



Overcoming the Challenges of CCUS: Insights from Case Studies on Materials and Corrosion

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OIL & GAS
CCS

HYDROGEN

OFFSHORE WIND


Track record beginning with EOR & acid gas injection which led to Carbfix



Focus on corrosion and materials selection studies

2 MTPA Canada 
CO2 Specification support
Pipeline and downhole Materials Support


EOR in North America




Acid Gas Disposal in Cyprus 


11 MTPA UK  
Specification review
Stress Cracking
NOx and SOx Assessment
Pipeline repurposing

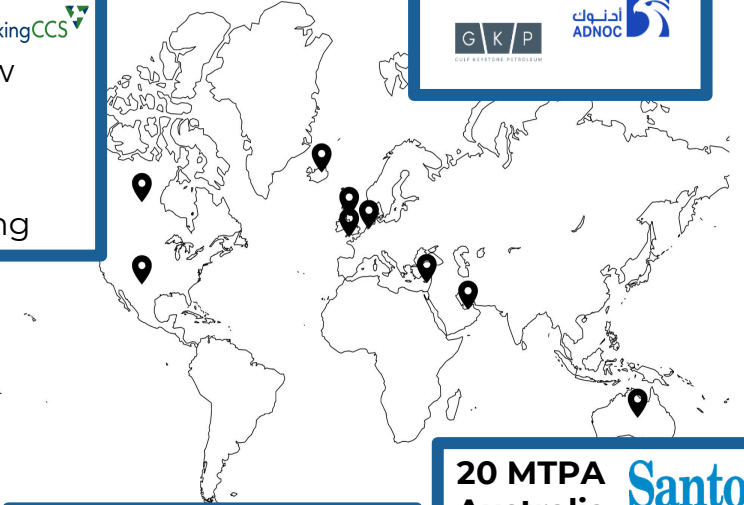
EOR and Acid Gas Disposal – UAE
 

10 MTPA UK 
Risk Assessment
Material Selection
Emitter Technology Review Support

2.5 MTPA Netherlands 
First Industry CO2 Disposal Project
Damage Mechanism Review
Specification Review

18,000 TPA Iceland 
High H2S Injection and downhole Material Selection

20 MTPA Australia 
Reservoir Thermodynamics
Material Selection
Risk Register



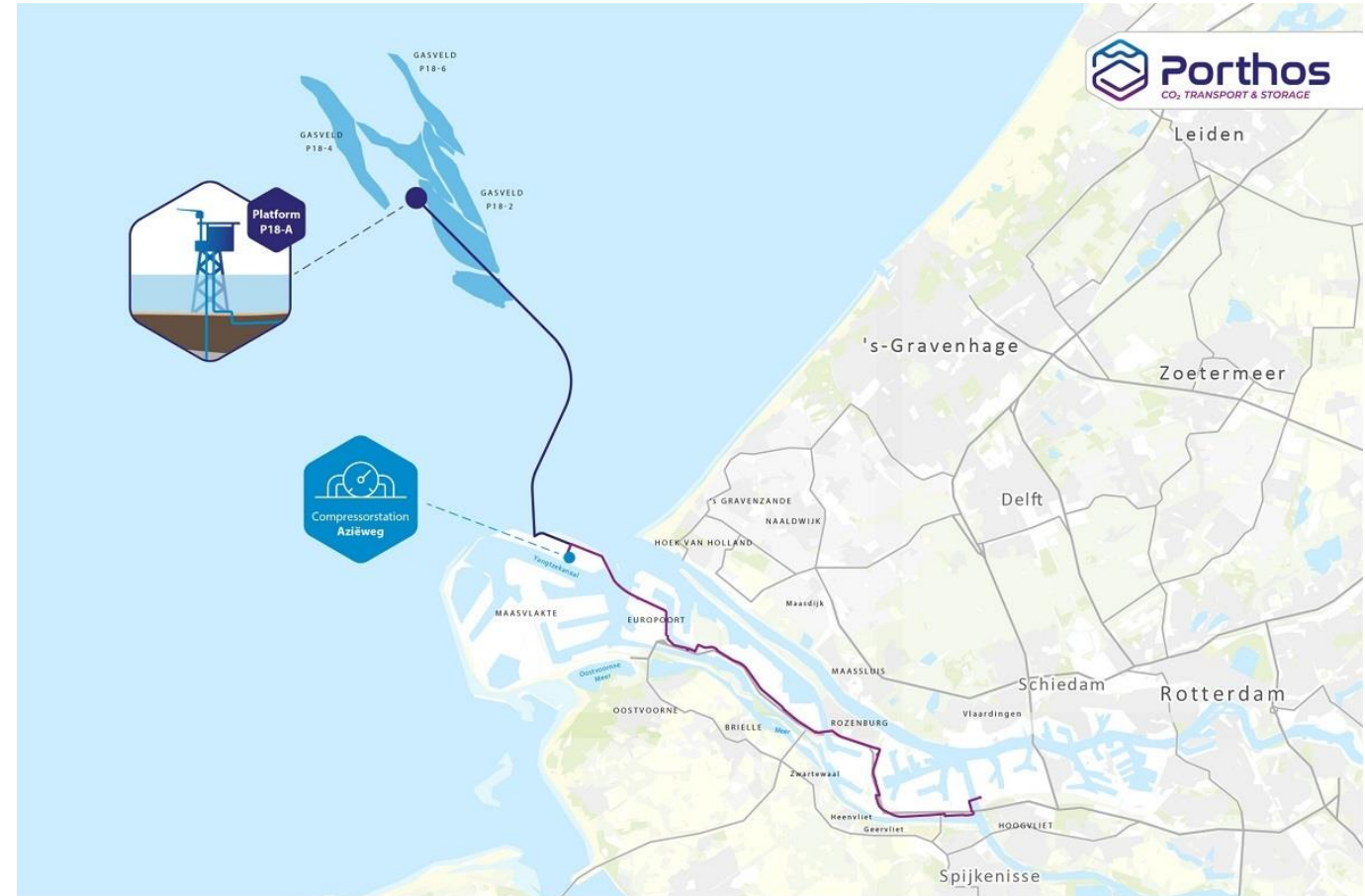
Case Study 1 – Porthos 2.5 MTPA CO₂e

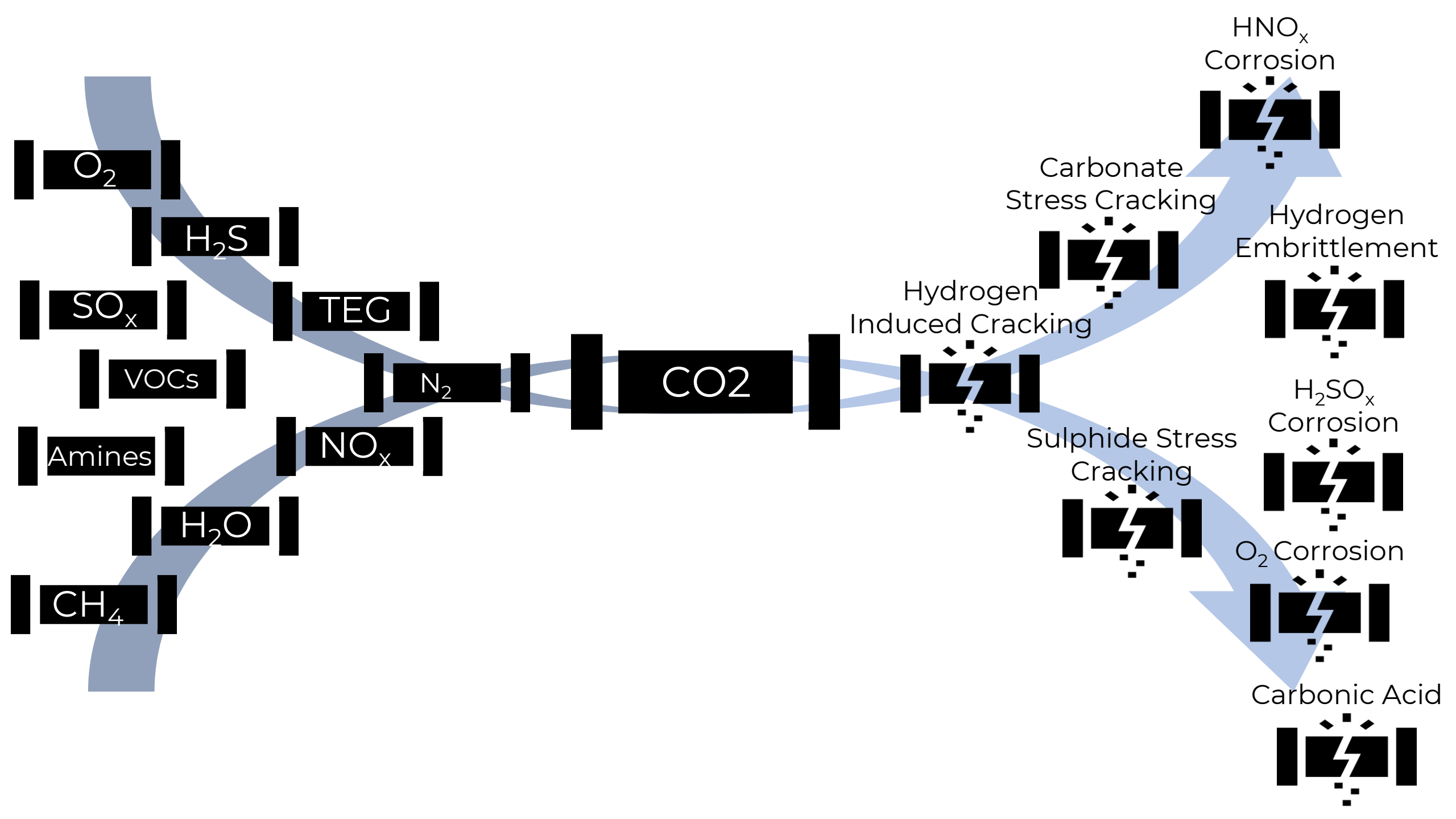
First industrial CCUS Hub

30km onshore section

20km offshore section

Onshore in gas phase, offshore dense.







Lack of Standards

Laboratory testing not available

Small data pool available

Unrealistic impurity limits

Case Study 2 – Whitecap 2 MTPA CO₂e

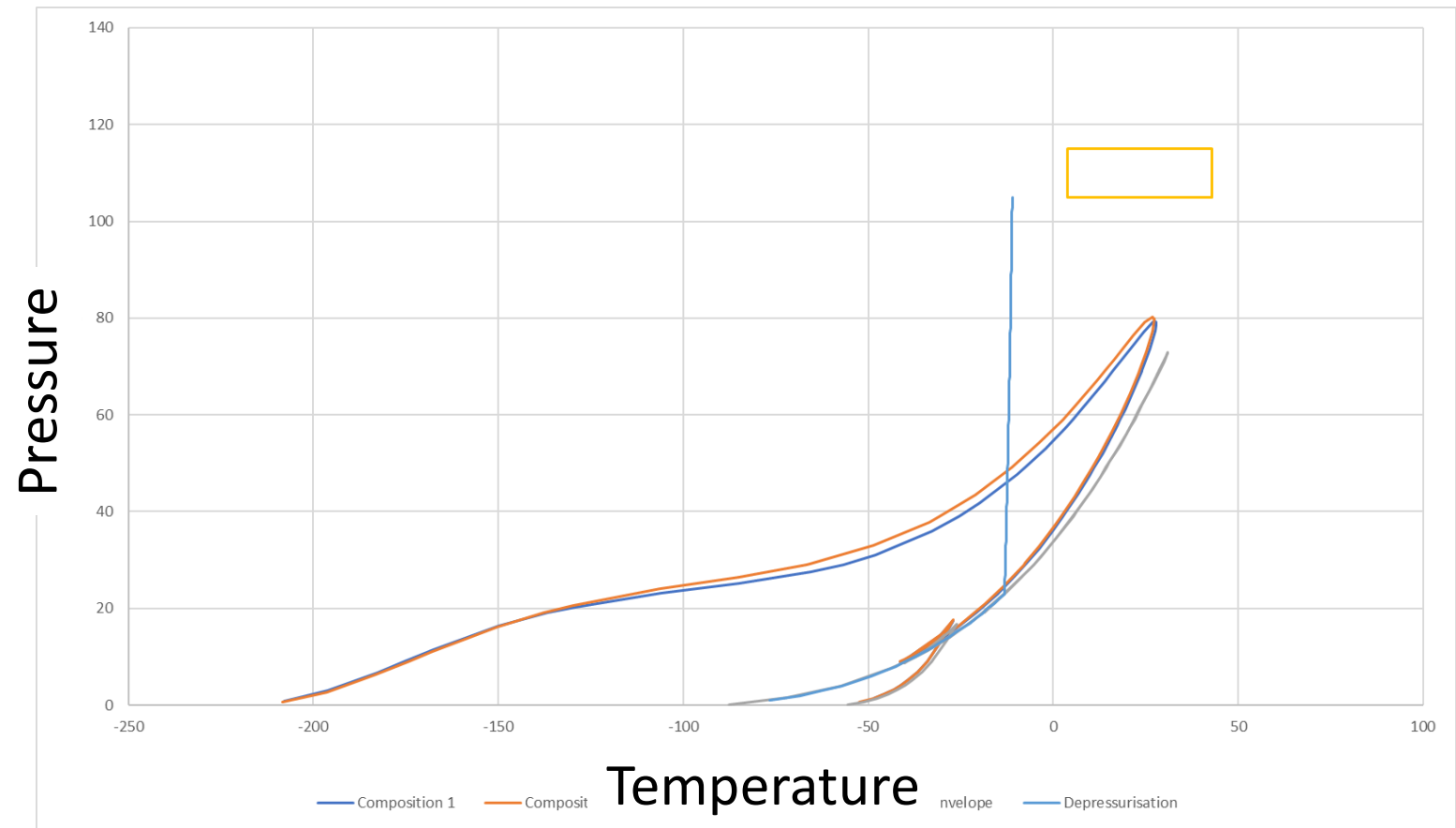
EOR System which is slowly attaching new emitters

Shifting from vertically integrated CO₂ system to horizontally



Assessed likelihood of two-phase flow via equation of state modelling to produce phase diagram.

Acid formation can be accelerated by O_2 presence in system.



Proposed depressurisation curve would inflict multiphase flow on pipeline, potentially increasing the risk of corrosion.

Project Changes

Further review of the CO₂ specification was necessary to determine the impact of adding emitters to the project.

Experienced Based

Based on work performed in previous projects to classify impurity limits in order to better understand effect of changing specification limits.



Case Study 3 – Cold eye document review

Long distance dense phase CO₂ pipeline

CO₂ sourced from several gas enrichment plants

Low spread of impurities but significant number of dangerous impurities.

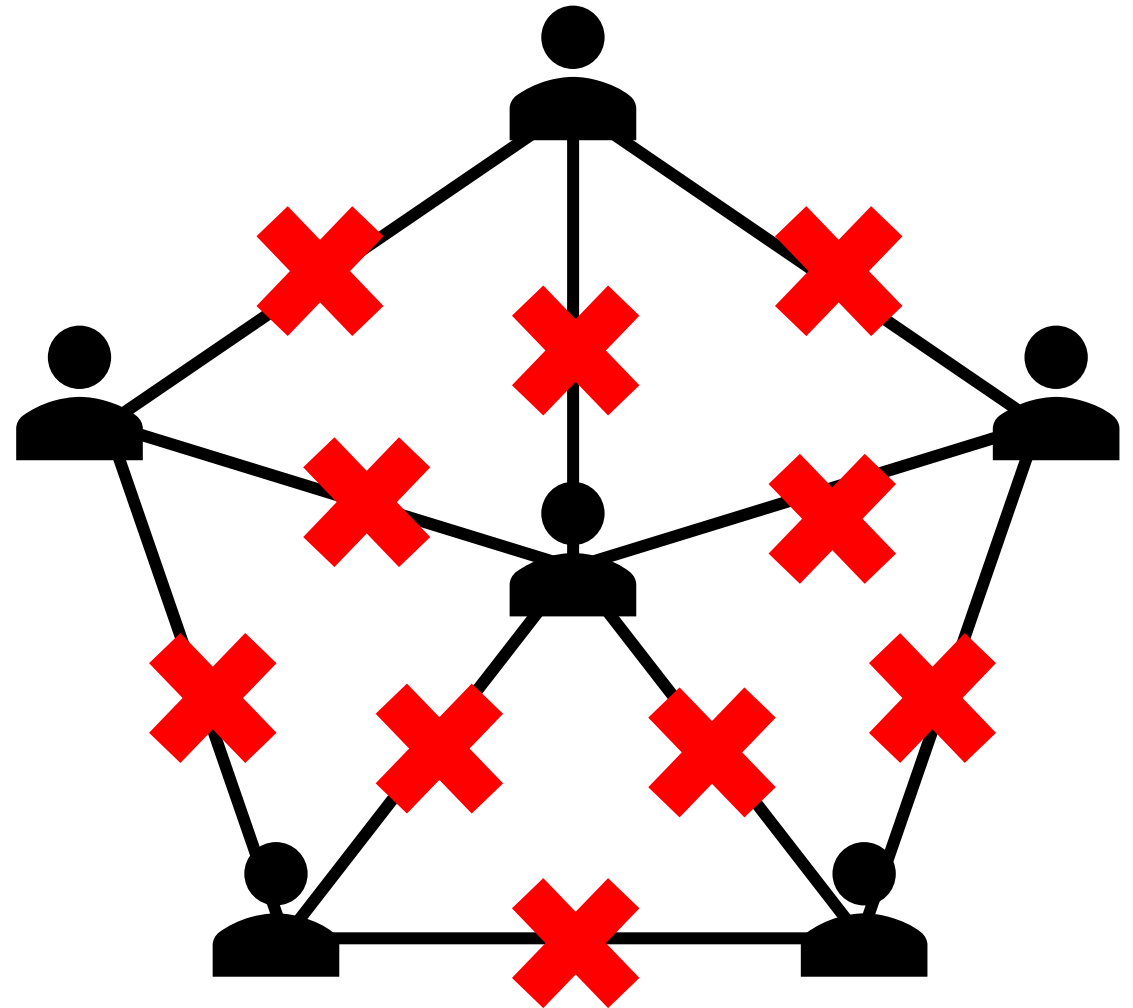


Siloed working

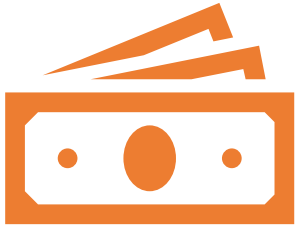
Over-reliance on oil and gas methodologies
(DWM CO₂ Corrosion Modelling)

Incorrect understanding of acid formation
studies

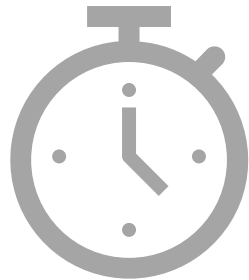
Poor understanding of monitoring needs and
roadblocks in CCUS systems



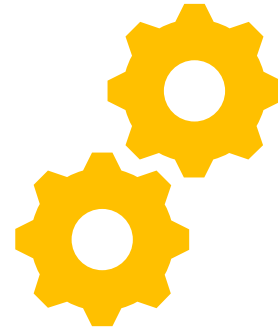
Impacts



**Potential impacts
to investment
decisions**



**Delays in purchase
orders**



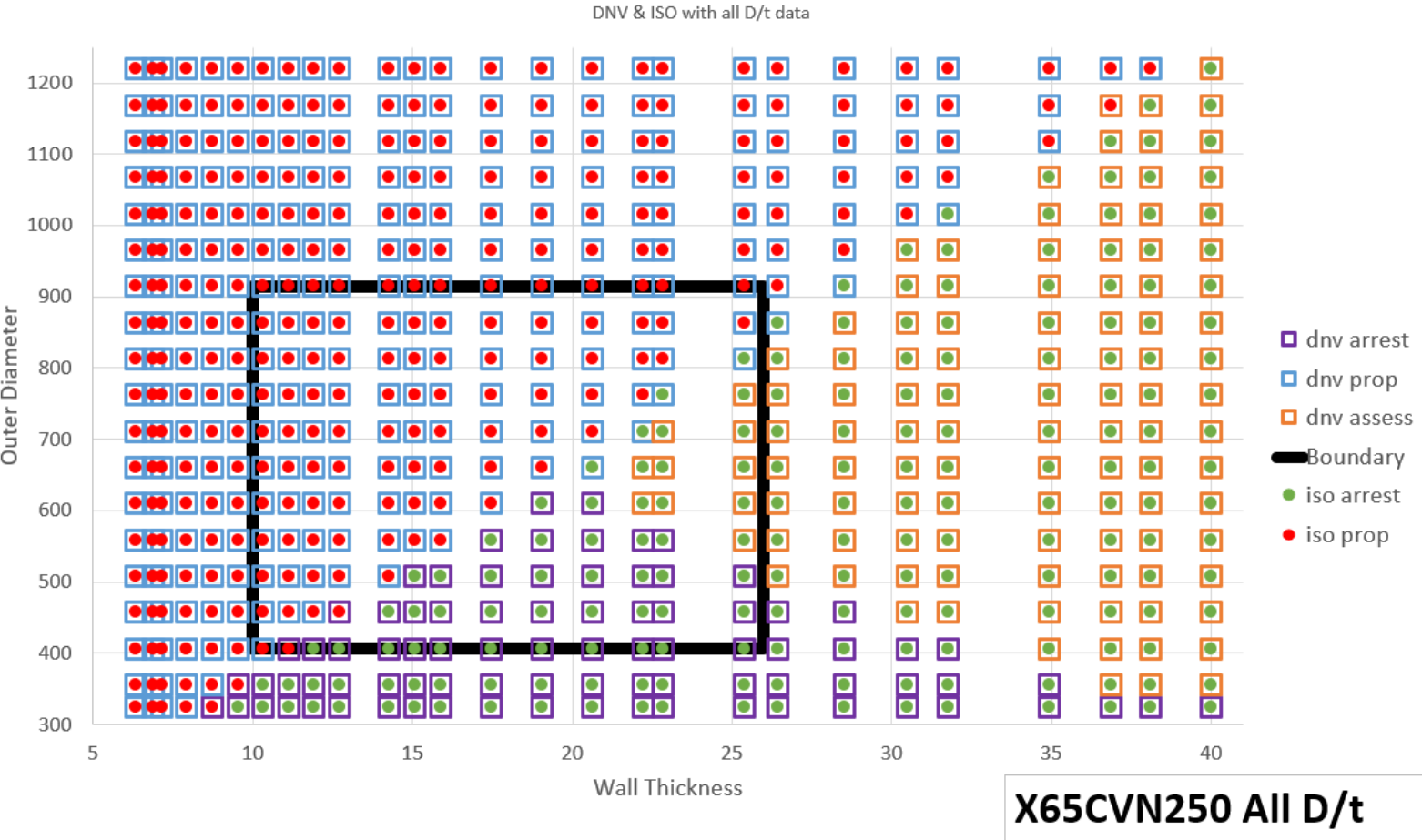
**Further
engineering work
necessary**



Can be avoided by:

Holistic working,
engaging with cross-
discipline working
Stepping away from Oil
and Gas Mindset

Impacts




Can be avoided by:



Holistic working, engaging with cross-discipline working

Stepping away from Oil and Gas Mindset

**2 MTPA
Canada**
Transitioning from EOR
system to full CCUS



**11 MTPA
UK**
Selected for Phase 2
FEED continues



**EOR in North
America**



**Acid Gas Disposal in
Cyprus**



**EOR and Acid Gas
Disposal –UAE**




**10 MTPA
UK**
Public Consultation



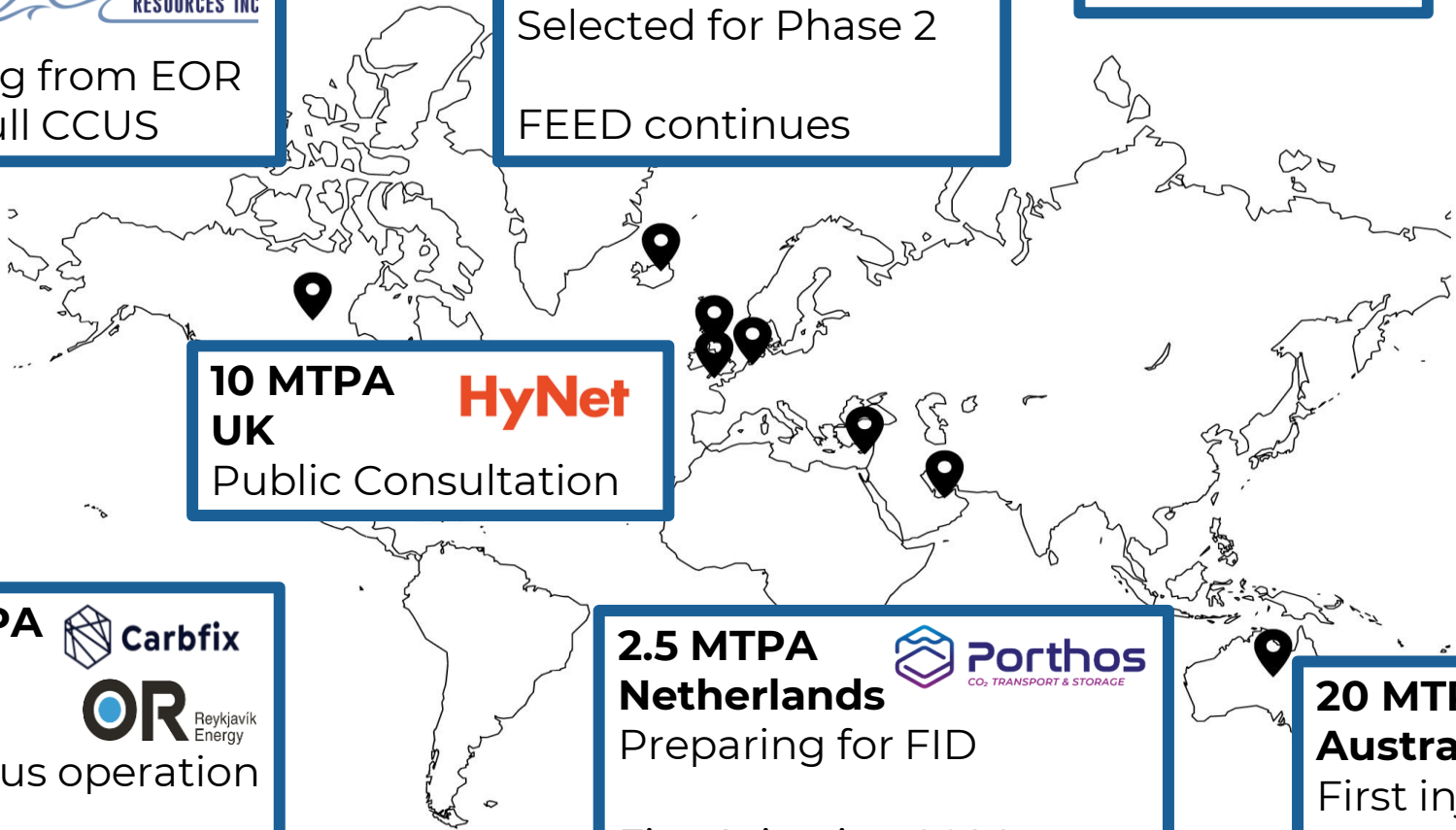

**18,000 TPA
Iceland**
Continuous operation
Expanding scope



**2.5 MTPA
Netherlands**
Preparing for FID
First Injection 2026



**20 MTPA
Australia**
First injection completed
Preparing for continuous
operation





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