

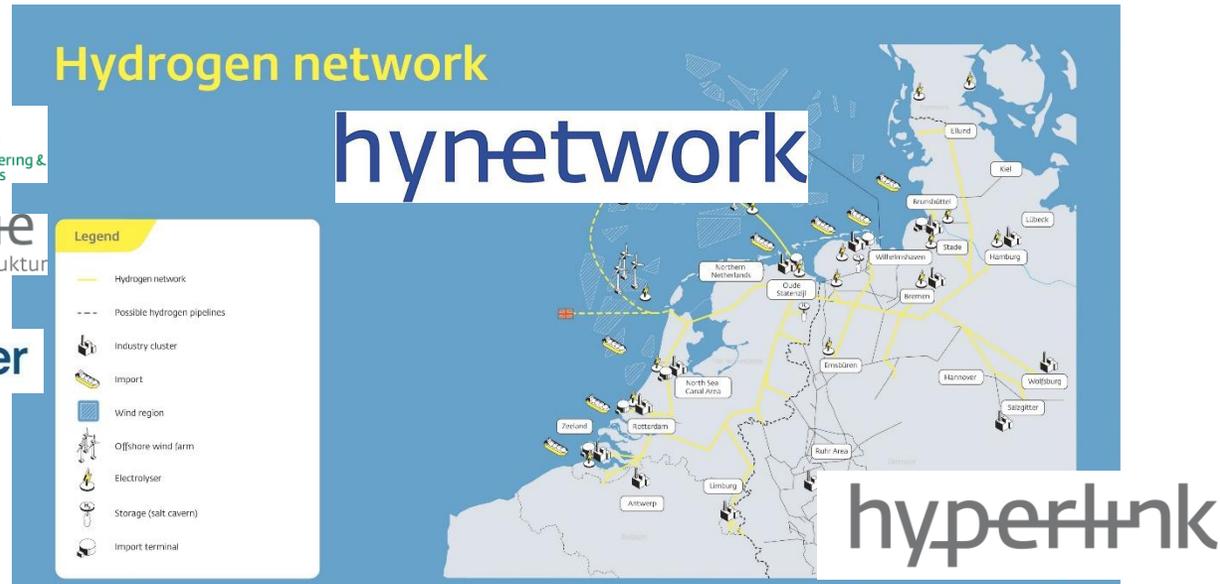
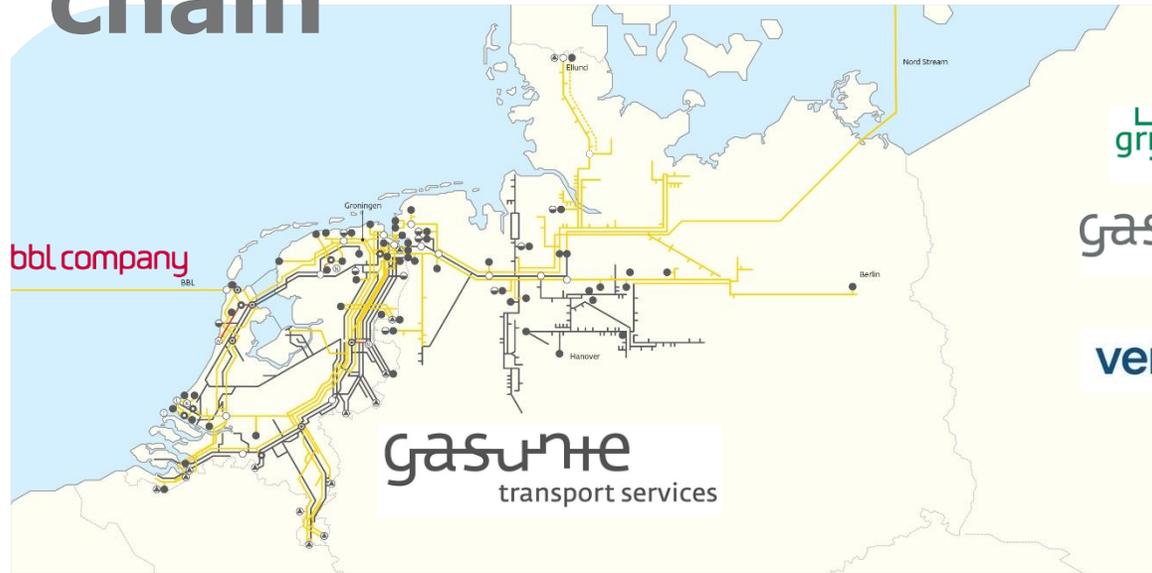
Underground Hydrogen Storage

HyStock hydrogen storage in salt caverns in Zuidwending

by Eddy Kuperus



Gasunie: Not 'just pipelines' and not 'just gas' but a connecting factor in the energy value chain



Import

Storage

Other 'gasses'

EemsEnergyTerminal

EETH₂

energystock

fast cycle gas storage

H₂CAST Etzel

delta rhine corridor
H₂ | CO₂

Porthos
CO₂ TRANSPORT & STORAGE

Gate terminal
Gas Access To Europe

æee Terminal Rotterdam

hystock
power to hydrogen

SpHyGER Etzel

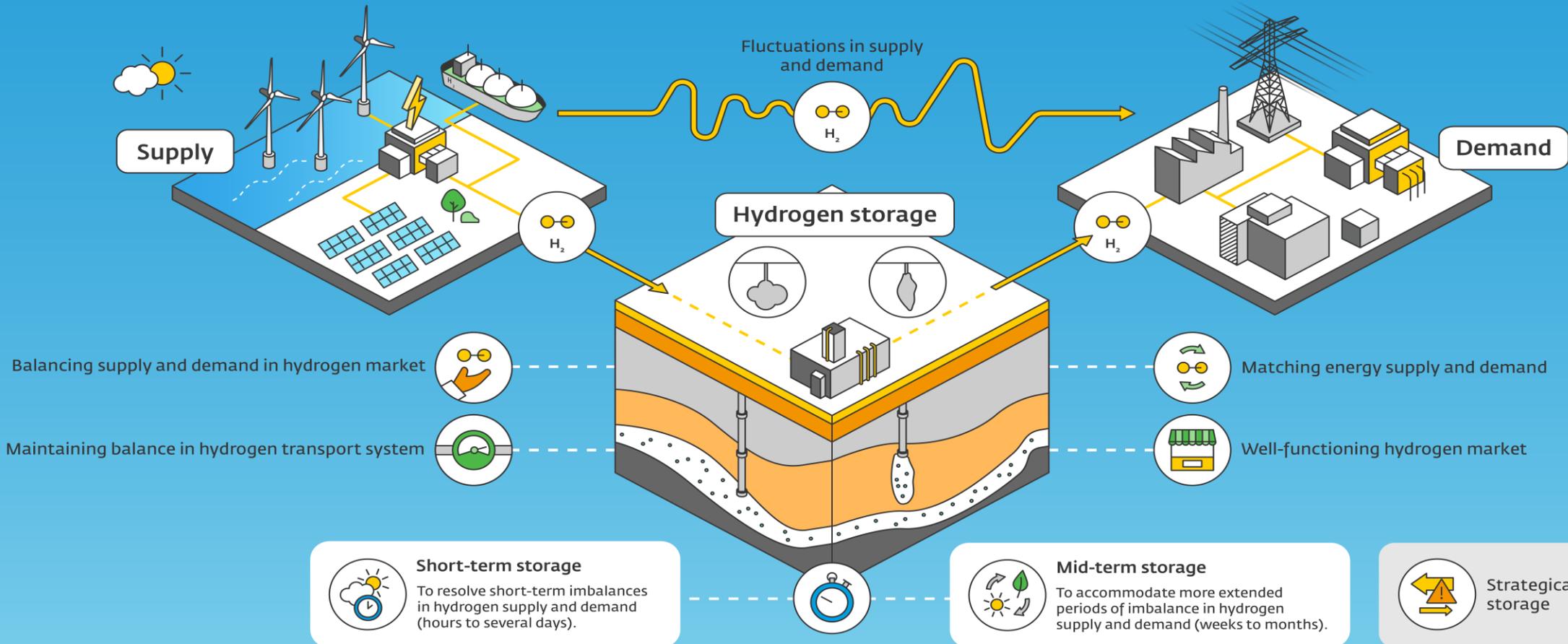
CONEXT

ARAMIS

gasunie

Full of new energy

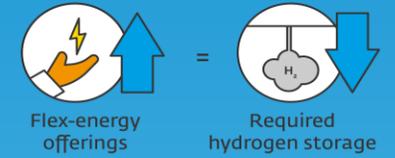
Underground hydrogen storage: indispensable for a well-functioning hydrogen system and crucial for an efficient energysystem



April 2024

Available techniques for underground hydrogen storage

Potential alternative flexibility resources



Hydrogen storage in salt caverns

Typically suitable for



Short-term storage

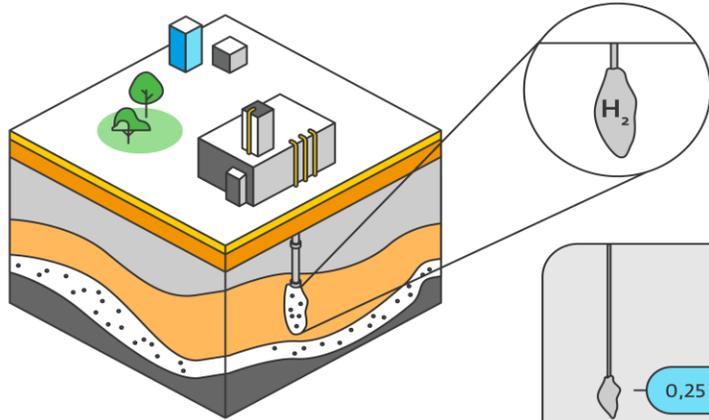


Mid-term storage

Possible locations



Where salt domes are available:
NL, offshore, DE



Capacity

0,25 TWh

8 - 20 TWh

32 caverns are equivalent to a small 8 TWh gas field

Hydrogen storage in depleted gas fields

Typically suitable for



Mid-term storage

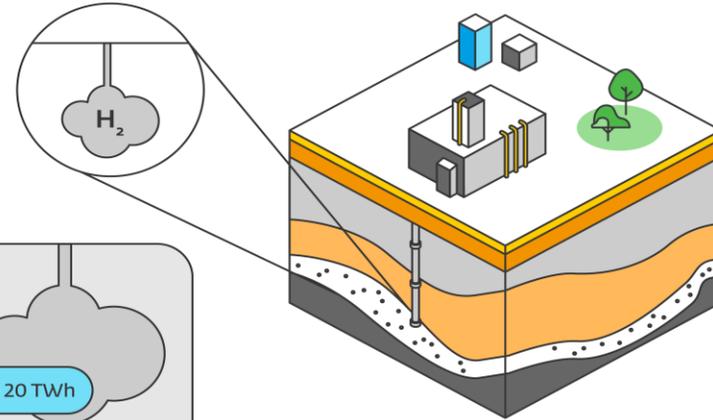


Strategical storage

Possible locations



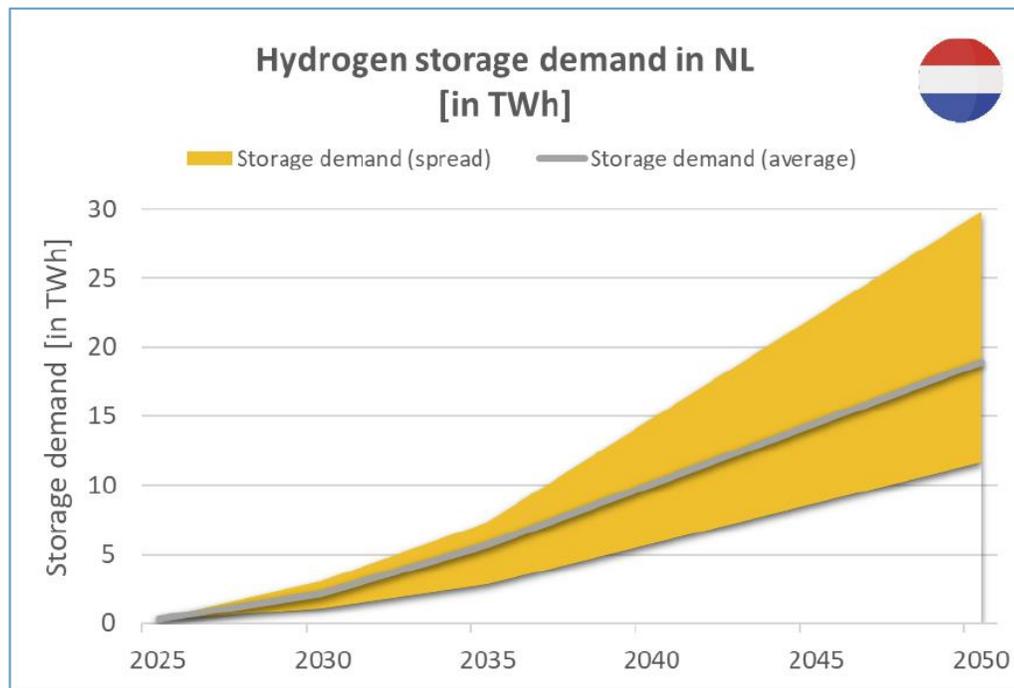
Where empty gas fields are available:
NL, offshore, DE



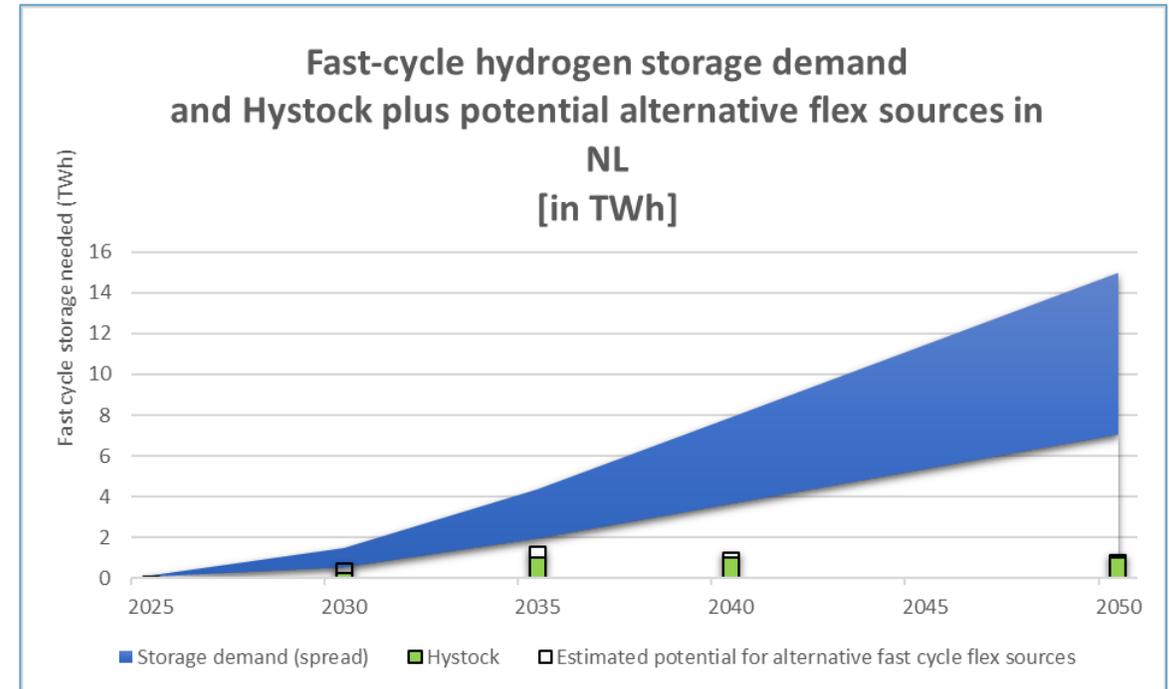
Salt caverns are expected to remain the most obvious technical and scalable option until 2035.

The challenge: hydrogen storage demand by 2050

Future energy system scenarios from different studies for the Netherlands show **large** demand for H2 storage capacity.



Source: Gasunie based on I13050



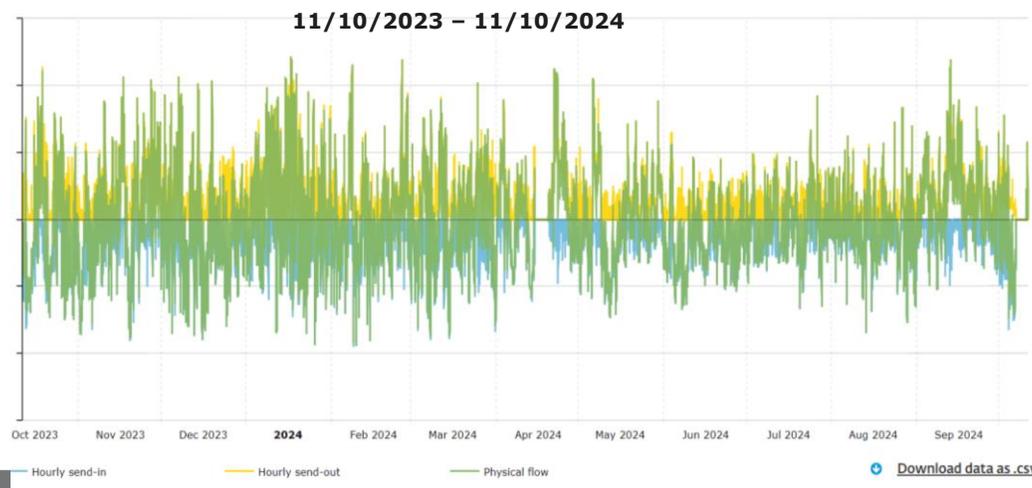
Source: Gasunie based on I13050

- In NL demand ranges from 14 to 30 TWh by 2050 (excluding extreme weather and strategic storage)
 - In 2035 storage needs mainly depend on H2-goals and RED III correlation rules
 - In 2040 storage needs will be heavily impacted by demand from power production
- Differentiation in storage characteristics (short term / high cyclic to long term / lower frequency)

EnergyStock Underground Gas Storage

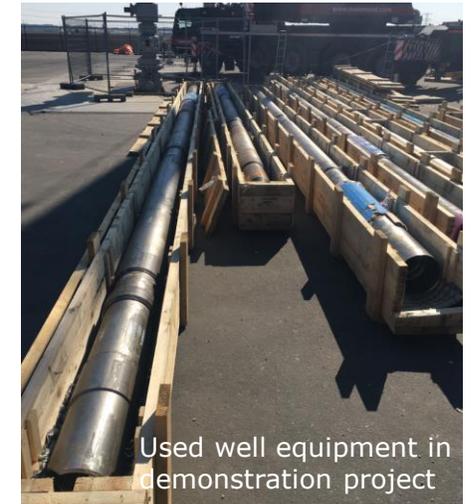
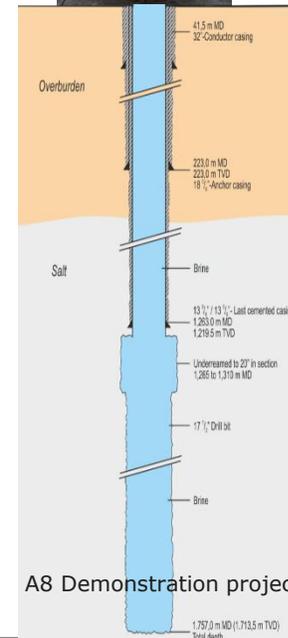


- 6 Gas storage caverns in operation since 2010
- Cavern volume ranges between 550.000 and 1.000.000 m³
- Cavern dimensions: height ~350 meter, diameter ~80 meter
- Fast cyclic operation

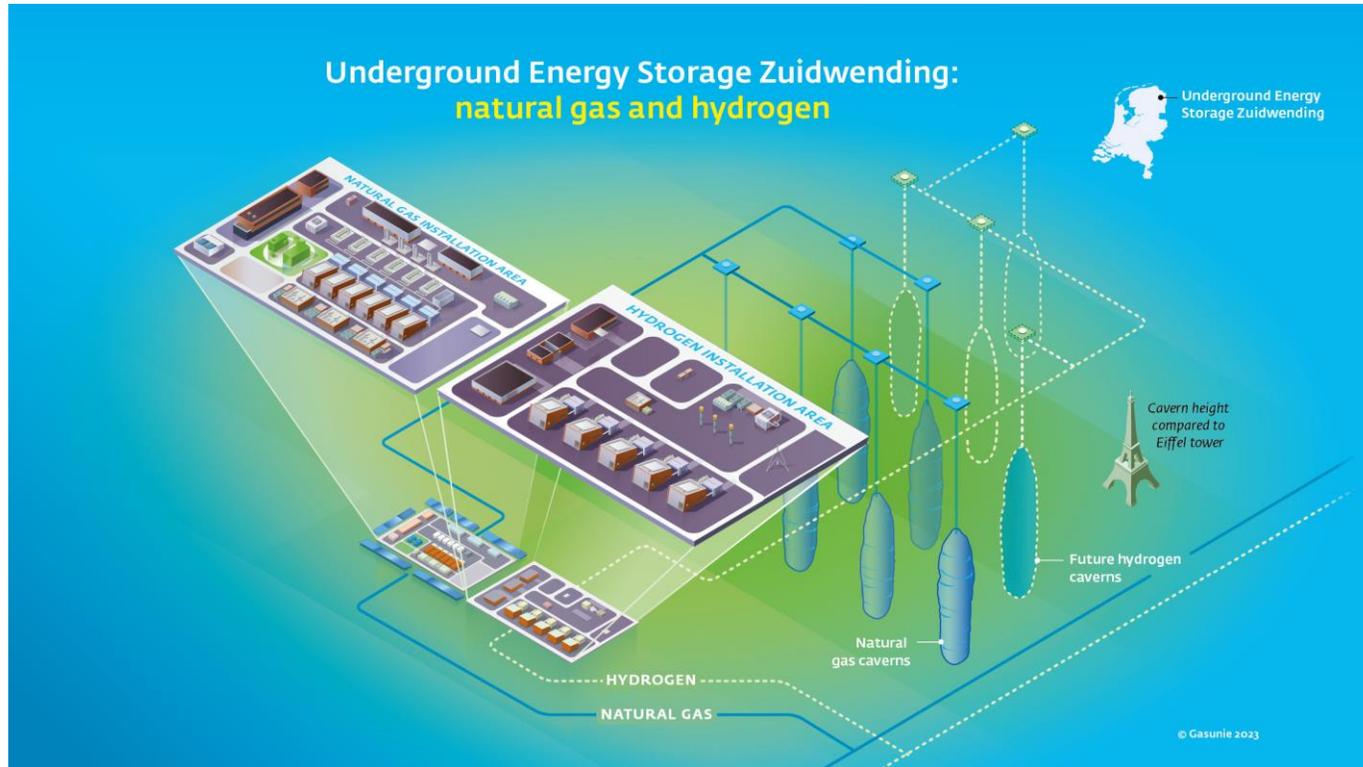


www.energystock.com/market-data/flow-information

Gasunie: Hydrogen activities in Zuidwending 2017 -2022



HyStock Underground Hydrogen Storage



- 4 storage caverns
- Cavern volume 1.000.000 m³
- Cavern dimensions: height ~450 meter, diameter ~90 meter
- Fast cycle operation
- Hydrogen quality 98 or 99,5%

www.energystock.com/market-data/flow-information

HyStock Underground Hydrogen Storage



- Commercial operation in 2029
- 3 new caverns in operation between 2031-2034
- Scalable development concept for surface facilities
- Evaluation drilling in Q1-Q2 2025 (Nobian)



Stakeholder and community engagement (in practice)



Inform

Recurring information meetings & proactive communication



Predictable

Say what we do & do what we say!



Empower

Support local initiatives eg. through sponsorship



Transparent

E.g. Seismic reports, presentations are a.o. made publicly available on www.energiebufferzuidwending.nl/



Participate

Consult local residents in decision making proces



Invest

Set up and expanding nature projects



Meet up the neighbors

hystock
power to hydrogen

energystock
fast cycle gas storage



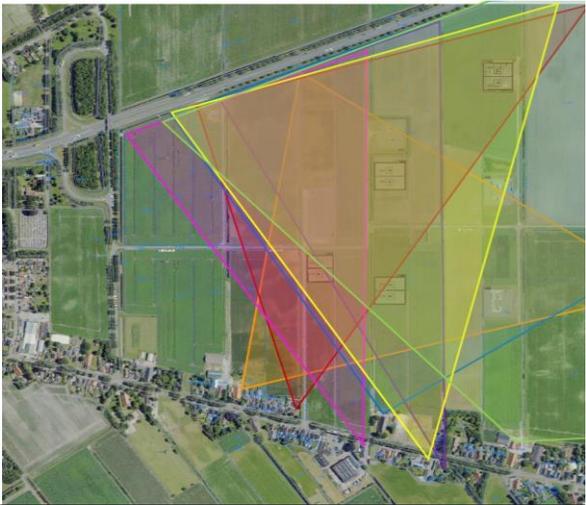
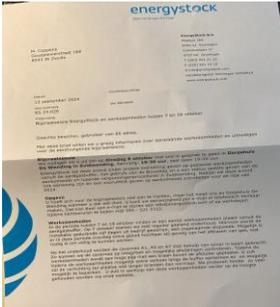
Inpassing discussie



Meet up the neighbors



Partridge project



Inpassing discussie



13 oktober 2024

Onderhoud installatie en inspectie cavernes tussen 7 en 18 oktober

Tussen 7 en 18 oktober voert EnergyStock verschillende werkzaamheden uit bij de...

[Lees verder >](#)



13 september 2024

Publicatie ontwerpbesluiten voor evaluatieboringen en diepboring

Op 13 september 2024 heeft het ministerie van Klimaat en Groene Groei (KGG) de ontwerpbesluiten...

[Lees verder >](#)



18 juli 2024

Microseismisch meetnetwerk: rapportage tweede kwartaal 2024

Het microseismisch meetnetwerk in Zuidvending is geïnstalleerd om de ondergrondse zoutberg met...

[Lees verder >](#)



Local sponsorship



Up to date website