



ENERGY INNOVATION NL

Powering a sustainable future

Hydrogen in The Netherlands

Jörg Gigler

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Hydrogen value chain

Major industrial clusters

- 1 Amsterdam
- 2 Rotterdam
- 3 Zeeland
- 4 Groningen
- 5 Chemelot

— Onshore hydrogen network	... Offshore hydrogen network	■ Downstream
■ Upstream	■ Midstream	■ Industry
⚡ Electrolysis	⌚ (Re)conversion	🚗 Mobility
⬆️ Offshore wind energy	🚢 Import	⚡ Power
	🏠 Storage	🏠 Built environment
	🏠 Underground storage	



Netherlands Government Hydrogen Strategy

Focus on hydrogen value chains:

- Offshore wind development incl. infrastructure
- Green hydrogen production
- Hydrogen infrastructure (on and offshore)
- Hydrogen storage
- Offshore electrolysis
- Import
- ...

Funding: 7-9 billion reservation for hydrogen



Dutch Hydrogen Roadmap

NWP Nationaal Waterstof Programma

2022-2025

Production
600 MW electrolysis capacity; use of CCS in the existing production

Imports
First imports of hydrogen, primarily as ammonia

Infrastructure and storage
Hydrogen network under construction, connects production with demand. First storage cavern

2025-2030

Production
80 PJ renewable hydrogen and the use of CCS too

Imports
Development of large-scale imports including transit

Infrastructure and storage
Hydrogen network connects production and demand, storage in 3-4 salt caverns

After 2030

Production
Renewable offshore hydrogen

Imports
Large-scale imports, is a part of the European market

Infrastructure and storage
Further development of distribution networks and offshore infrastructure

Application

- 600 MW renewable hydrogen, particularly as a feedstock
- 50 hydrogen filling stations with corresponding vehicles
- First pilot projects in the built environment
- First gas-fired power plants are suitable for the admixture of hydrogen for electricity generation

Application

- 40-80 PJ particularly for the production of steel and chemicals and in refining
- 18-58 PJ hydrogen for all transport modalities
- First pilot projects for zero-emission aviation and shipping
- Potentially the first 100% hydrogen power plants for the generation of electricity

Application

- Use for production of steel and chemicals and at refineries
- Use in electricity generation and parts of the built environment
- Hydrogen is a fully-fledged option for road transport
- Conversion of the last gas-fired power plants

Preconditions: essential if the objectives are to be achieved



Policy framework



Safety



Innovation



Social acceptance



Manufacturing industry



Human capital agenda



Innovation strategy: 5 priorities suggested

1. **Green hydrogen chains in industry** (energy & feedstock), based on offshore wind, including transport and storage
2. **Import of hydrogen** (& derivatives)
3. End-use of hydrogen in **heavy duty transport**
4. **Decentralised hydrogen chains** to serve local markets and help to solve grid congestion
5. Support for **technology clusters** (manufacturing)

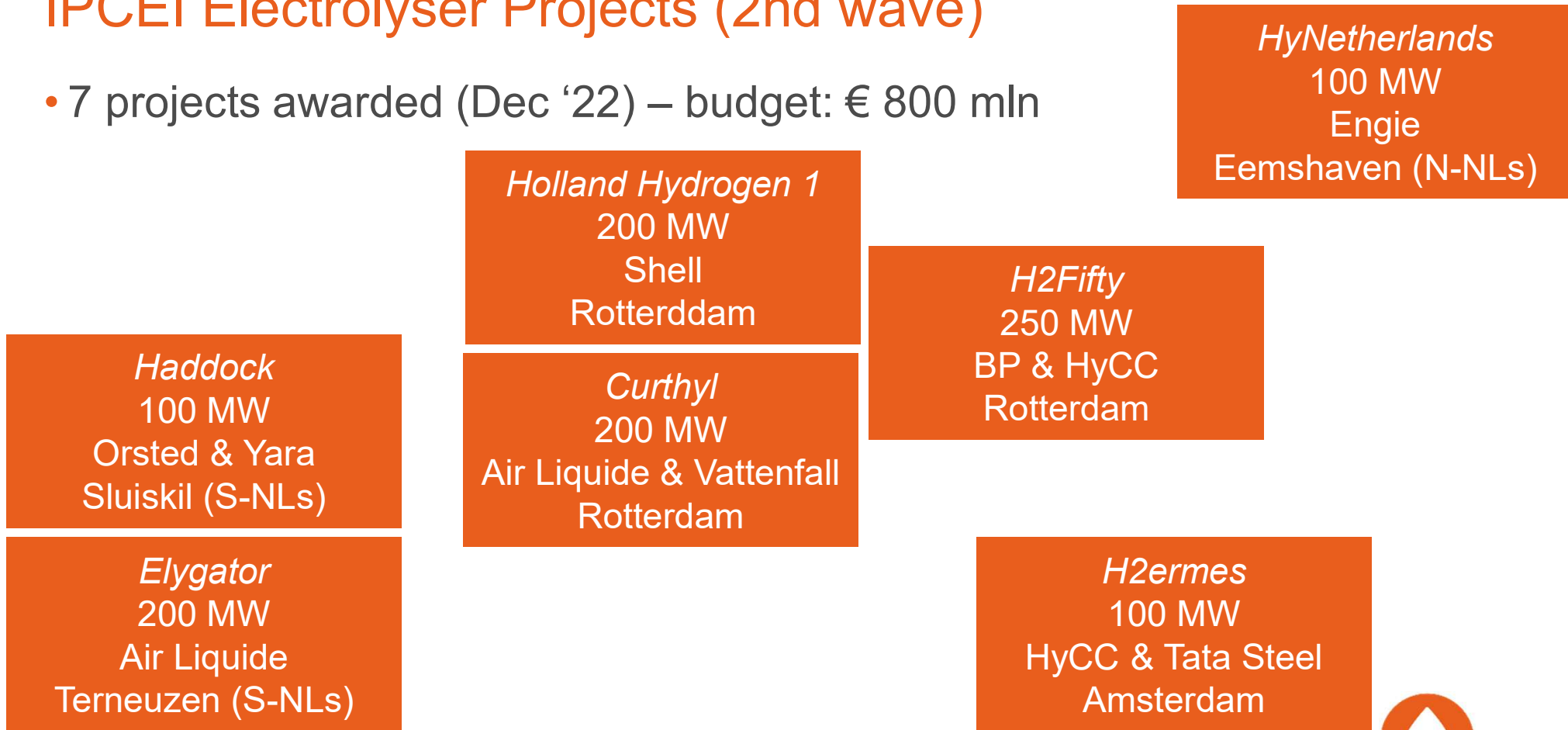





Subsidies: much support for fundamental, industrial and experimental research & pilots and demo – capex and opex support



IPCEI Electrolyser Projects (2nd wave)

- 7 projects awarded (Dec '22) – budget: € 800 mln



-  Energy Hub
-  Storage
-  Electrolyser
-  Industry cluster
-  Import
-  Offshore Hydrogen Receiving and Compression Arena (OHRCA)
-  Wind area Germany
-  Wind area Netherlands
-  Onshore hydrogen network
-  Offshore hydrogen network
-  Anticipated onshore hydrogen network
-  Other pipelines





European Hydrogen Policy Framework

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



Excelling in Hydrogen

Dutch solutions for a climate-neutral world



NL

Netherlands

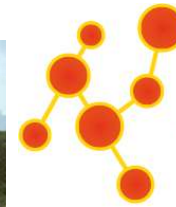
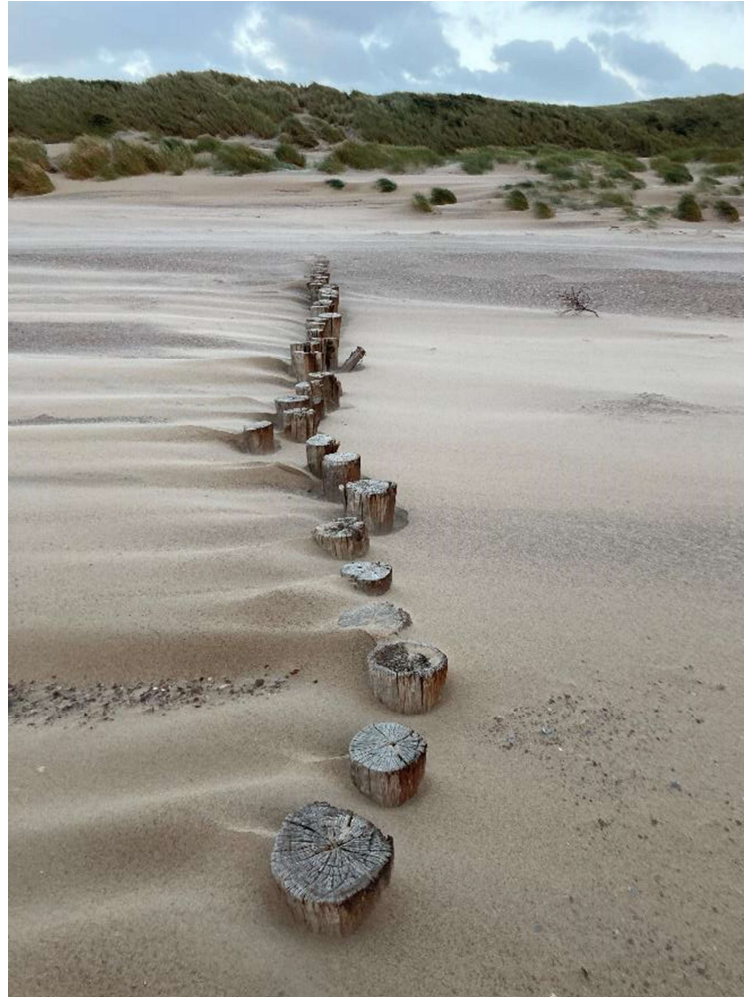


Thank you
for your attention!

Jörg Gigler

jorg@gigler.nl

+31 6 4525 1571



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Topsector Energie

