

Netherlands

Hydrogen & Innovation in The Netherlands

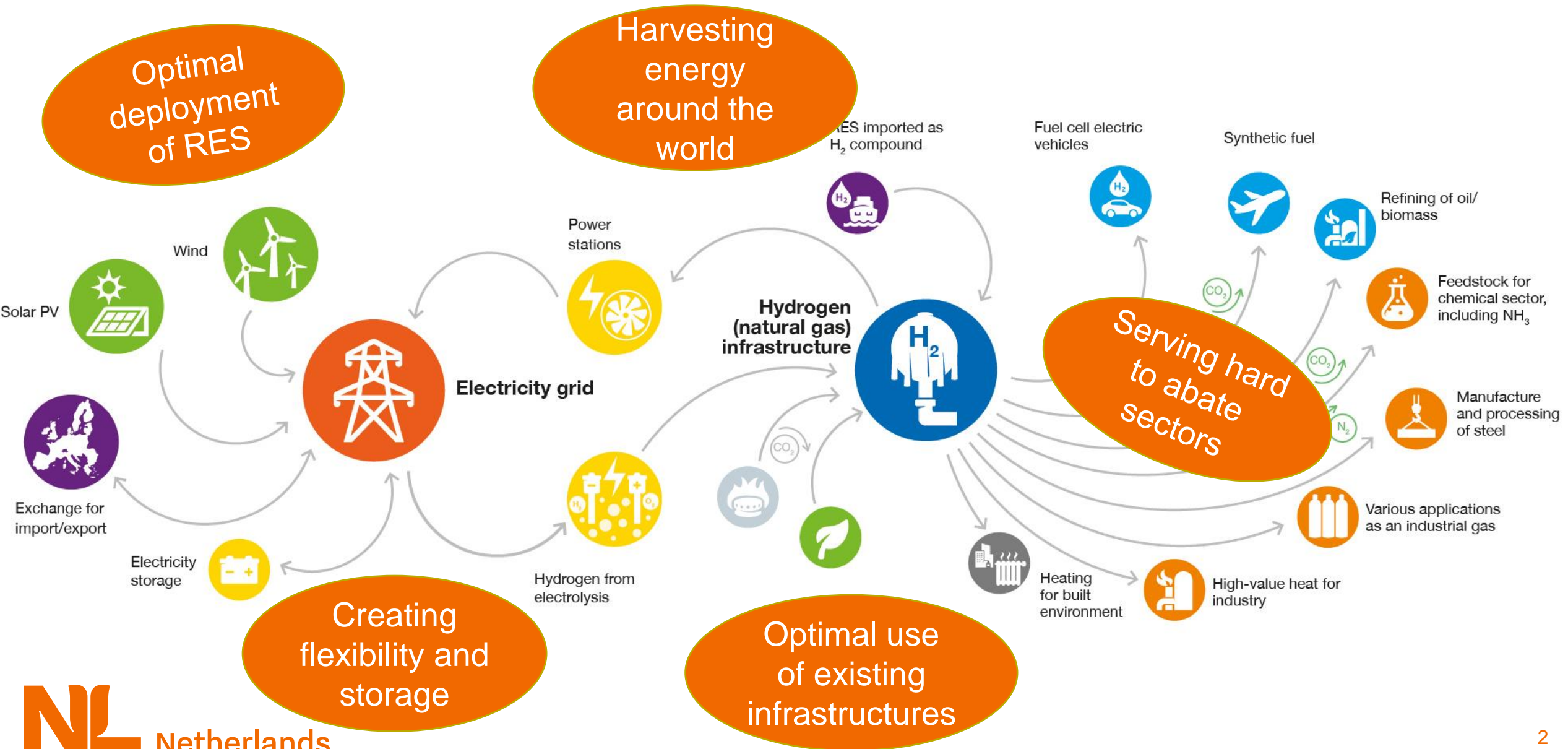
Webinar Czech delegation

March 7, 2024

Jörg Gigler



Hydrogen is developed from a system's perspective



Hydrogen: great opportunities for Dutch economy



Dutch government supports hydrogen in the next years with € 10 bn

probably 4-5 bn is secured, other budgets may depend on new coalition

- **Electrolysis** onshore: € 5.2 bn

- 2023: € 0.25 bn
- 2024: € 1.0 bn
- >2025: € 3.9 bn

- **Electrolysis** offshore: € 1.9 bn

- **Infrastructure**: € 1.05 bn

- Backbone onshore: € 0.75 bn
- Backbone offshore: € 0.05 bn
- Storage: € 0.25 bn

- **IPCEI** (EU): € 1.6 bn

- **Import**: € 0.3 bn (H2Global)

- Besides investment support there is also government support for R,D&D (1.2 – 1.5 Bn for 2021-2028). And some opex support (SDE++)



The Netherlands, like any other European country, must comply with EU regulation

Fit for 55

- Cutting GHG emissions: 55% in 2030
- Coherent & balanced framework
- Just, innovative, competitive transition
- Eu leading the way

Green Deal Industrial Plan (2023)

- Regulatory framework (NZIA, CRMA, ...)
- Access to funding for clean tech
- Skills and people
- Competition and trade

European Hydrogen Strategy

- 6 GW electrolysis in 2024
- 1 million ton of green hydrogen
- 40 GW electrolysis in 2030
- 10 million tons of green hydrogen

RePowerEU

- Save energy and diversify supply
- Produce clean energy (45% in 2030)
- 10 million tons hydrogen production
- 10 million tons of hydrogen import



European policy: mandatory green hydrogen targets (Delegated Act)

Renewable Energy Directive (RED) – Delegated Act (DA):

- 42.5% Renewable Energy by 2030
- Additionality: complex rules
- Industry: 42% of hydrogen must be RFNBO by 2030 and 60% by 2035

AFIR – Alternative Fuel Infrastructure Regulation:

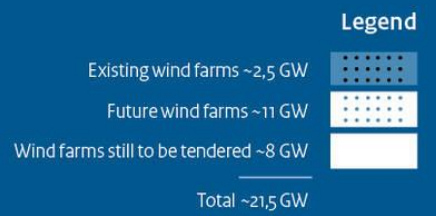
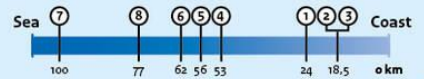
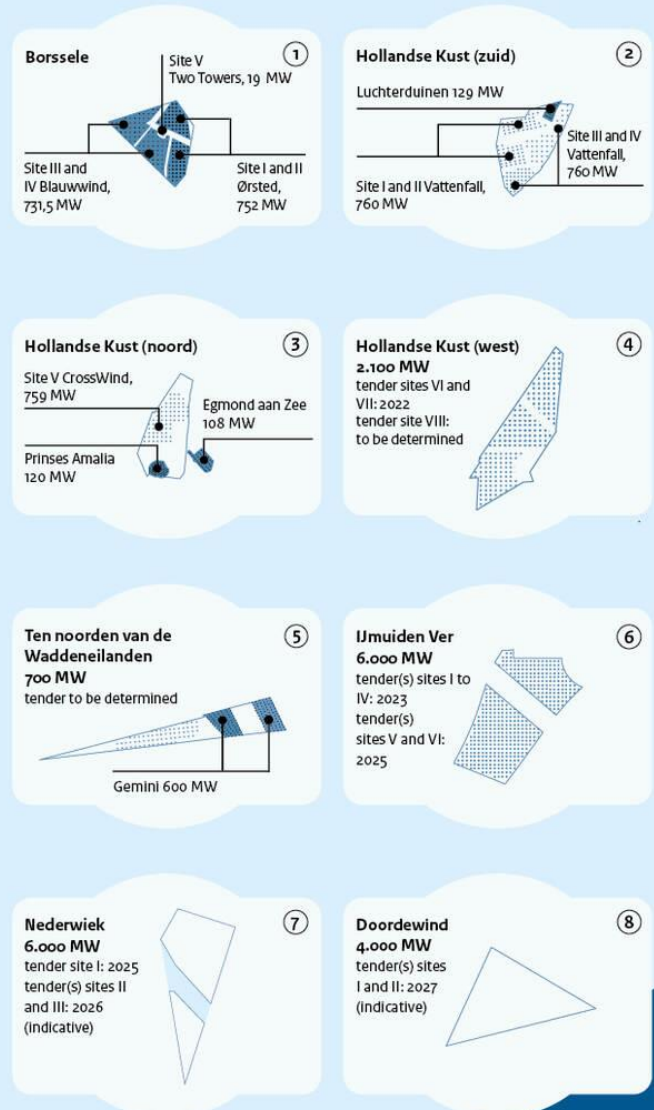
- HRS along Ten-T corridors
- HRS in all urban nodes

Aviation:

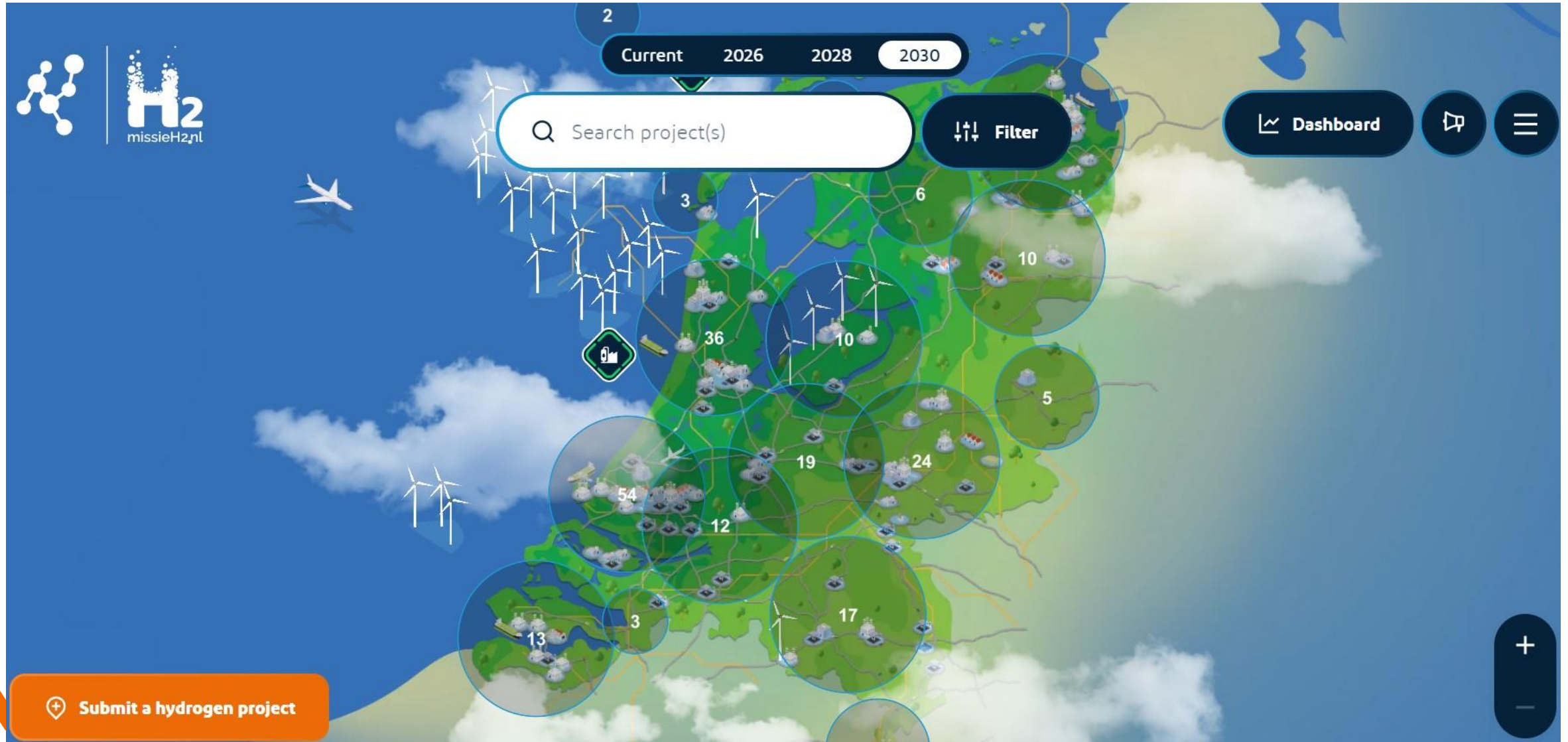
- 1.2% of aviation fuel in EU must be derived from synthetic fuels

Offshore wind energy roadmap:

2030: 21 GW
 2040: 50 GW
 2050: 70 Gw



Access all our projects (313 per Feb '24)
at www.missieH2.nl/en/



IPCEI 2nd wave Electrolyser Projects: 7 projects, 1150 MW, 800 mln

Holland Hydrogen 1
200 MW
Shell
Rotterdam

Curthyl
200 MW
Air Liquide & Vattenfall
Rotterdam

H2Fifty
250 MW
BP & HyCC
Rotterdam

HyNetherlands
100 MW
Engie
Eemshaven (N-NLs)

Haddock
100 MW
Orsted & Yara
Sluiskil (S-NLs)

Elygator
200 MW
Air Liquide
Terneuzen (S-NLs)

H2ermes
100 MW
HyCC & Tata Steel
Amsterdam



Hydrogen projects map – some results (handle with care!)

- > 700 project partners
- 21% of projects is operational
- Largest share of operational projects: end use (101) and HRS (55)
- Application areas: 40% mobility, 30% production, 10% industry, 5% buildings
- Approximately 5-10 new projects/month
- Pipeline total production capacity: 1.4 Mtons/y
- Pipeline elektrolyser capacity: 17 GW



**NEDERLAND
WATERSTOFLAND
2030**

Zet jezelf op de kaart. Ga naar missieh2.nl

Missie H2 is supported by       

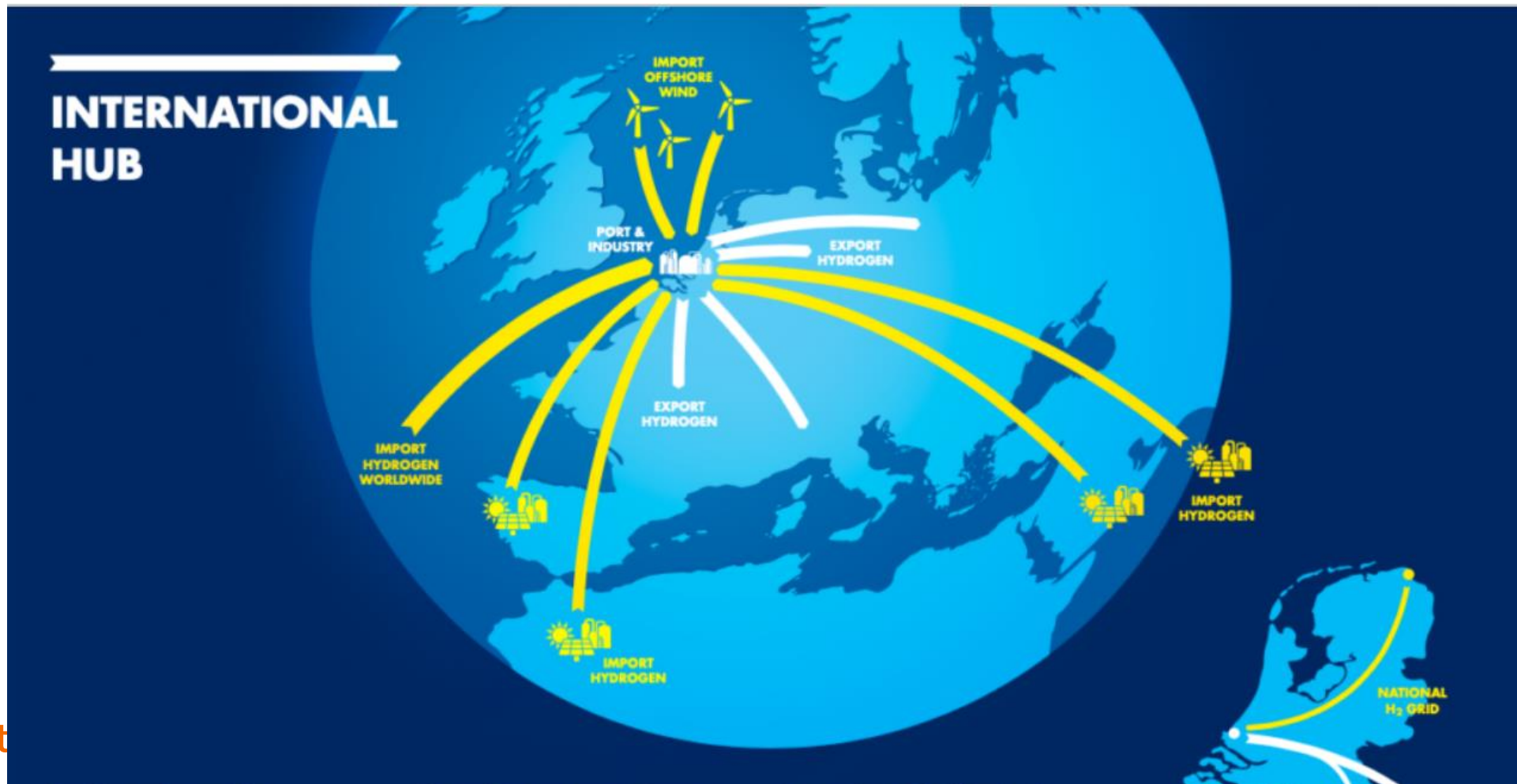
TeamNL 
partner van TeamNL

For hydrogen transport and distribution we repurpose our natural gas grid for hydrogen and build hydrogen storages



We also aim to import hydrogen (derivatives) for our domestic and NW European partners

Many MoU's have been signed: Oman, Morocco, Namibia, South-Africa, Chili, Portugal, Spain, US, etc



Hydrogen import terminals are under development, its number is growing

Port of Rotterdam has a large focus on ammonia,
Amsterdam focusses on liquid hydrogen and LOHC

- ACE-terminal ammonia – Port of Rotterdam – 2026 – Gasunie / HES International / Vopak – 1 Mton? (permits/design)
- Ammonia Terminal & storage – Port of Rotterdam – Year? – Koole Terminals / Horizont Energie (N) (MoU)
- Expansion of existing ammonia terminal – Port of Rotterdam – 2023 – OCI – capacity from 0.4 to 1.2 mln tons (FID)
- Green Point Valley Project – Vlissingen – Year? – Vesta / Uniper – ammonia capacity from 60k m³ to 1 Mm³ (feasibility)
- Zenith Energy – Amsterdam – terminal for liquid hydrogen

Innovation programme: GroenvermogenNL

Received a total public budget of € 838 mln for 6 years, > € 1 billion incl. private support



- 1. Fight climate change**
achieve net-zero in 2050 by reducing GHG emissions in non-electrifiable applications using green H₂
- 2. Boost earnings power**
become a significant international player in the green H₂ & chemistry economy, unlocking potential of NL high-tech sector
- 3. Retain key industries**
within the Netherlands, by facilitating their transition to net-zero using green H₂ & chemistry
- 4. Improve business climate and energy security**
by creating national green H₂ production capacity in parallel with import infrastructure

Integrated innovation programme: GroenvermogenNL

GroenvermogenNL instruments

50 M€

- National human capital agenda



Human capital

- Regional learning communities
- Digital platform
- National coordination



R&D

7 work packages:

1. *Making carbon neutral H₂ (call open)*
2. Transport & storage of H₂
3. Direct use of H₂
4. Green H₂ & e⁻ for C-based chemistry
5. Green H₂ & e⁻ for N-based chemistry
6. Green H₂ & e⁻ for specialties
7. Socio-economic aspects & H₂ implementation

177 M€



Pilot support

Projects throughout the value chains of production, transport, storage and industrial use of green hydrogen (carriers).

- 3-5 projects in H₂ value chain
- Small scale demonstration
- Regional testing facilities

**First two projects have been granted
Duwaal & H₂ Hollandia**

100 M€



Demo support

Support for the manufacturing industry
Demonstrating value chain projects
Feed/feasibility studies
Potential endurance testing facility

500 M€

Integrated innovation programme: HyDelta.nl



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The research programme

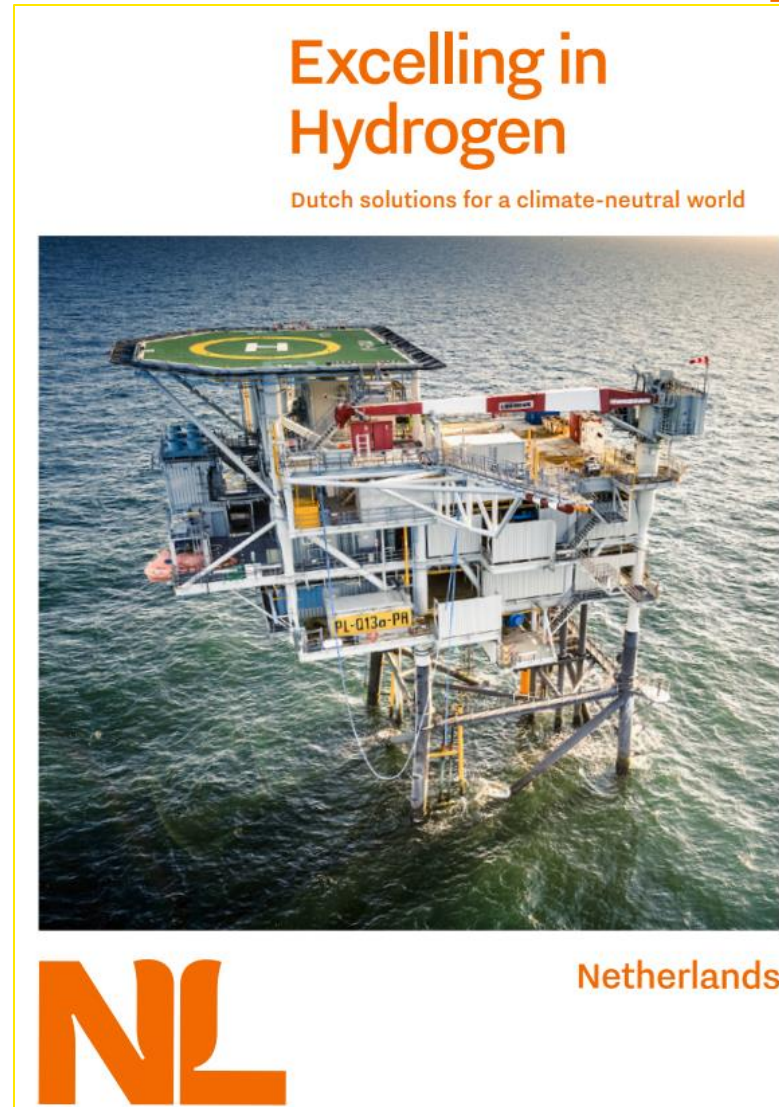
The HyDelta research programme is divided into HyDelta 1.0/2.0/3.0 (currently running) including different Work Packages (WPs). Main focus:

- Hydrogen safety
- Hydrogen in the gas grid
- Value chain & hydrogen admixing
- Economic aspects of the hydrogen system
- Hydrogen & transport assets
- Social aspects of hydrogen

All research deliverables are freely available!

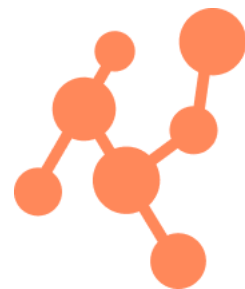
Want to know more?

Download our brochure with all Dutch players!



Thank you for your attention
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