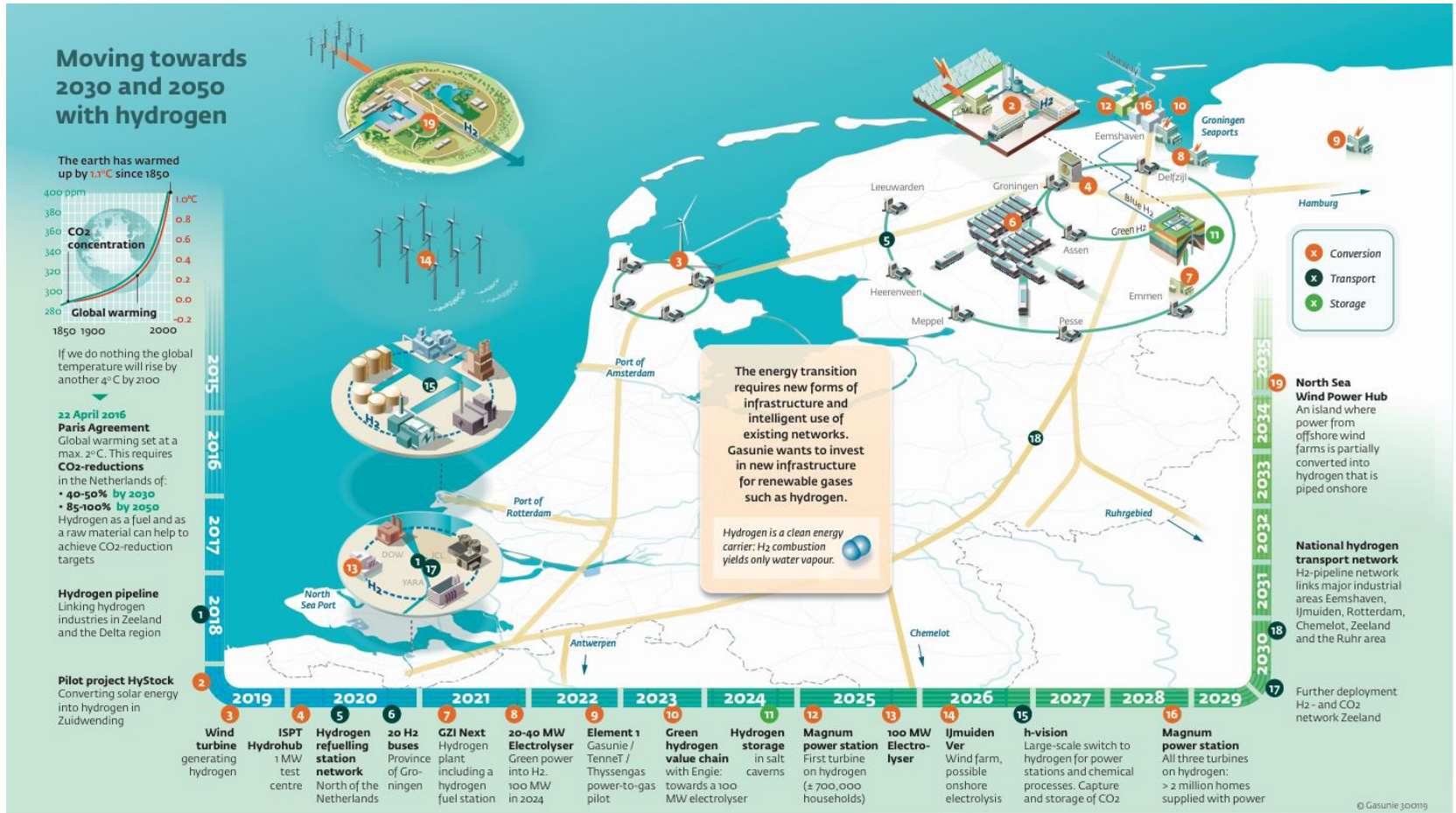
Fase 2: **Erflanden**
1100 woningen

**NAAR EEN
VERANTWOORDE
TOEKOMST**



Fase 3: **Centrale Ten Arlo**
H₂ productie met lokaal
opgewekte zonne energie

Roll out to mass application



Join us in Heavenn!



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