Porthos

CO_2 transport and offshore storage from Rotterdam, the Netherlands

Bram Herfkens, project manager Storage

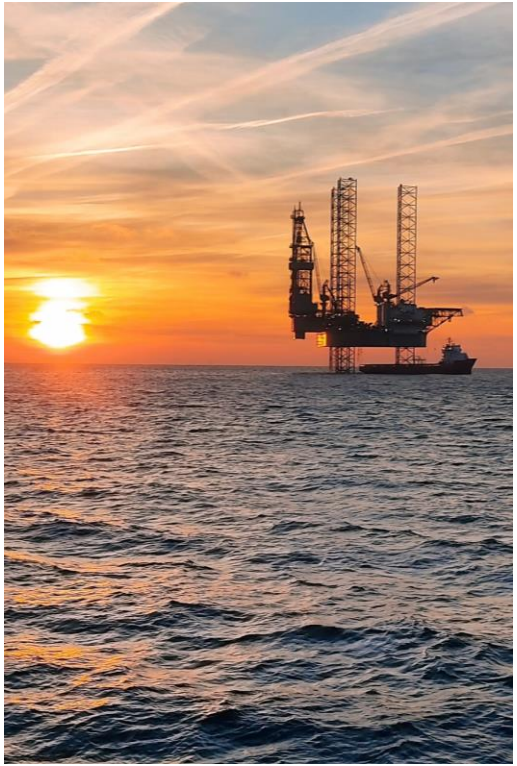
5th International workshop on offshore CCS, 19 May 2022

Co-financed by the Connecting Europe Facility of the European Union

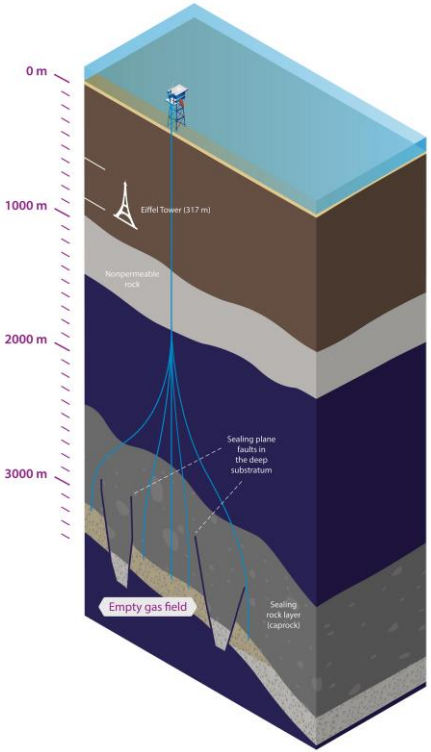
Porthos
CO_2 TRANSPORT & STORAGE

Technical Aspects of Depleted Gas Fields

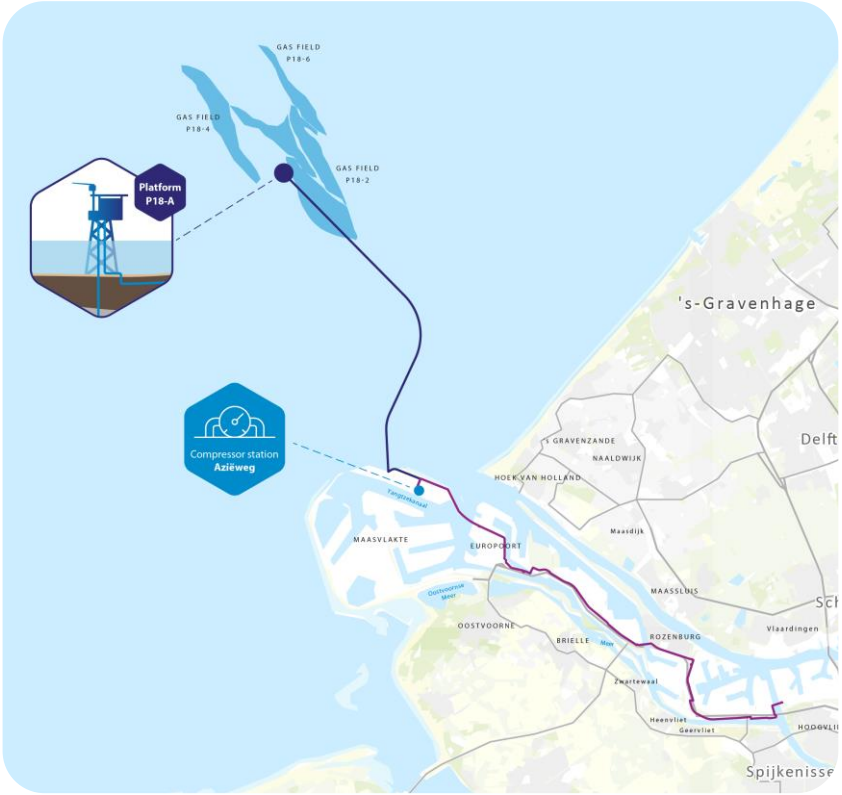
- Reuse of Facilities
- Re-use of wells
- Gasfield Containment & Seismicity
- Thermodynamics
- Permits & Lookahead



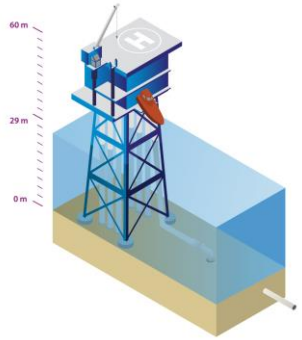
Porthos



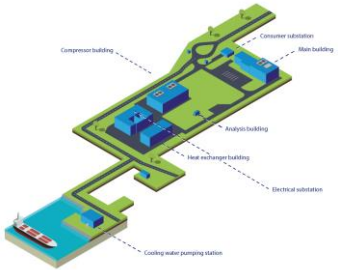
Re-use of depleted gas fields



Onshore & Offshore pipelines



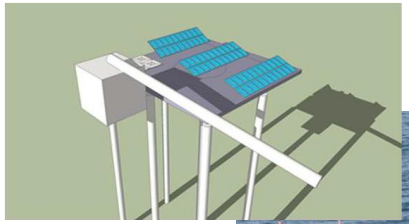
Re-use of Platform

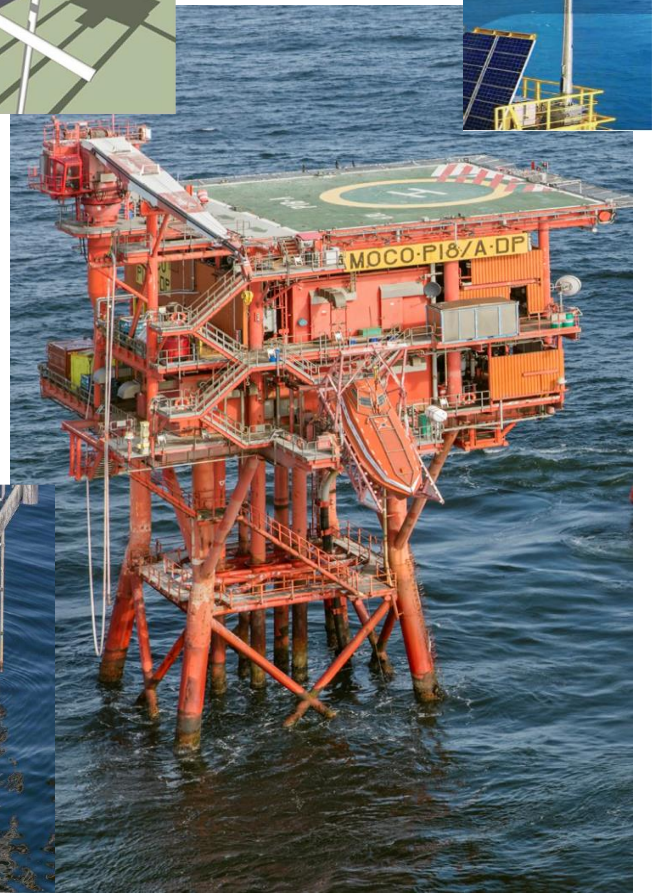


New compressor station

Reuse of Facilities

- Life time extension assessment
- Maintenance philosophy: from break-down to preventive
- Concurrent operations: gas production & CO2 injection
- Change operations & logistics to daylight only and boat access
- Gas price development impacts cease of production dates



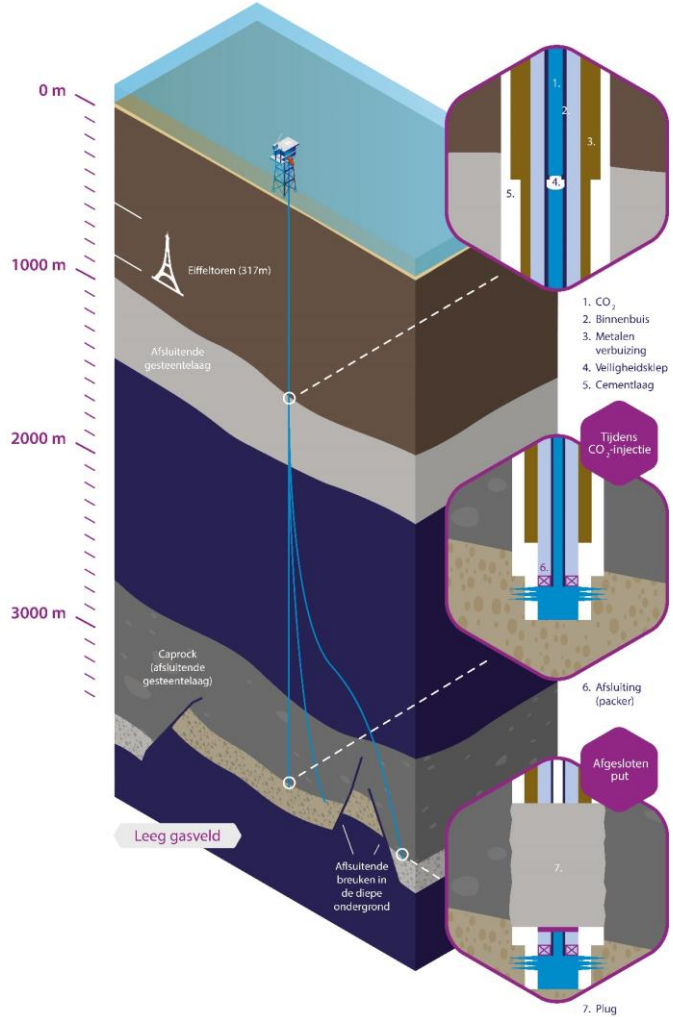


Re-use of gas wells

Well integrity
- Cement bond logs reliable?
- Status of casing, liners and conductors
- Annulus pressures

Well Design
- New completions
- Thermal loads and tubing of Cr25
- DTS / DAS monitoring
- Developed SSSV’s for arctic conditions

Well Containment
- Thermal loading: debonding of casing-cement-rock face
- Hydrostatic head/pressure as containment barrier

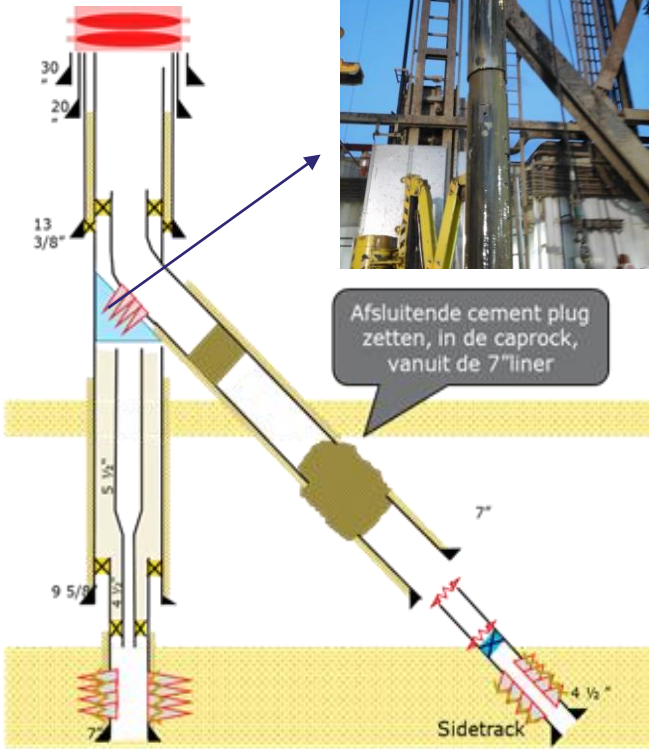


Closure of gas production wells

Well Abandonment:

- Re-entry of suspended wells
- Complex wells, not designed for re-use or re-entry
- Full bore formation plugs become the standard?

Successful well campaign pre-FID to de-risk the project



Risk Management Storage

1	Containment Risk	• Migration • Leakage
2	Seismic Risk	• Earthquake • Leakage
3	Operational Risk	• Flow Assurance and control
4	Commercial Risk	• Injectivity • Storage Capacity

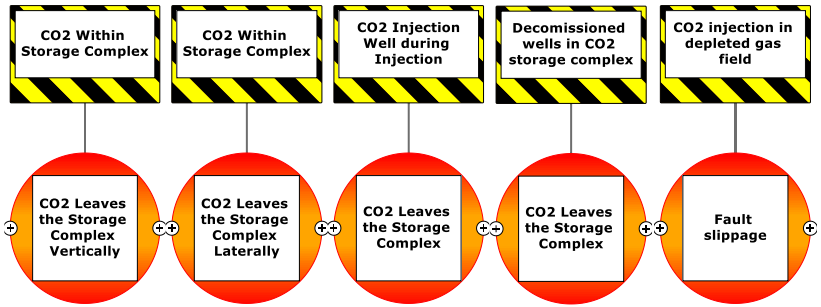
Key Technical Aspects

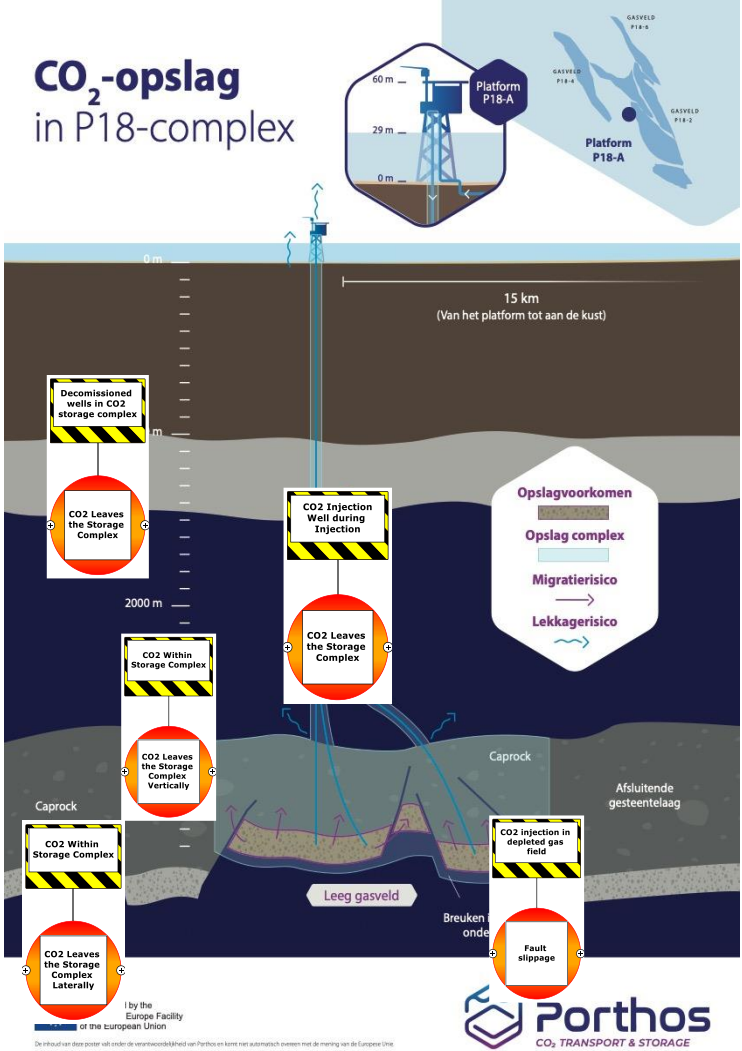
A.Containment

1. from the reservoir laterally
2. from the reservoir vertically
3. from injection wells, during injection
4. from wells after plugging and abandoning

B.Seismicity

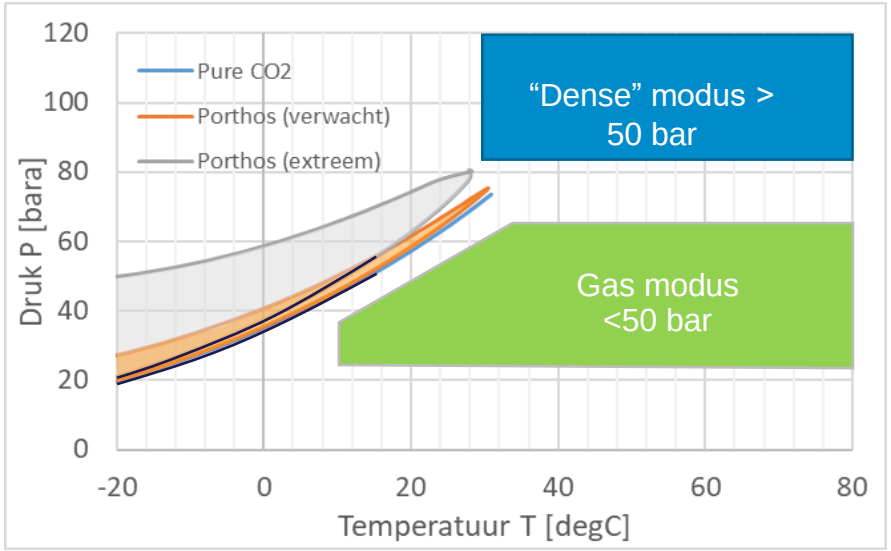
5. Fault slippage -> “earthquake”



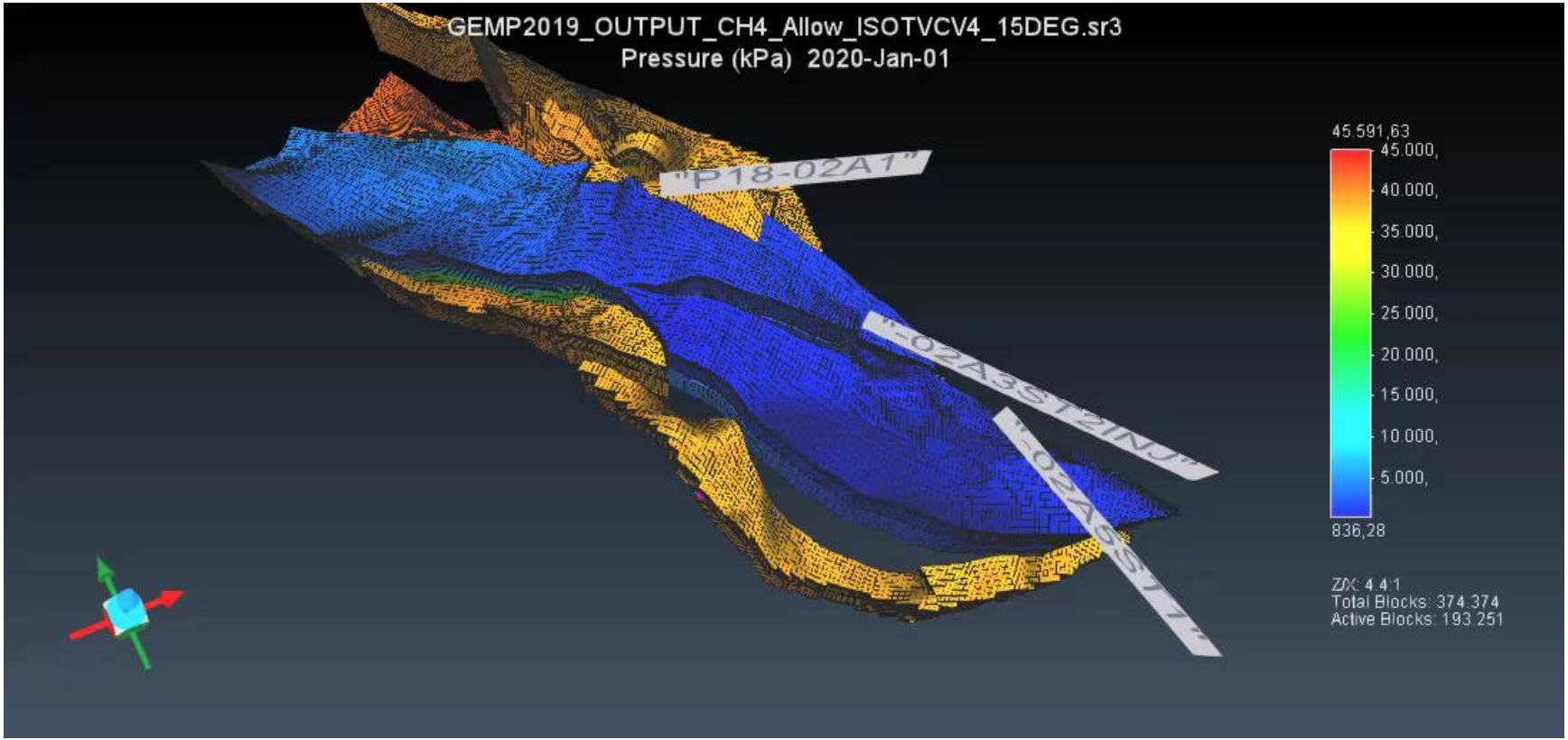


Storage in depleted fields is new

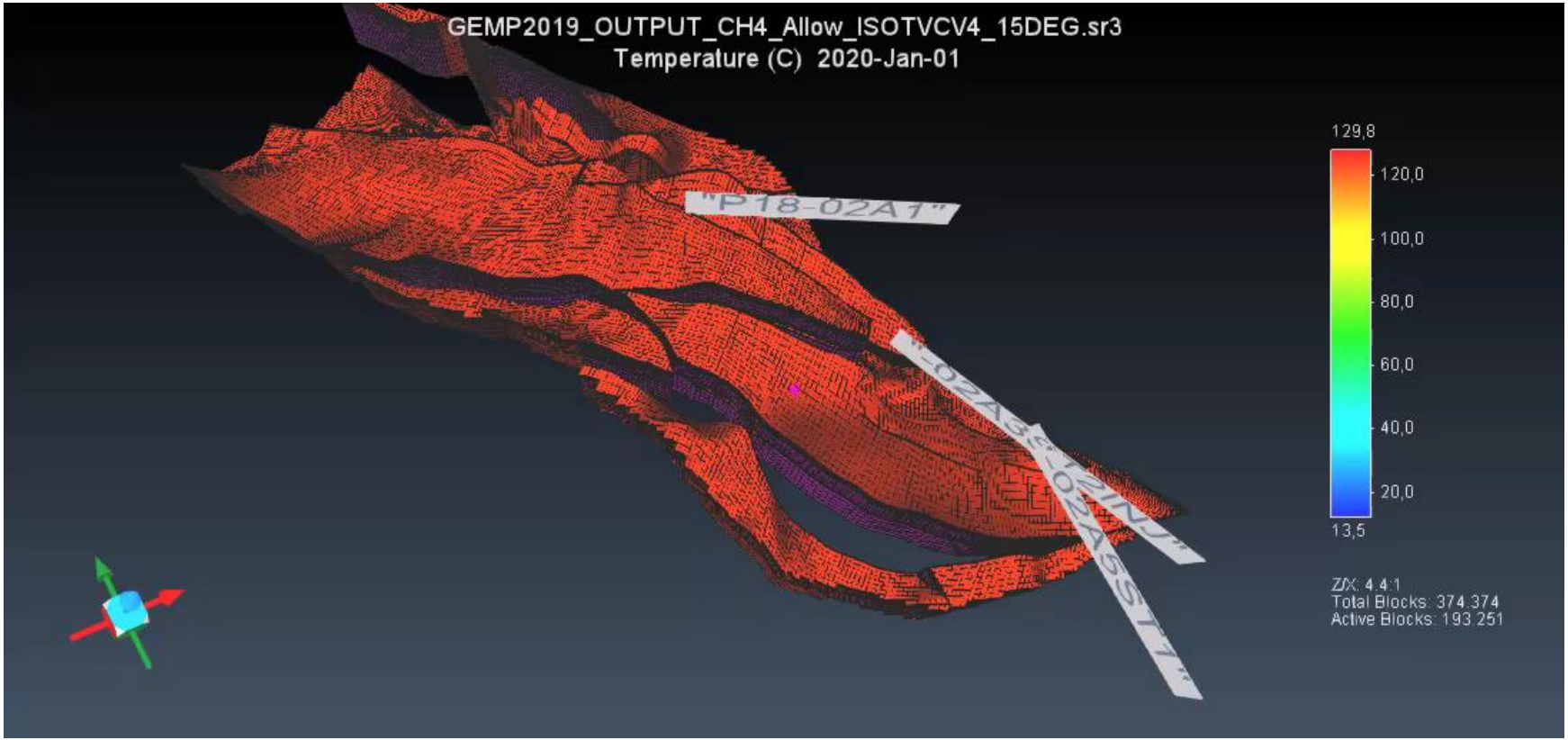
- Gas fields have a proven geological containment
- Reservoir pressure is low (20 bar, was >350 bar)
- CO2 transport is high pressure, dense mode
- Challenge is pressure drop
- Temperature drops with pressure drop
- Low temperatures in wells and reservoir
- Reservoir pressure will remail lower than (CO2) virgin pressure
- CO2 specification affects phase behaviour



Reservoir modeling
from under-pressure to equalized pressure

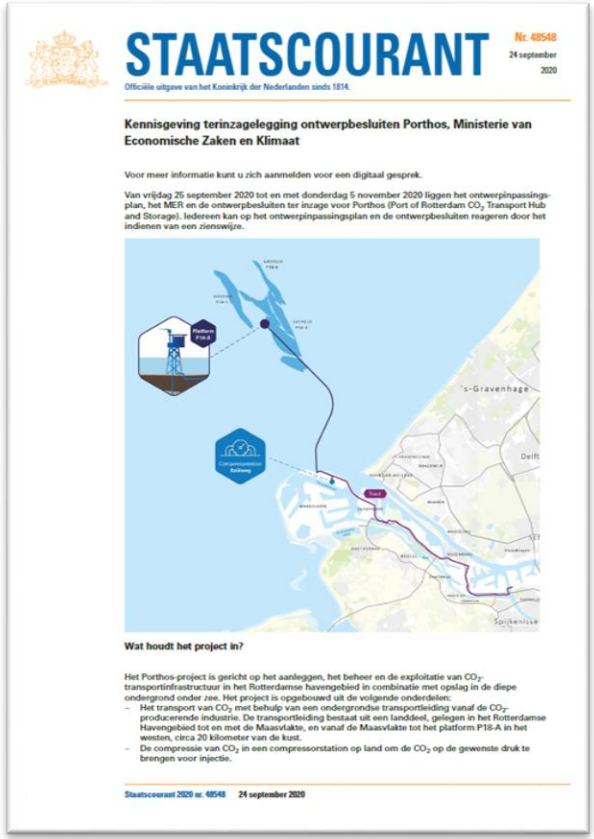


Reservoir modeling
Thermal effects and seismicity



Status of Permitting

- Porthos received the concept storage permits from the regulator (MEA).
- Now awaiting European committee advise and definitive permits
- Porthos permit was first of its kind.
  - How will other projects approach this?
  - How will authorities deal with defferences?



STAATSCOURANT

Nr. 48548
24 september 2020

Officiële uitgave van het Koninkrijk der Nederlanden sinds 1814.

Kennisgeving terinzagelegging ontwerpbesluiten Porthos, Ministerie van Economische Zaken en Klimaat

Voor meer informatie kunt u zich aanmelden voor een digitaal gesprek.

Van vrijdag 25 september 2020 tot en met donderdag 5 november 2020 liggen het ontwerpinpassingsplan, het MER en de ontwerpbesluiten ter inzage voor Porthos (Port of Rotterdam CO_2 Transport Hub and Storage). Iedereen kan op het ontwerpinpassingsplan en de ontwerpbesluiten reageren door het indienen van een zienswijze.

Wat houdt het project in?

Het Porthos-project is gericht op het aanleggen, het beheer en de exploitatie van CO_2-transportinfrastructuur in het Rotterdamse havengebied in combinatie met opslag in de diepe ondergrond onder zee. Het project is opgebouwd uit de volgende onderdelen:

- Het transport van CO_2 met behulp van een ondergrondse transportleiding vanaf de CO_2-producerende industrie. De transportleiding bestaat uit een landdeel, gelegen in het Rotterdamse Havengebied tot en met de Maasvlakte, en vanaf de Maasvlakte tot het platform P18-A in het westen, circa 20 kilometer van de kust.
- De compressie van CO_2 in een compressorstation op land om de CO_2 op de gewenste druk te brengen voor injectie.

Look ahead

Current

- Permit procedures
- Decommissioning of well
- FID deliverables
- European tenders construction compressor station and offshore pipeline

Second half of 2022

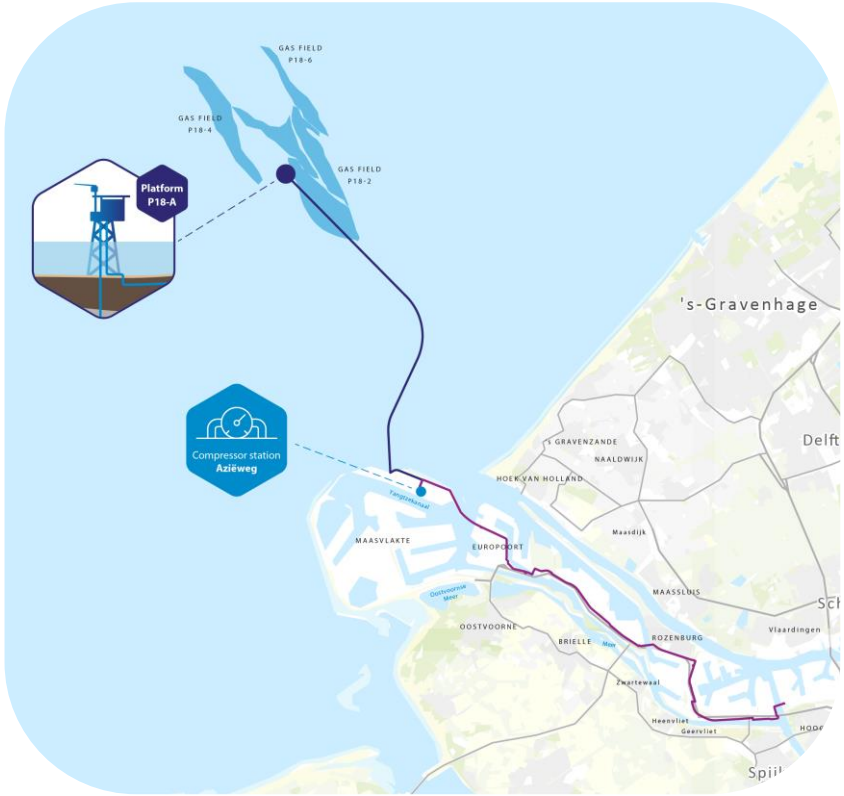
- Final Investment Decision (FID)

2023

- Start construction

2024/2025

- System operational



Thank you

The contents of this presentation are the sole responsibility of Porthos and do not necessarily reflect the opinion of the European Union.

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