

# Hydrogen and HEAVENN

*Power to the molecules*

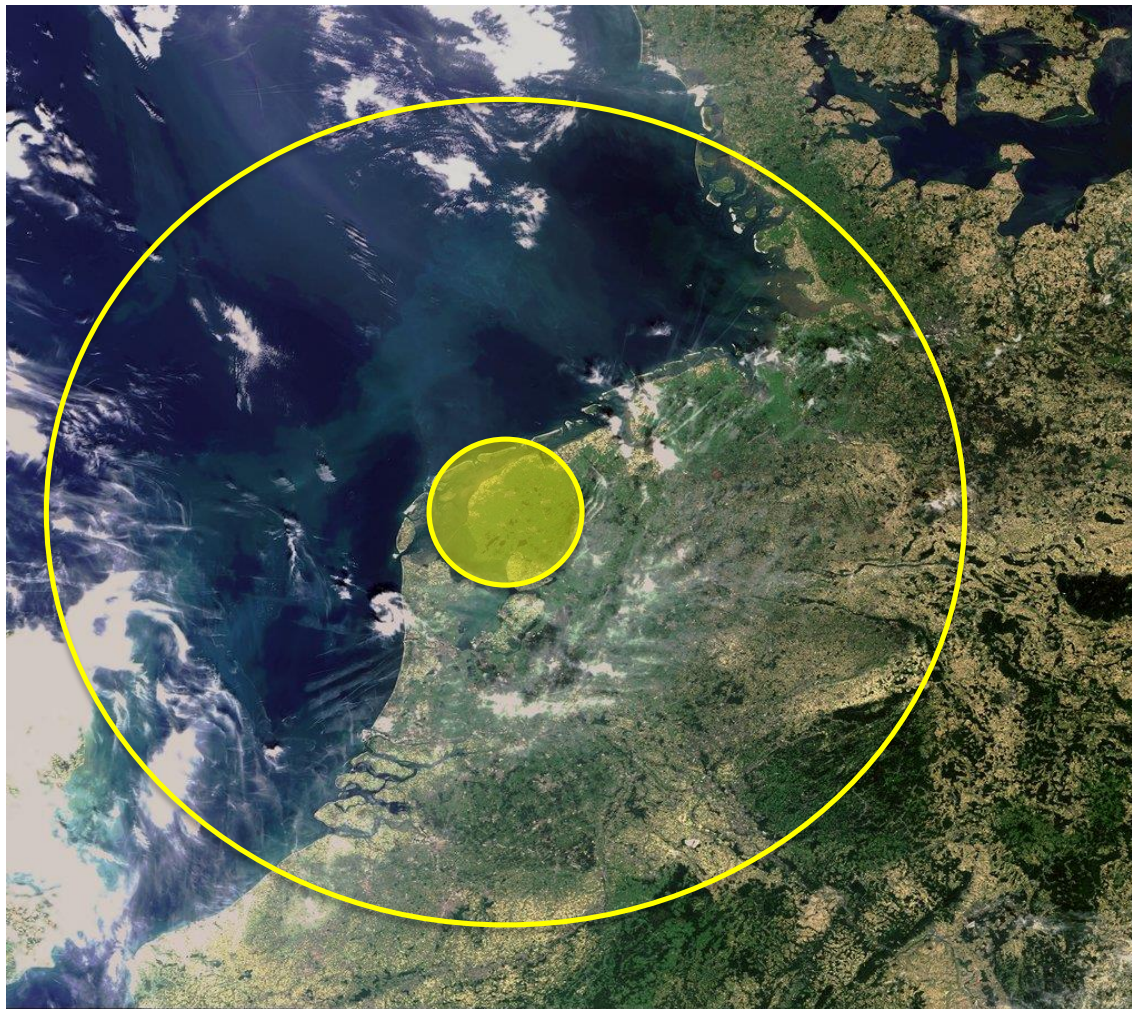
**Patrick Cnubben**

**New Energy Coalition**

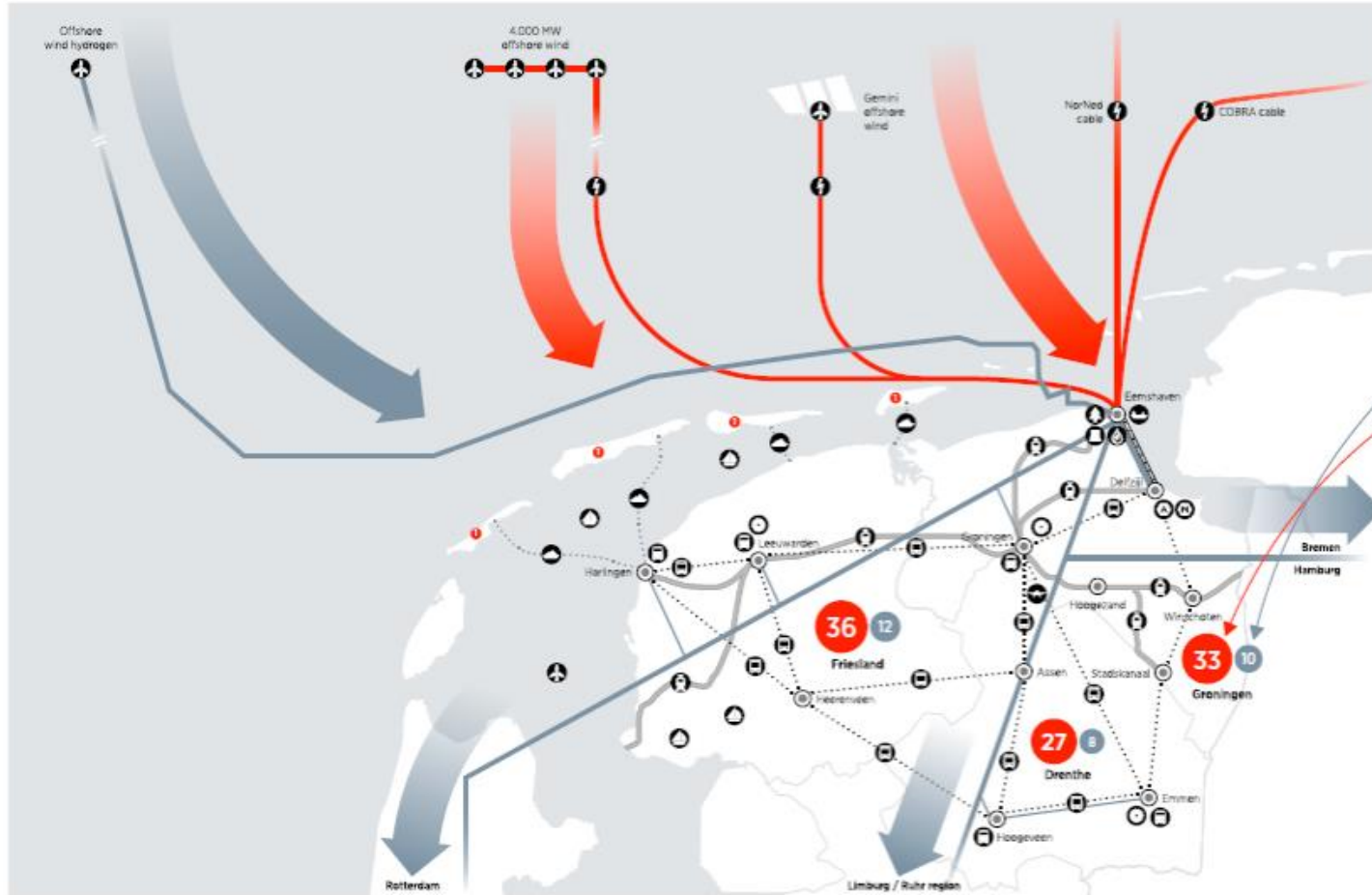
# Agenda

- **EU flagship project HEAVENN**
- **A lot of initiatives and projects**
- **Next steps**

# Where are we located?

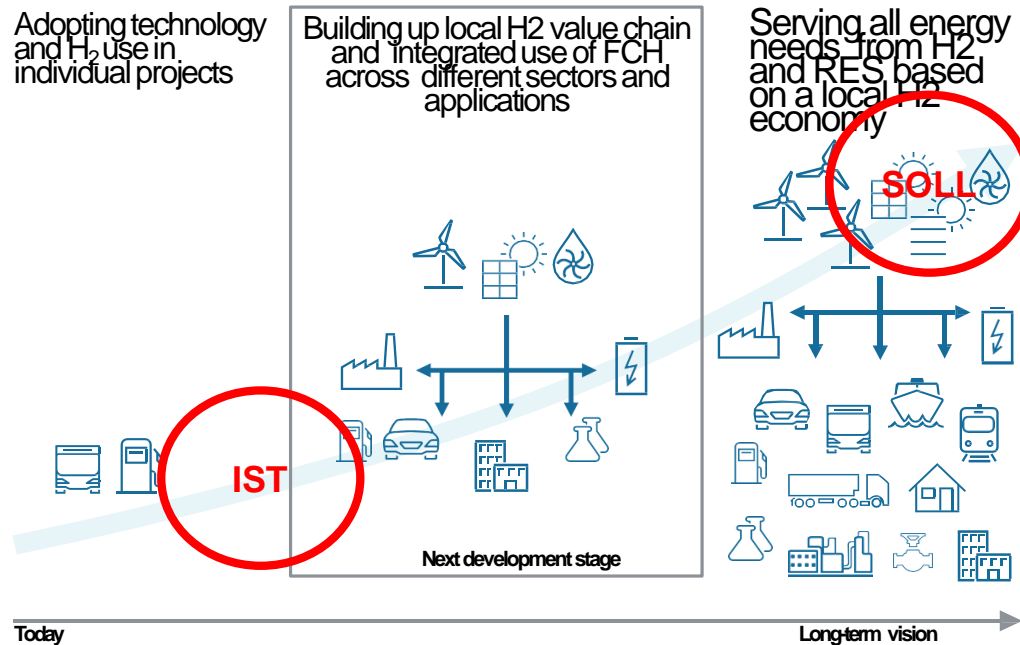


# Green Hydrogen Economy in the Northern Netherlands



- Hydrogen pipeline
- Industrial gasses pipeline (Syngas, CO, CO<sub>2</sub>, O<sub>2</sub>)
- Electric grid
- Hydrogen train
- (Hydrogen) ferry
- (Hydrogen) bus
- (Number of) Hydrogen fueling stations
- (Number of) Solar hydrogen smart areas
- Hydrogen innovation center
- Wind farm
- 1,000 MW biomass gasification
- 1,000 MW electrolysis hydrogen
- Magnum power plant (Ammonia-hydrogen fueled)
- Green ammonia production
- Green methanol production
- Hydrogen harbor facilities
- Hydrogen distribution center
- Hydrogen sailboat
- Hydrogen drones

# Becoming an Integrated Hydrogen Economy



- Linking individual projects and developing local H<sub>2</sub> infrastructure, represents the next development stage towards a local H<sub>2</sub> economy
- H<sub>2</sub> Valleys should establish local H<sub>2</sub> nuclei
- Part of a clear local strategy to start a long-term green energy transition
- Backed-up by 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.

# HEAVENN

## **The consortium**

- Stichting Energy Valley, part of New Energy Coalition
- 29 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



# HEAVENN

# New Energy Coalition



Nouryon

gasunie



HyEnergy  
TransStore



H2Tec BV

EWE

HYDROGEN VALLEY®



Qbuzz



Supported by:



# Industrial feedstock

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

# Heat & Power

- Heat for residential and municipal buildings (100 and 250: Hoogeveen and Groningen)
- 2 (-10) MW Electrolyser for industrial heat (Emmen)
- Back-up power datacenter 100kW fuel cell supply based on green H2 (Groningen)
- On-shore auxiliary power 100 kW for inland boats/barges (Delfzijl)
- Total heat & power H2 demand: expected to increase to >500 tpy

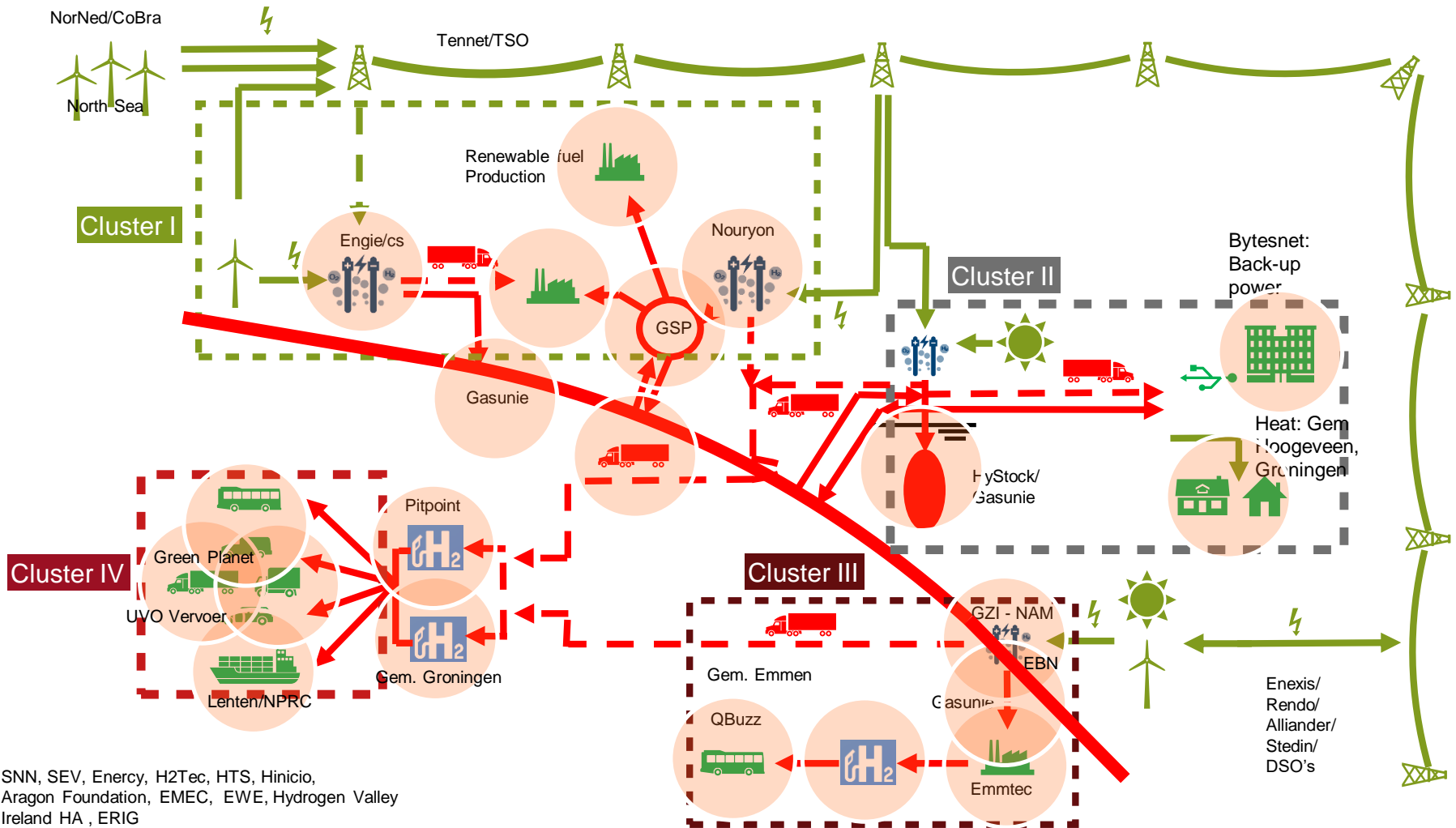
# Mobility

- Buses: 10 FC buses in Emmen
- passenger and light duty : 105 FC passenger cars and 10 vans
- heavy duty : 4 special trucks and 8 HDVs
- 4 HRS (2 x 350 bar, extension/upgrade to 700 bar)
- maritime/inland barge
- Total mobility H2 demand: estimated 680 tpy

# Storage & Infrastructure

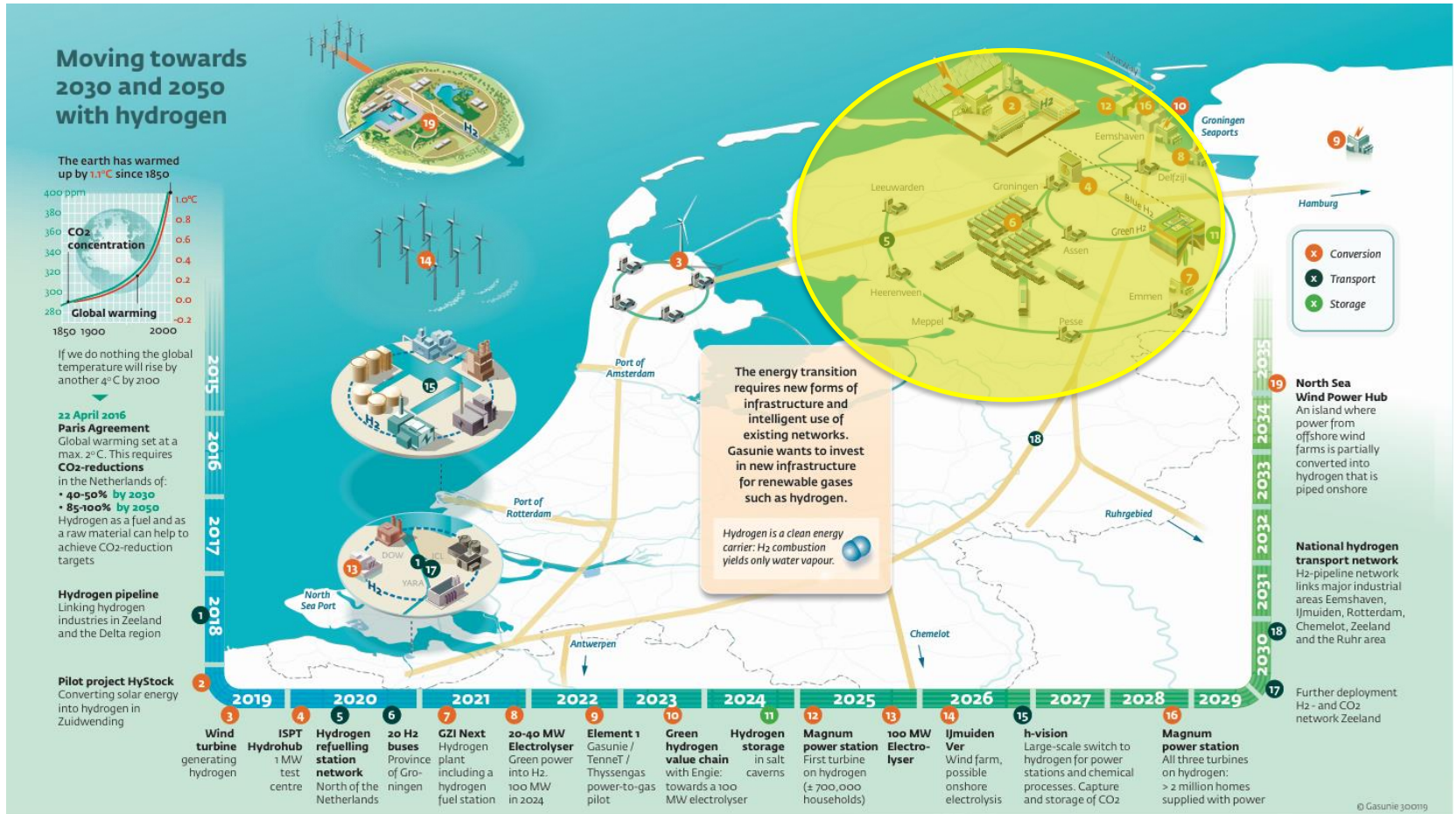
- Studies & preparatory work for the deployment of repurposed and new H2 pipelines
- Realisation of (polymer-based) pipeline connections on the Delfzijl Chemical complex connecting supply and demand
- Deployment of new H2 pipeline between GZI site and the Emmtec Industry Park
- Distribution of H2 across the region via virtual gas pipelines i.e. trailers
- Deployment of underground gas storage system

# HEAVENN

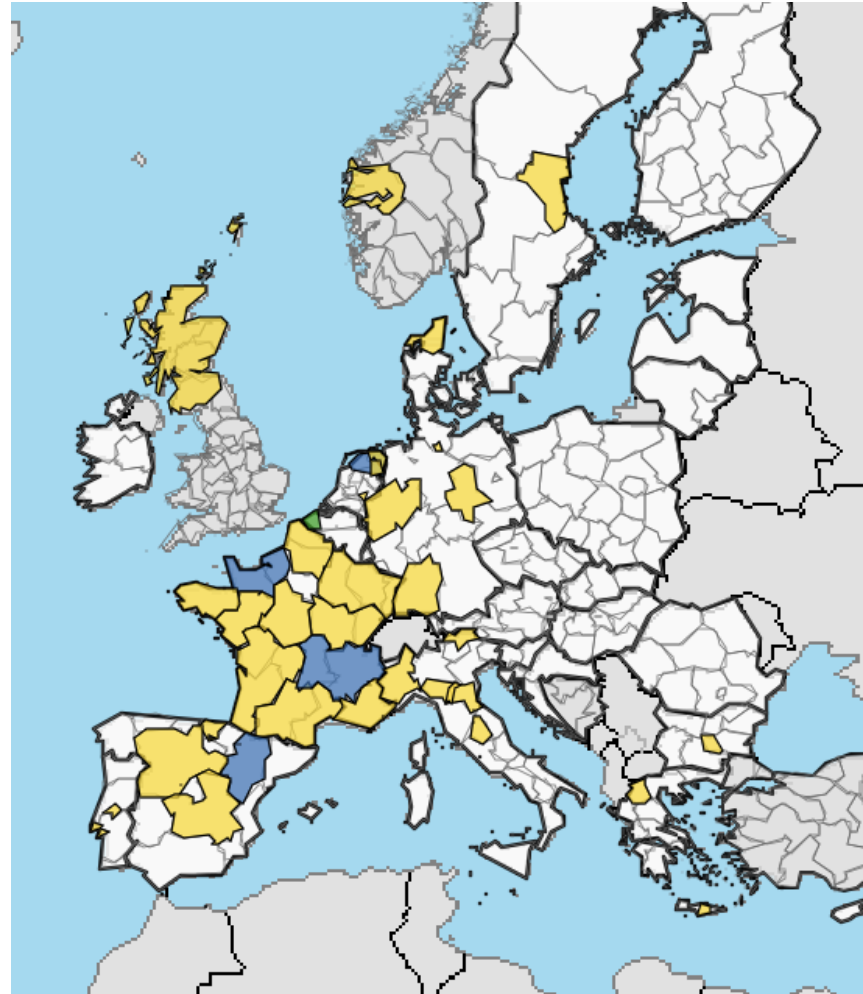
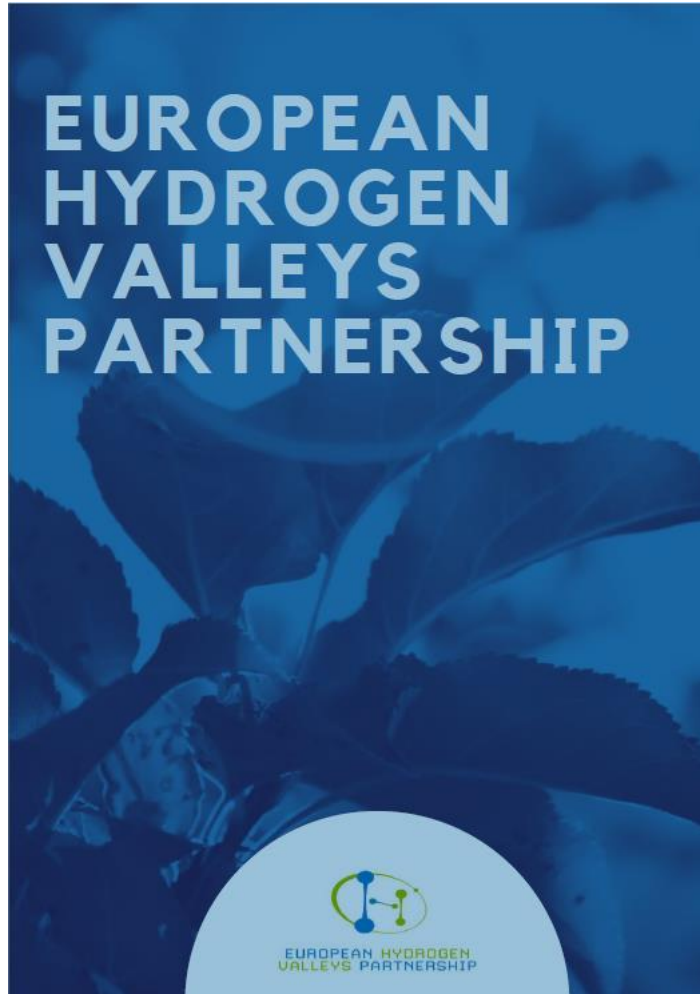


SNN, SEV, Energy, H2Tec, HTS, Hinicio,  
 Aragon Foundation, EMEC, EWE, Hydrogen Valley  
 Ireland HA, ERIG

# More than Heavenn Roll out to mass application

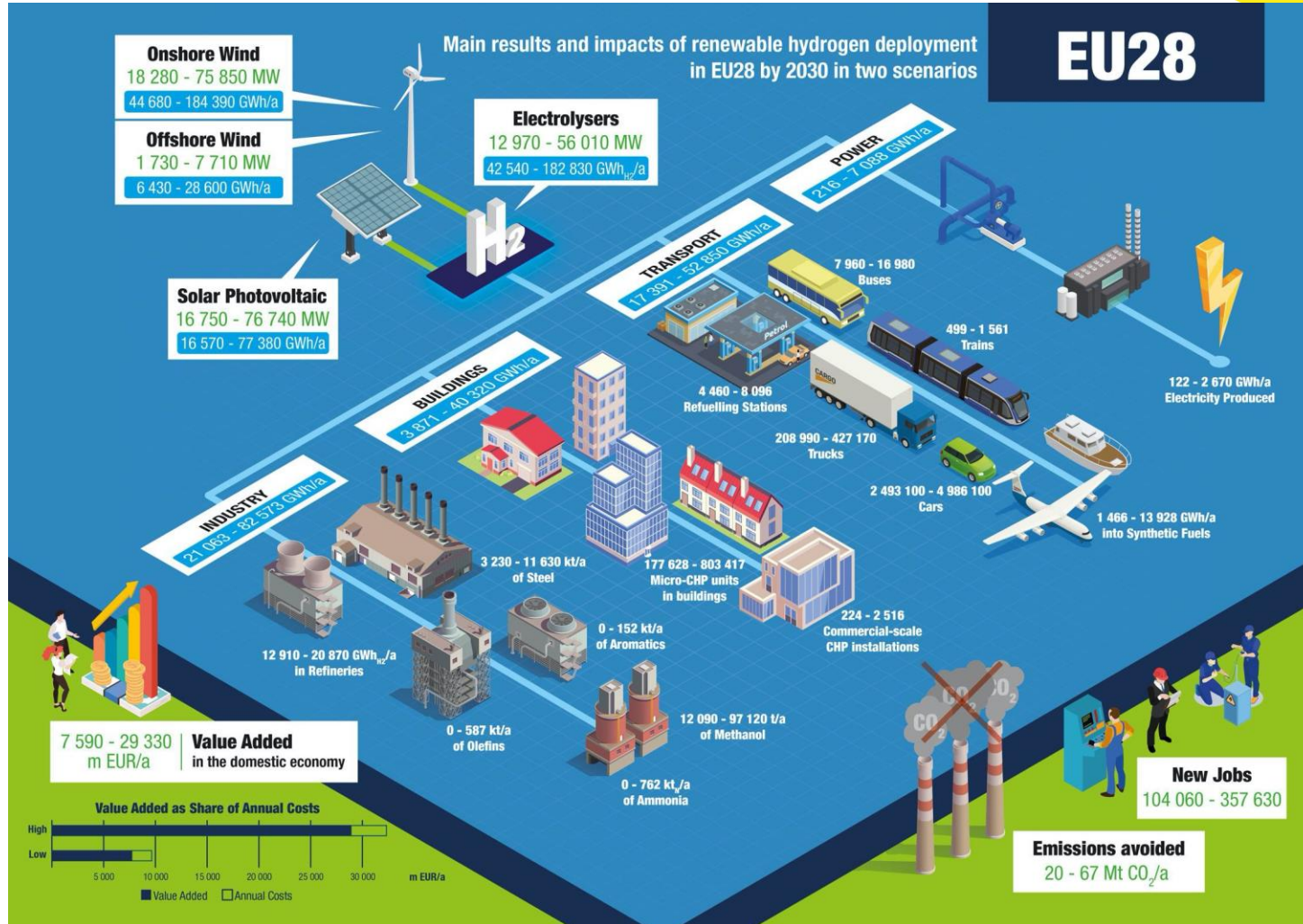


# European Hydrogen Valley's Platform





# Hydrogen perspective

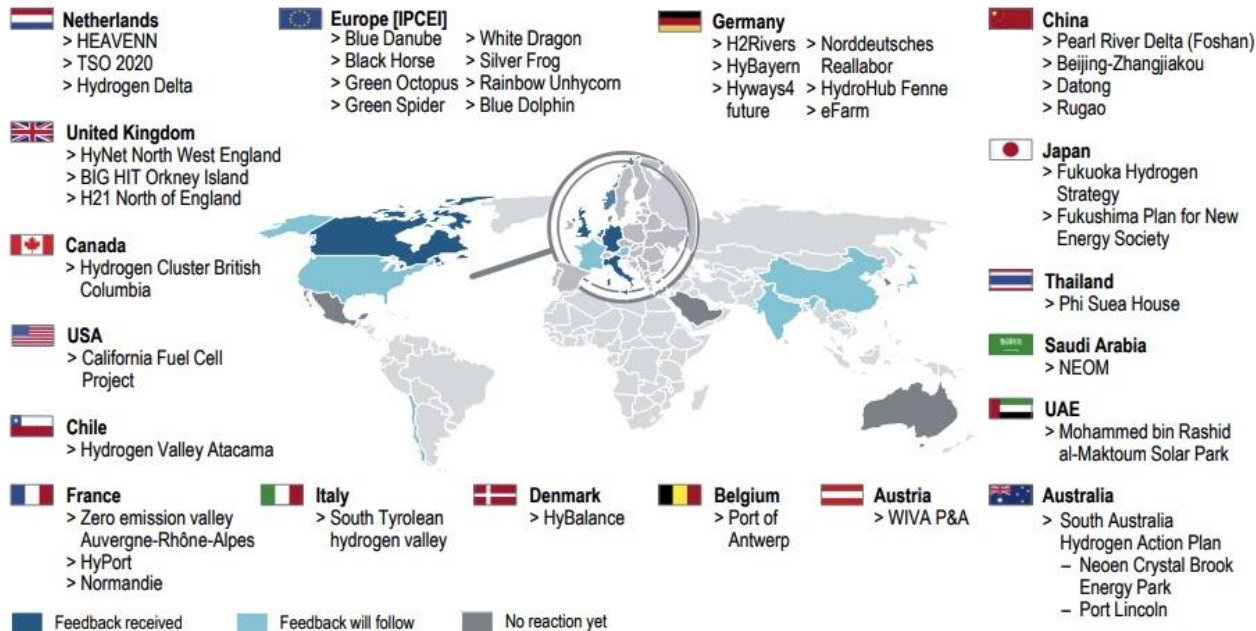


# Mission Innovation Hydrogen Valley Platform

We have gathered the first comprehensive overview of H2Vs globally and identified 40 relevant projects together with IC8 members

Global Hydrogen Valley projects and status of IC8 feedback

Current status – Pre-final



Source: Roland Berger

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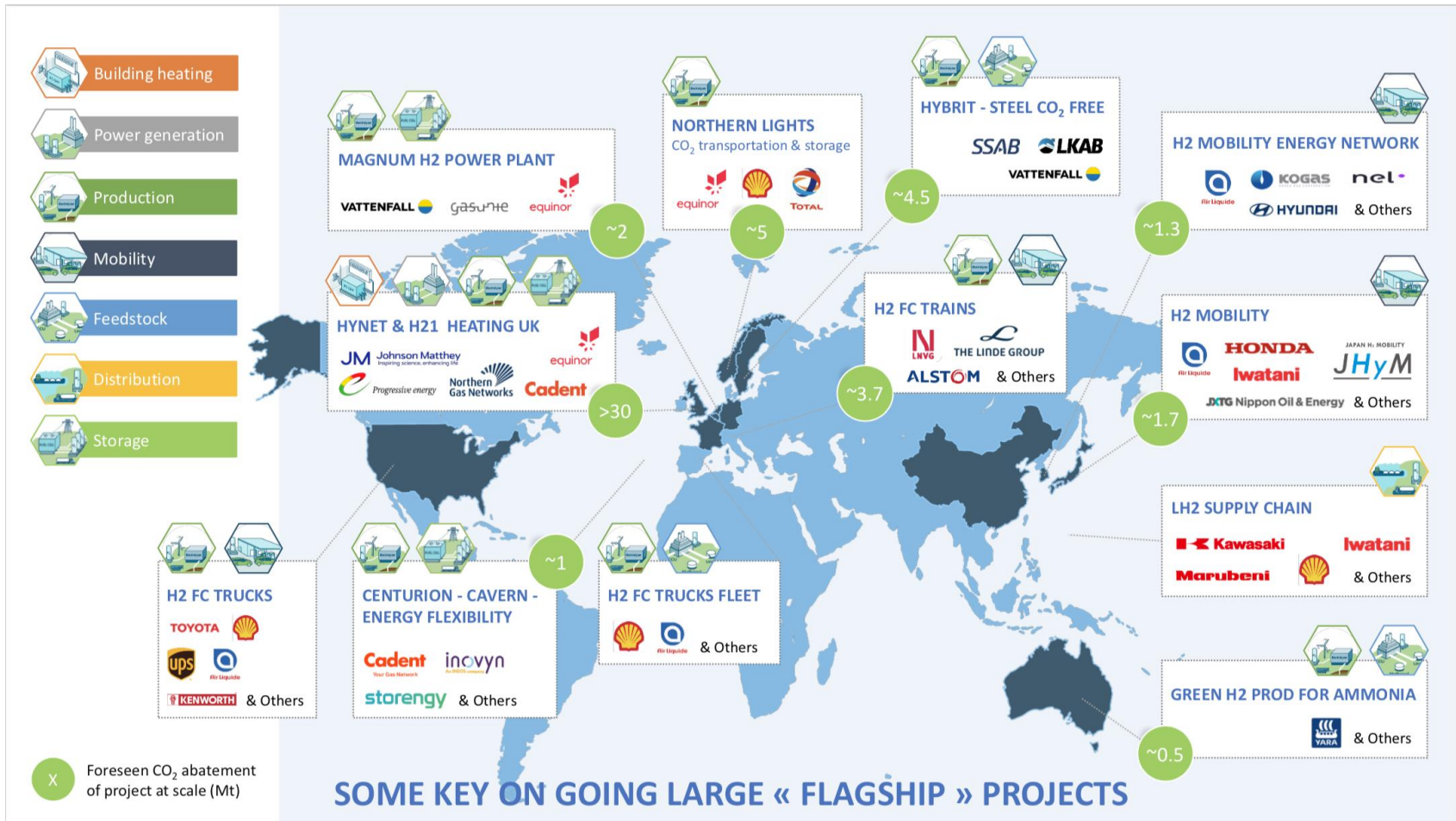
FUEL CELLS AND HYDROGEN  
JOINT UNDERTAKING



MISSION  
INNOVATION

accelerating the clean energy revolution

# Global developments



# 20+ H2 busses

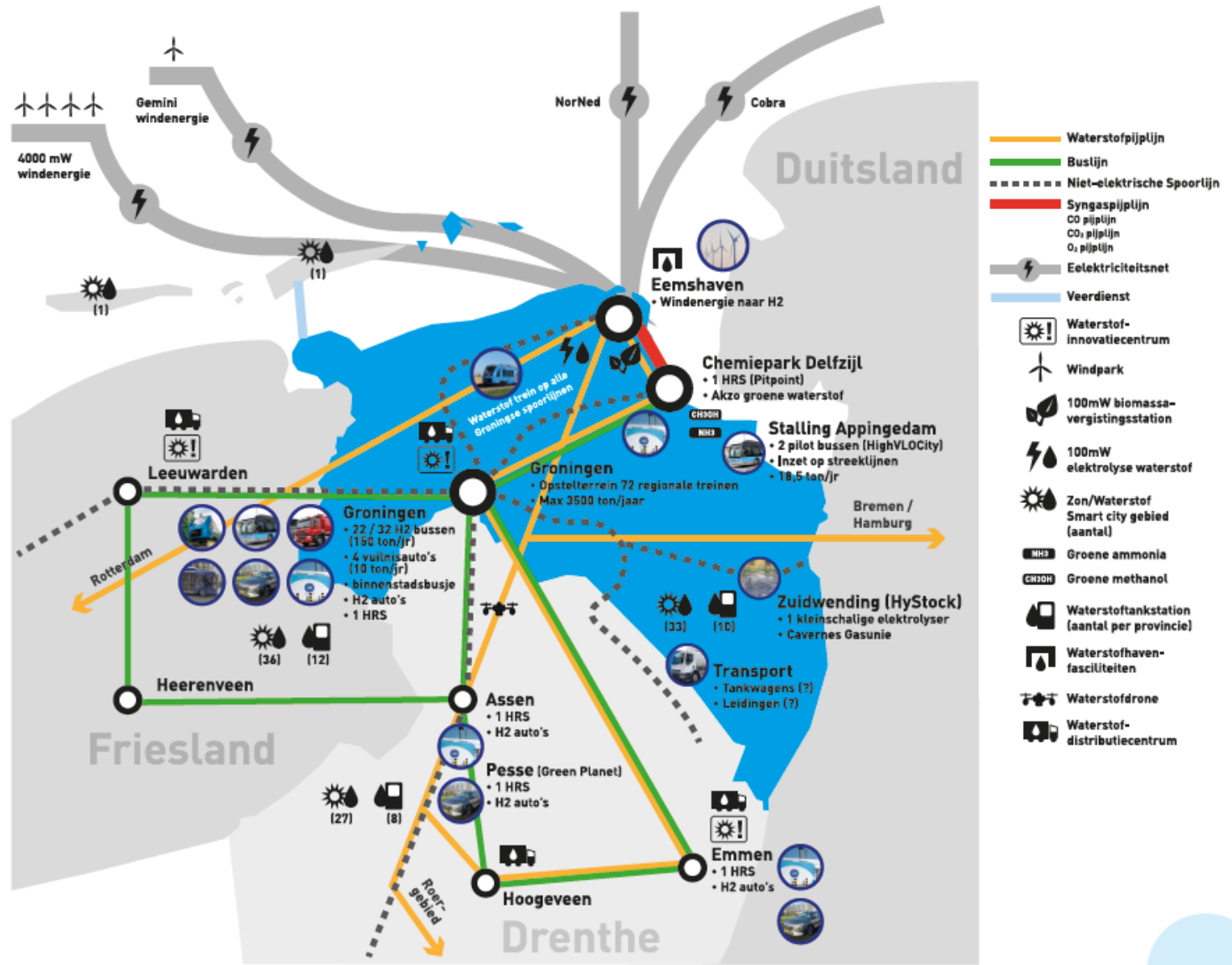
New  
**Energy**  
Coalition



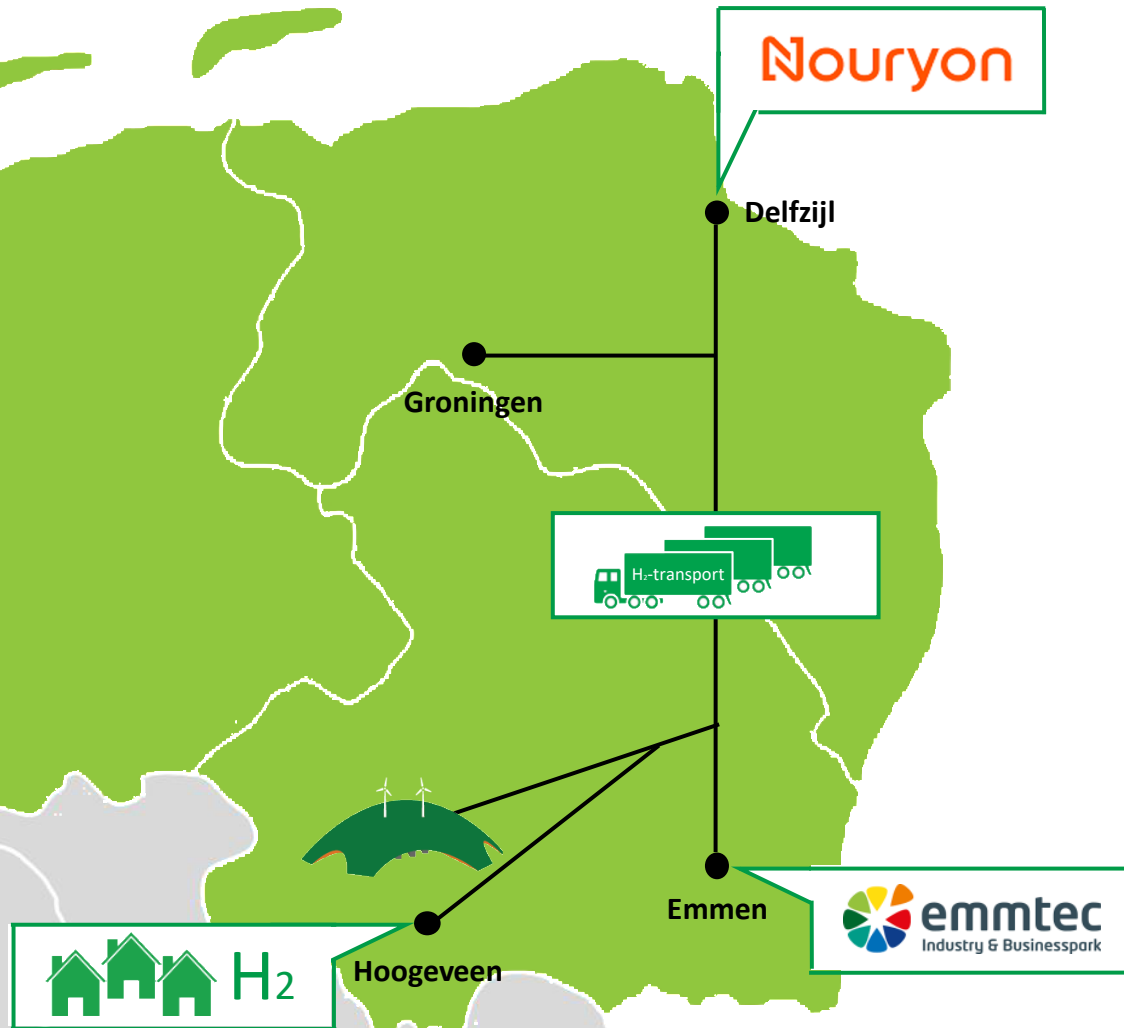
 ov bureau groningen drenthe

**Qbuzz**

# Hydrogen mobility



# Hydrogen Transport & Storage



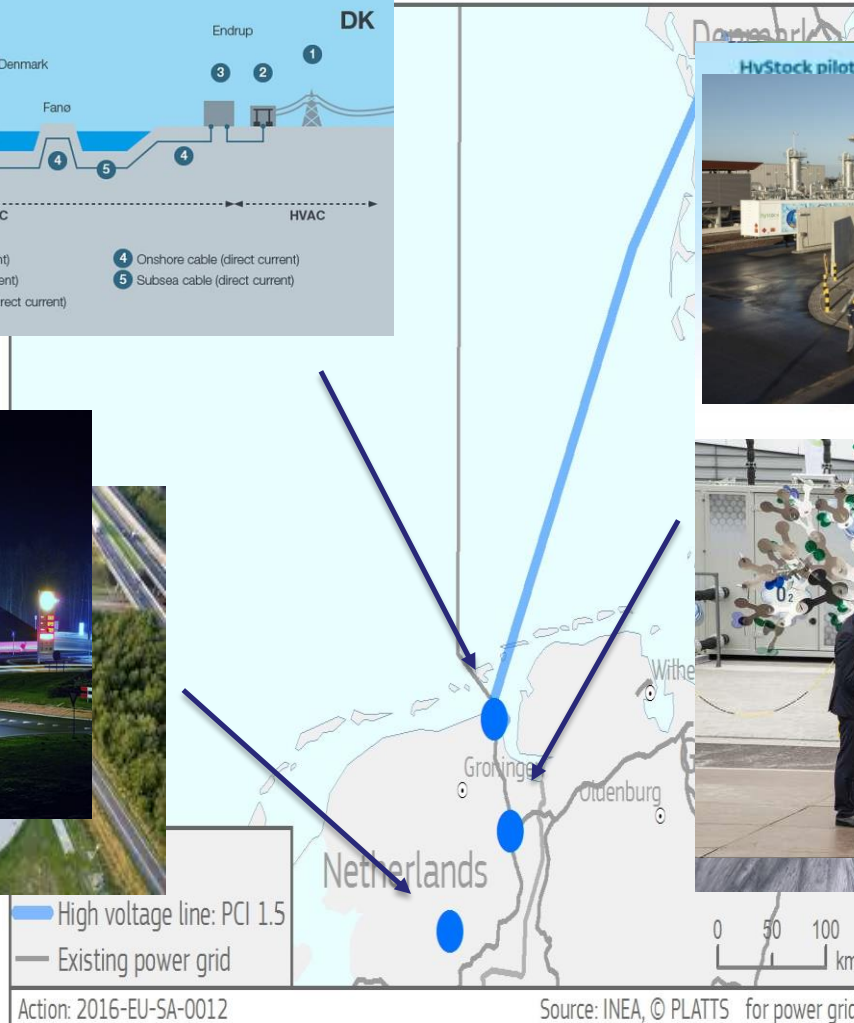
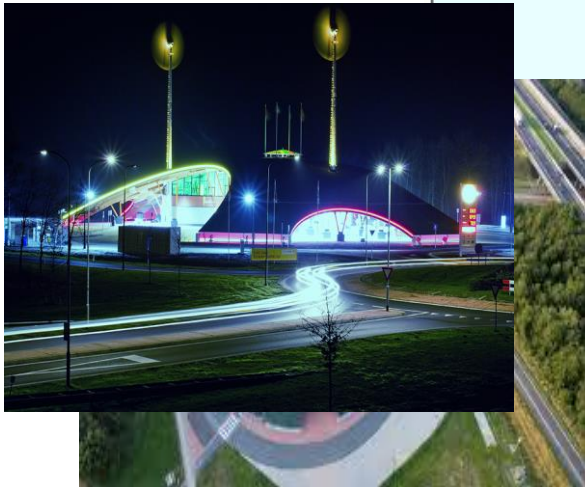
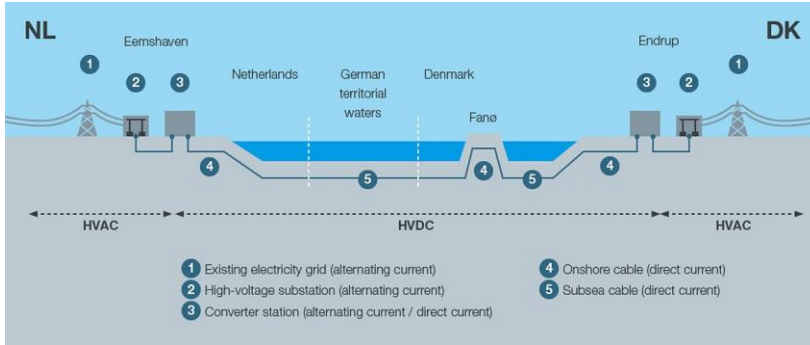
# More wheels!

New  
**Energy**  
Coalition



# TSO 2020

Electric “Transmission and Storage Options” along TEN-E and TEN T corridors for 2020



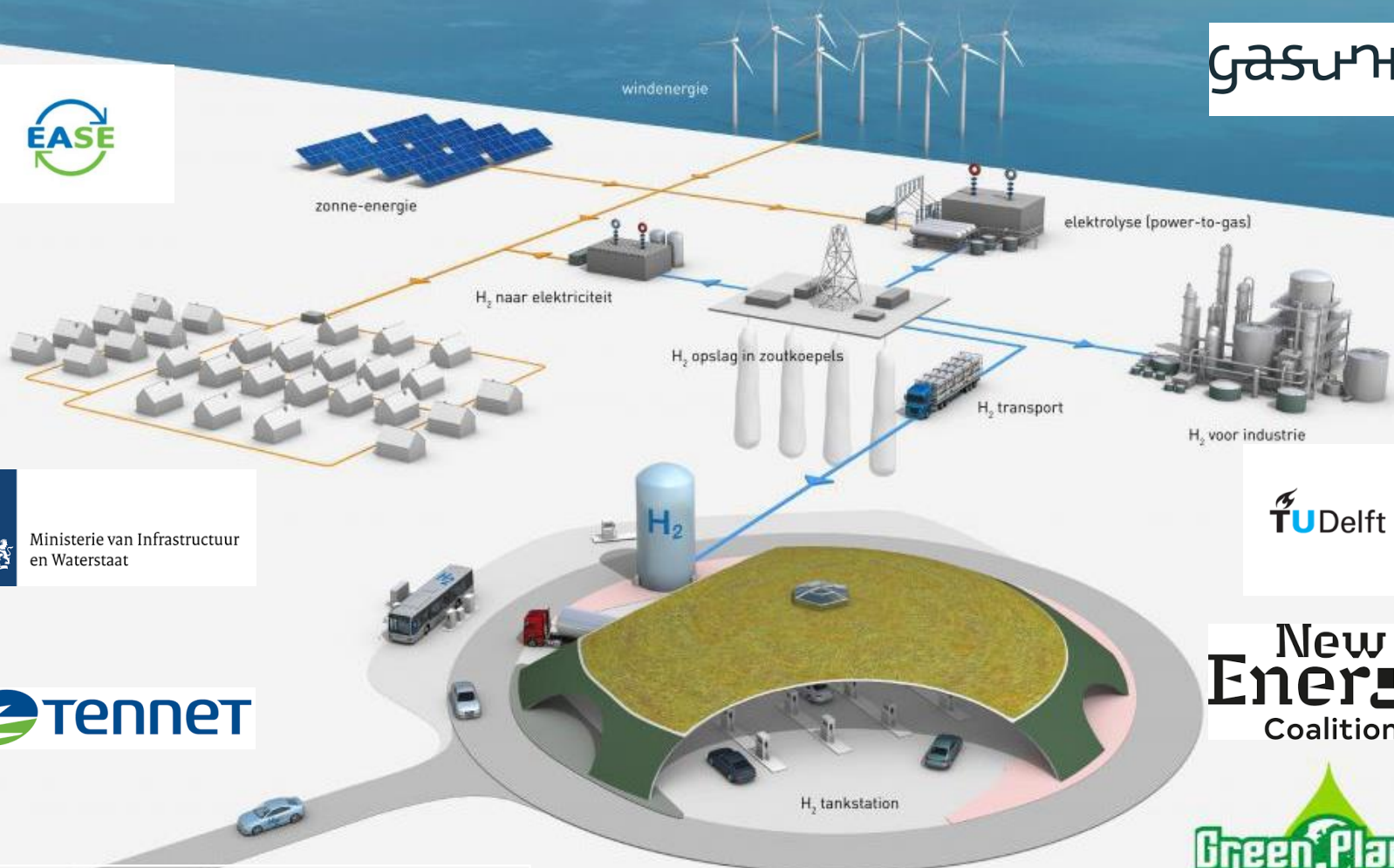


# TSO 2020

Electric “Transmission and Storage Options” along TEN-E and TEN T corridors for 2020

New Energy Coalition

gasunie



TU Delft



New Energy Coalition



Co-financed by the European Union  
Connecting Europe Facility

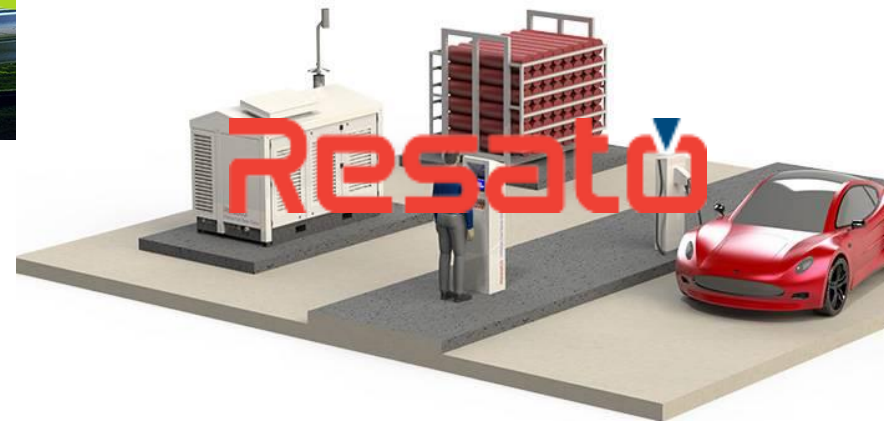


today for tomorrow

# Value chain solutions

ov bureau groningen drenthe

**Qbuzz**



# Equipment

New  
**Energy**  
Coalition



# Trucks & Ships & Trains



**CLUSTERDEAL 250 BEDRIJFSVOERTUIGEN OP WATERSTUF**  
 VANUIT DE HOOPDEKKE HOOP OP EEN STREKTOEGANG NAAR H2O-RIJKE

**DOEL**  
 Het Clusterdeal project wordt geleid door Waterstof Cluster Nederland, samen met de provincie Noord-Brabant, de gemeenten Breda, Eindhoven, Tilburg en de provincie Noord-Brabant.

<b>VERBODEN WERKSTOFFEN IN WATERSUF</b>	<b>VERBODEN WERKSTOFFEN IN WATERSUF</b>
• Benzine	• Diesel
• LPG	• Gasolie

**WISINGSRUIMTEN**

- Gebied waarvoor een vergoeding wordt gegeven voor de aanleg van een waterstofvoorziening
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**NUMMER**  
 Het aantal voertuigen dat wordt aangekocht wordt vastgesteld op basis van de beschikbare capaciteit van de waterstofvoorziening.

**WEDEROMKOPEN**  
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# 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**  
H<sub>2</sub> productie met lokaal  
opgewekte zonne energie

**Join us in Heavenn!**



**Patrick Cnubben**

**[p.cnubben@newenergycoalition.org](mailto:p.cnubben@newenergycoalition.org)**