Rotterdam CCUS project Porthos

Carbon Sequestration Leadership Forum

November 5th, 2019

Port of Rotterdam

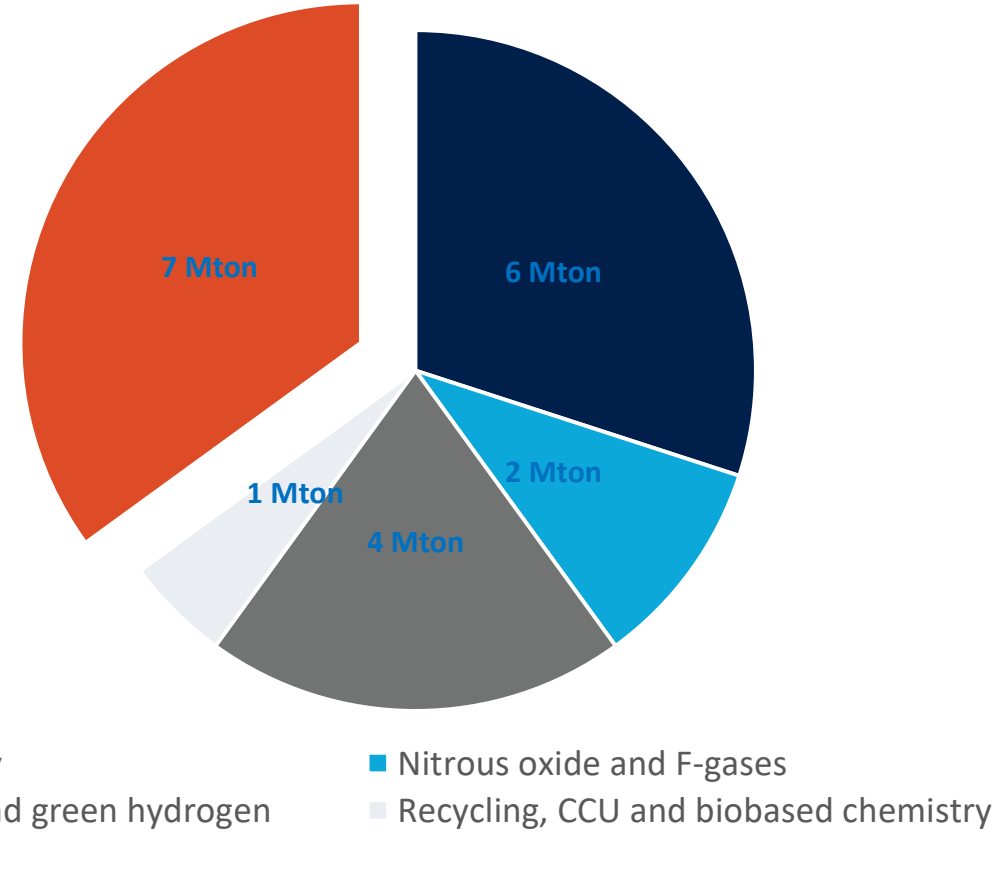
ebn

gasunie

European Commission

Situation in the Netherlands

- Climate target Paris & Dutch government: 49% reduction CO_2 by 2030
- National Climate Agreement:
  - Industry 14,3 Mton reduction per year, 7 Mton CCS = 50%
- Debate on Climate Agreement is about:
  - CO_2 tax vs. bonus-malus incentive
  - Who pays? Industry vs. civilians
  - Cap on CCS: quantity and timeframe

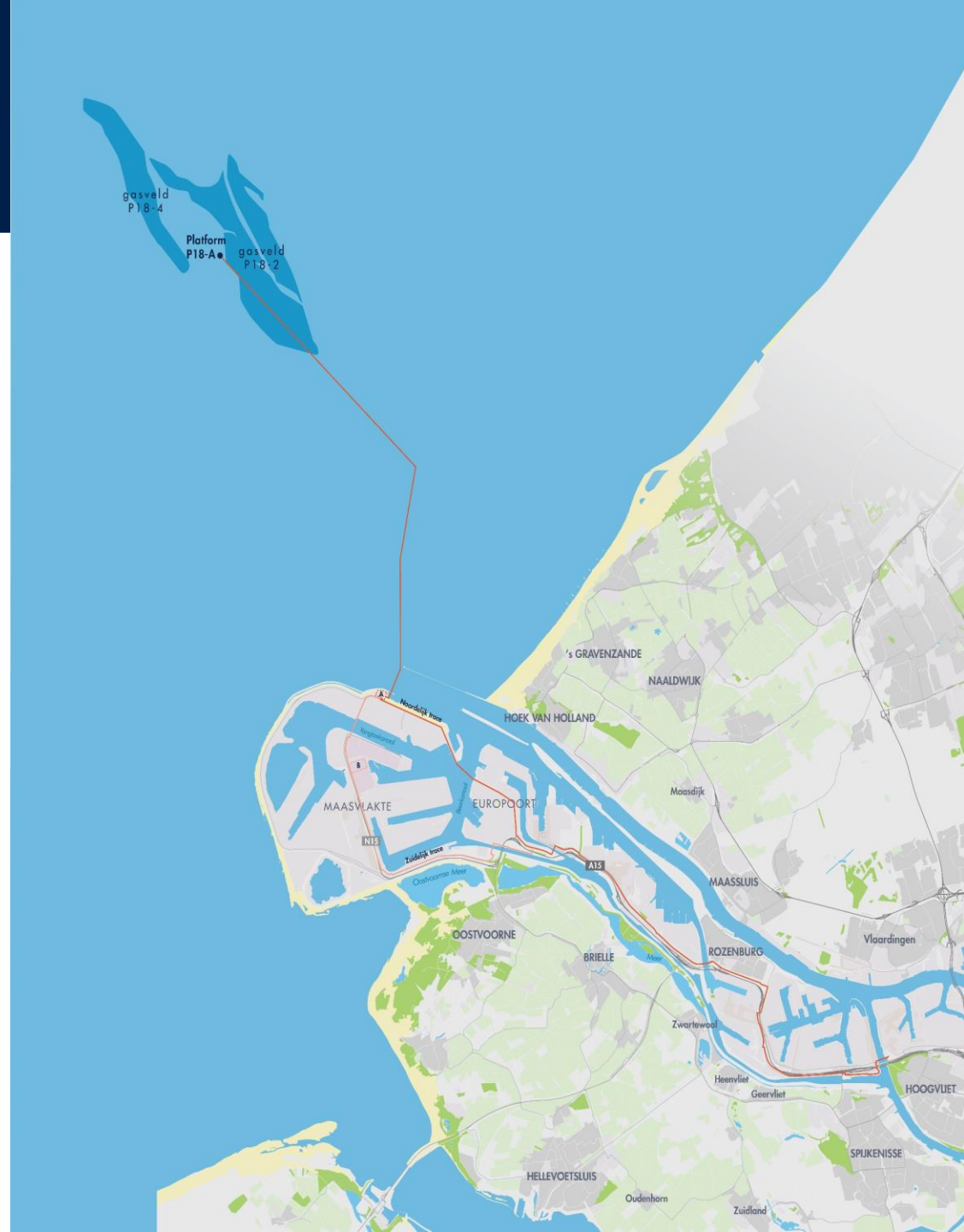


Rotterdam ideal location

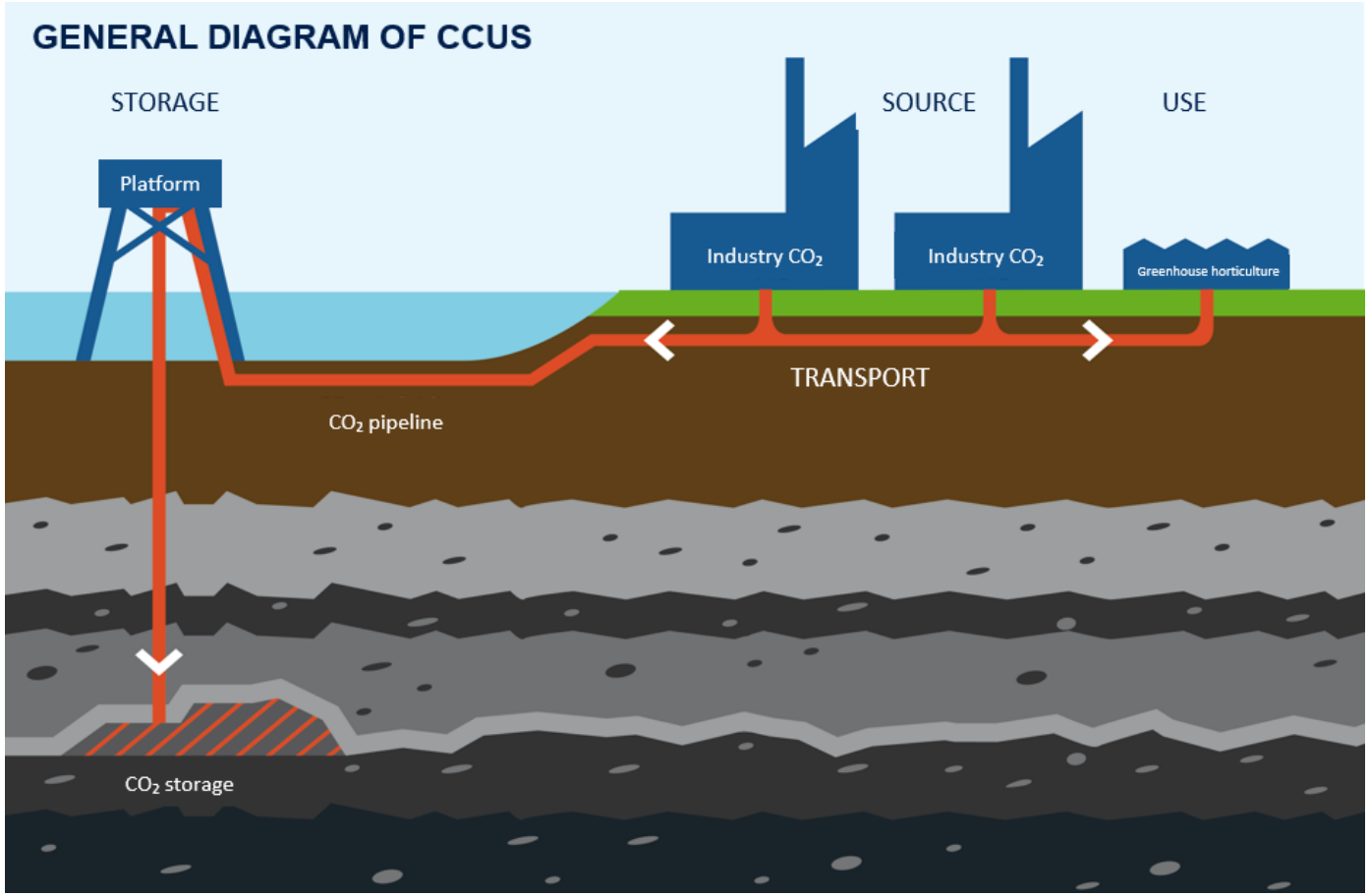
- Port of Rotterdam unique location for CCUS
  - ~ 16% national CO_2 emissions
  - Large industrial cluster
  - Relatively small area
  - Cost effective
  - Storage location offshore
  - Combination with other developments in the port, e.g. hydrogen

Rotterdam CCUS project Porthos

- **What:** one-stop-shop for open access CO_2 transport and storage network
- **Why:** to help meet the Dutch and EU CO_2 reduction targets of The Netherlands
- **Where:** Rotterdam as CCUS nucleus with storage in offshore P18 gas fields
- **Who:** initiated by 3 state-owned parties; EBN, Gasunie, Port of Rotterdam.
- **When:** ambition: ready for FID 2021 and commissioning in 2023

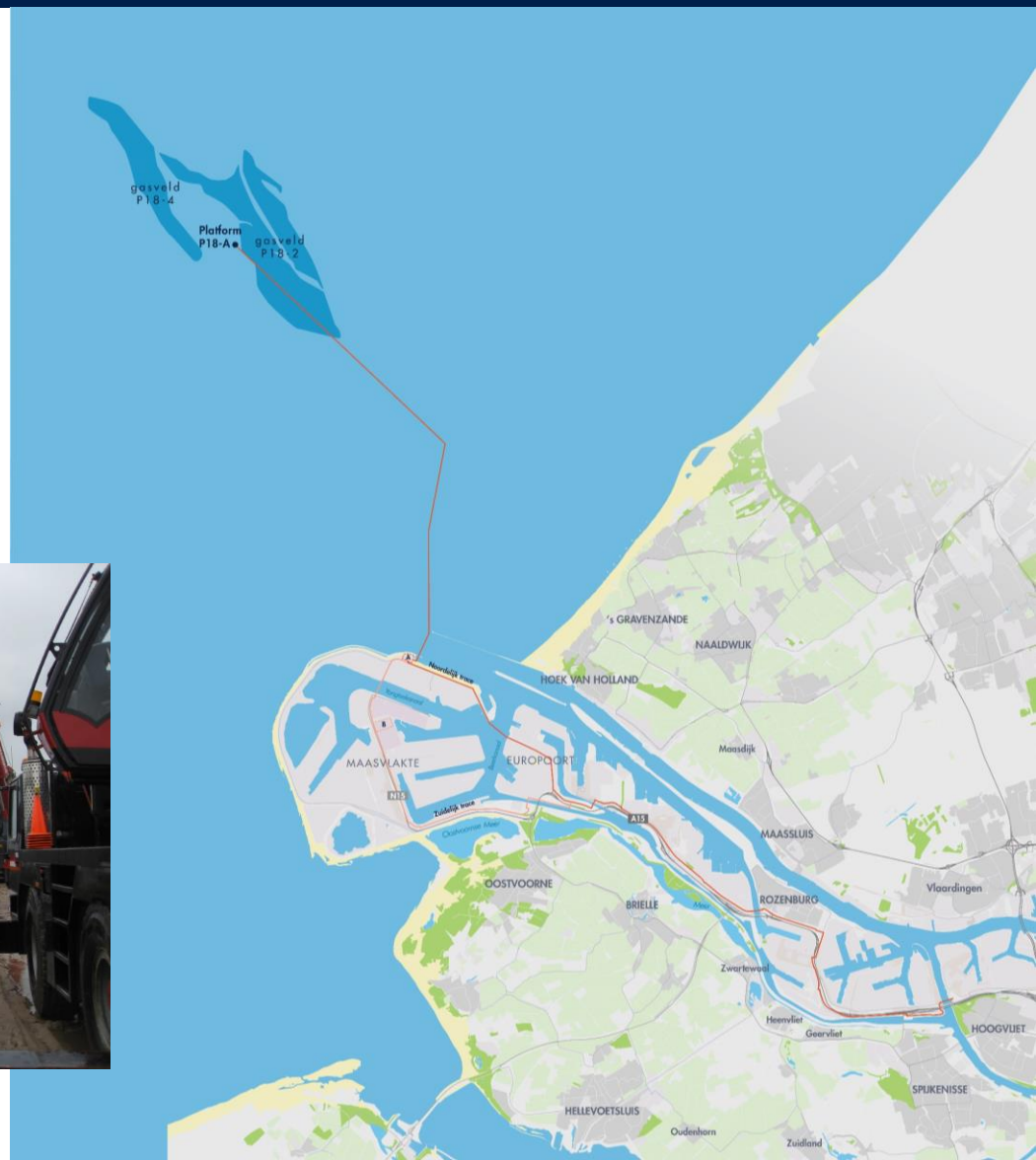


How does CCUS work?



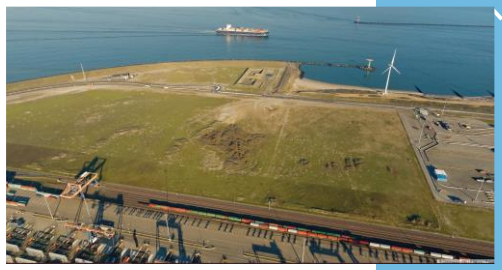
Transport: onshore pipeline

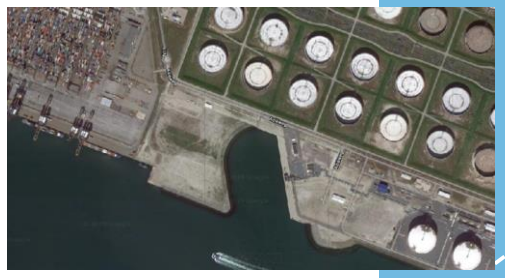
- In existing pipeline corridor
- Total length: 33 km
- Capacity: 5 Mton per year
- Diameter: 108 cm

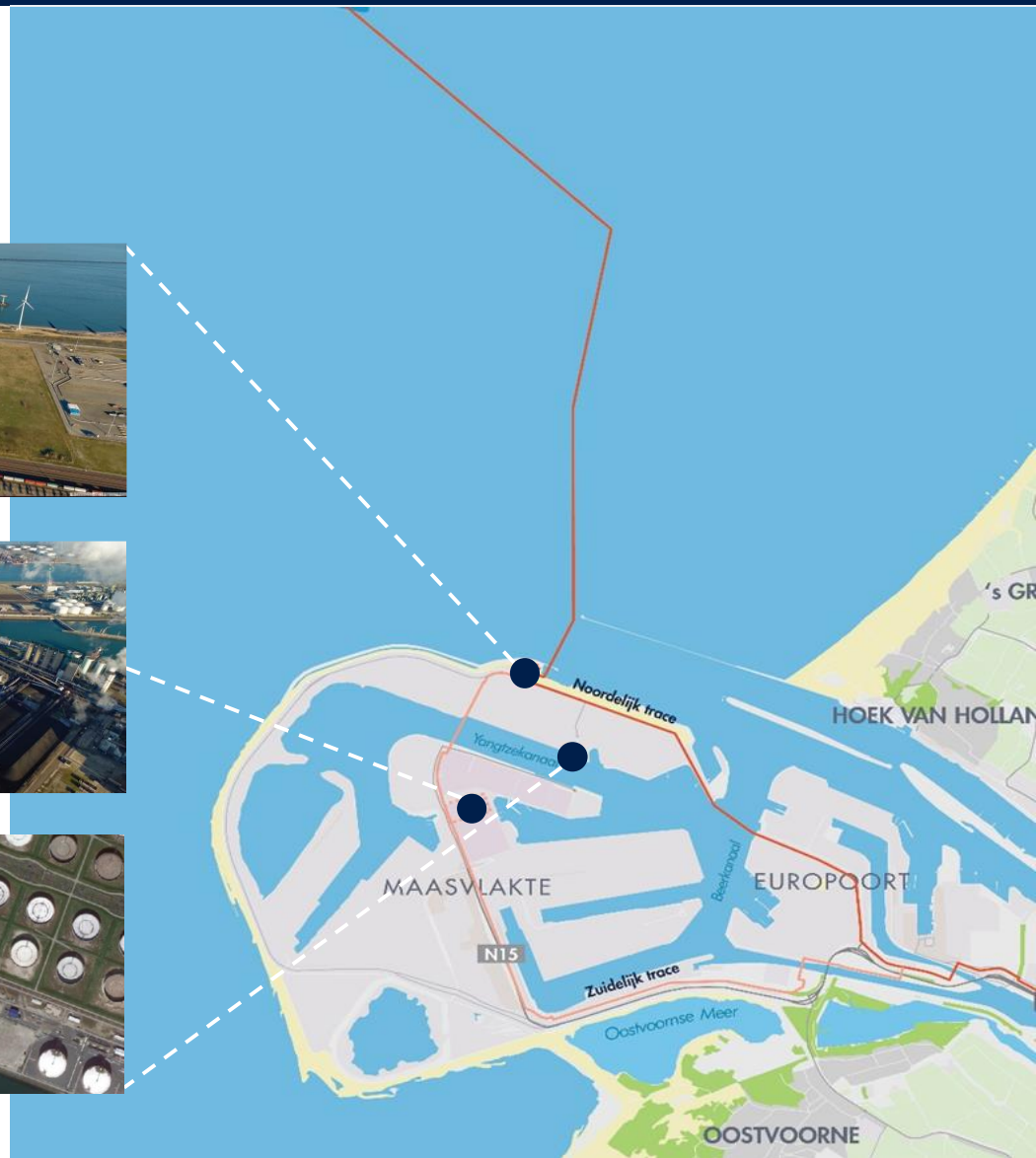


Transport: compressor station

- 3 possible locations: Edisonbaai, Europaweg, Aziëweg
- About 6 hectare
- Electricity
- Cooling installations
- Measure and control systems

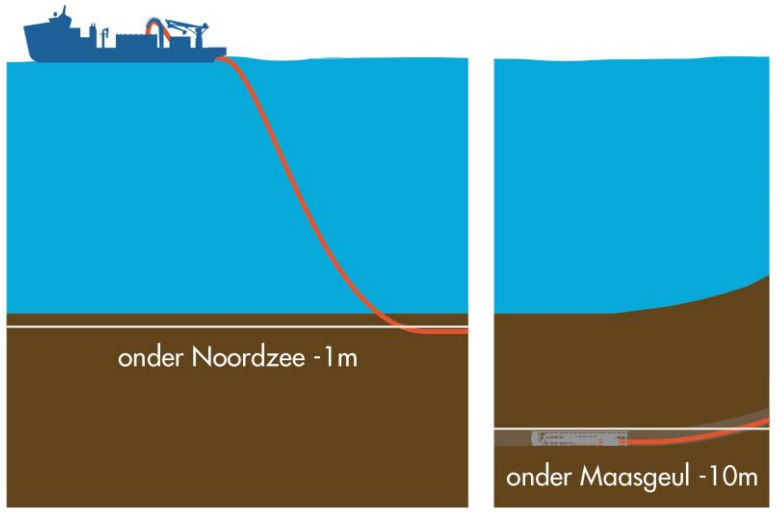






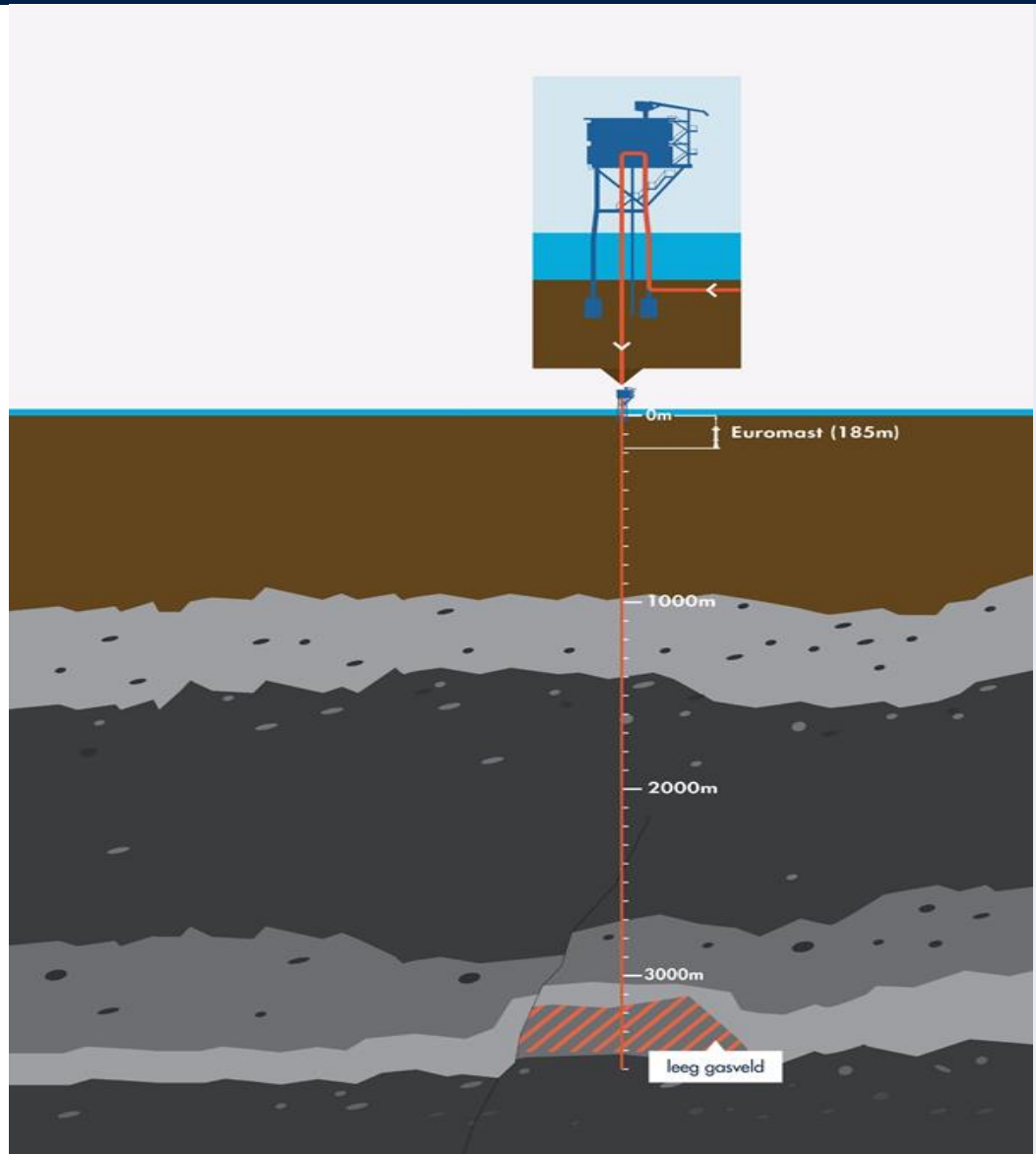
Transport: offshore pipeline

- From the Maasvlakte (compressor station) under the bottom of the North Sea to the P18 fields
- Diameter: 40 cm
- Total length: 21 km
- Capacity fields: 37 Mton
- Maasgeul: drilling (HDD)
- At sea: pipe laying ship



Storage

- (Almost) empty gas fields
- Natural closing through sealing layers
- Depth between 3.175 en 3.455 meter
- Re-use existing platforms and wells



Status of the Porthos project

✓ CCS included in preliminary Dutch Climate Accord

Subsidy support mechanism (SDE++)

✓ Porthos finalized Feasibility and Concept Select phases

Started Define Phase (Front End Engineering and Design)

✓ Expression of Interest process done

Industry expressed sufficient interest

✓ Started Environmental Impact Assessment (EIA) procedure

Public consultations in Rotterdam Industrial Area conducted

Challenges ahead towards a Final Investment Decision

- Business case
  - Close the financial gap: funding
- Regulatory
  - Allocating the storage liabilities and roles and responsibilities
- Technically
  - Developing a clear operating philosophy based on complex flow control
- Generally
  - CCS requires leadership and offensive policies, aimed at delivering projects in industrial clusters with high potential for CO_2 reduction

→ Final Investment Decision in 2021

Thank you for your attention

Port of Rotterdam ebn gasunie

European Commission