



Accelerating a Europe-wide market for CCUS

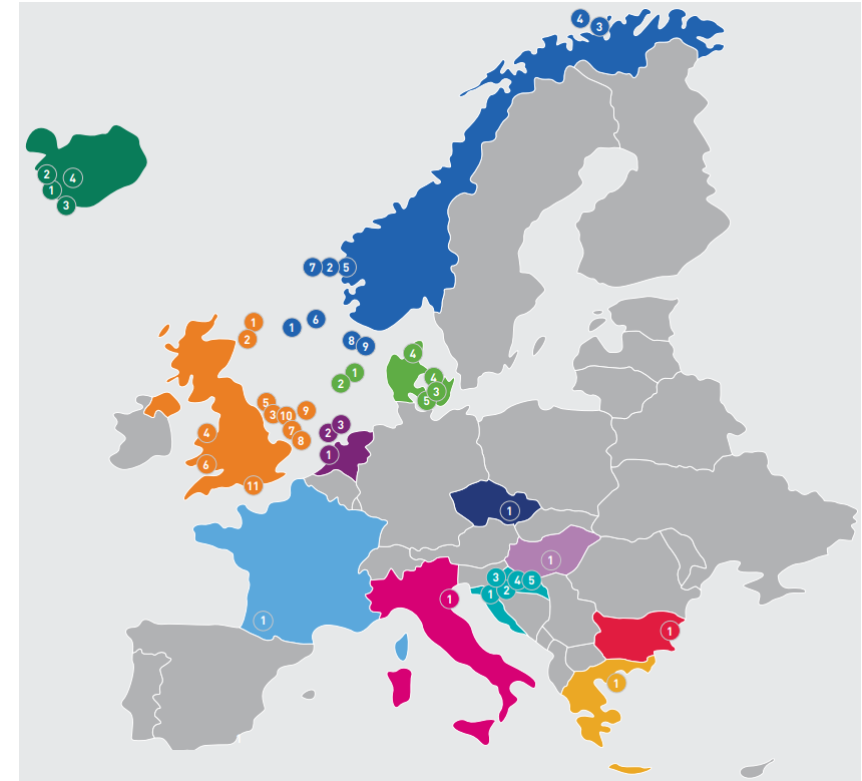
9th of July 2024

WWW.XODUSGROUP.COM



Europe is on the Cusp of Accelerating CCUS

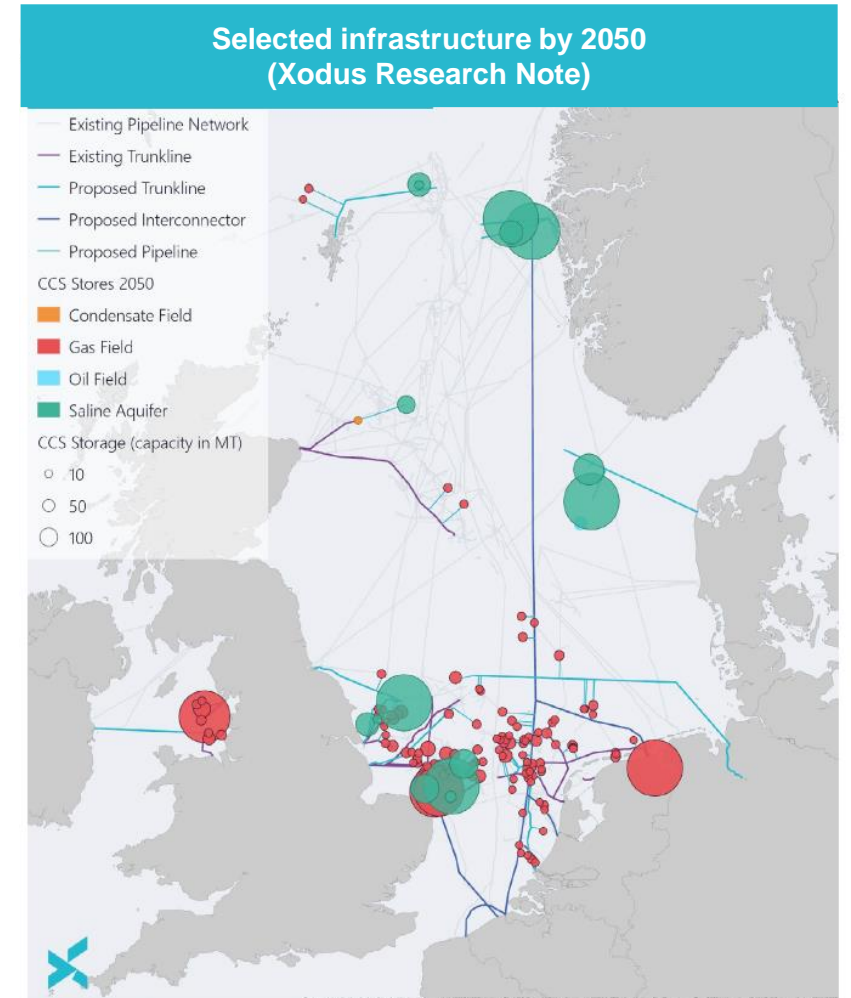
- Norway is leading the way with projects “in the ground”.
 - Established long-term CCUS in Sleipner and Snøhvit.
 - Phase 1 of the Northern Lights: 1st injection planned for early 2025.
 - 6 current exploration licences for CCUS, 4 recently released “offered areas” for CCUS.
- Denmark is making great strides to scale up their CCUS efforts.
 - Project Greensand: Pilot phase with 1.5 MTPA injection planned for 2025/2026, Siri Fairway Expansion project is planned to increase injection to 8 MTPA.
 - 3 offshore and 5 onshore exploration licences for CCUS.
- The Netherlands is close to building its first CCUS project with more to follow.
 - Porthos project: FID in October 2023 and construction has started. Will deliver 2.5 MTPA of CCUS from 2026.
 - Aramis project: Progressing towards FID - aims to provide open access CCUS system capable of delivering 22 MTPA of CCUS.
- The UK is progressing towards a number of CCUS clusters.
 - HyNet and East Coast Cluster (Net Zero Teesside and Zero Carbon Humber): Progressing towards FID.
 - 27 current CCUS licences with CCUS vision recently published by the UK government.
- The EU has announced 14 CCUS projects that are projects of common interest.



IOGP Map of CO2 Storage Projects in Europe (2024)

Forecasting the Scale of North Sea CCUS Infrastructure by 2050

- Xodus research note (2023) on the potential development of North Sea CCUS infrastructure.
 - Evaluated the potential rollout of the CCUS infrastructure in different market scenarios over time.
 - Carefully selected the most cost-effective infrastructure by conducting a comprehensive bottom-up assessment, which included over 560 storage sites and 40 pipelines.
- **High case scenario:** Projected that CCUS infrastructure would expand significantly, with the capacity to store as much CO₂ as is currently being extracted in the North Sea for natural gas:
 - 100 storage sites out of 560
 - 7,000 km of pipelines
 - 55% incorporating some infrastructure re-use.

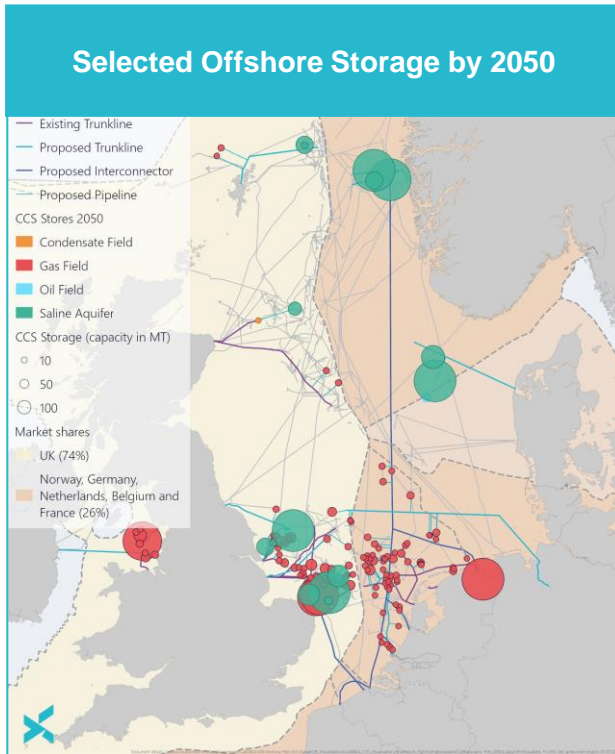


Xodus Analysis, Extract from "Forecasting the North Sea CCUS Infrastructure by 2050"

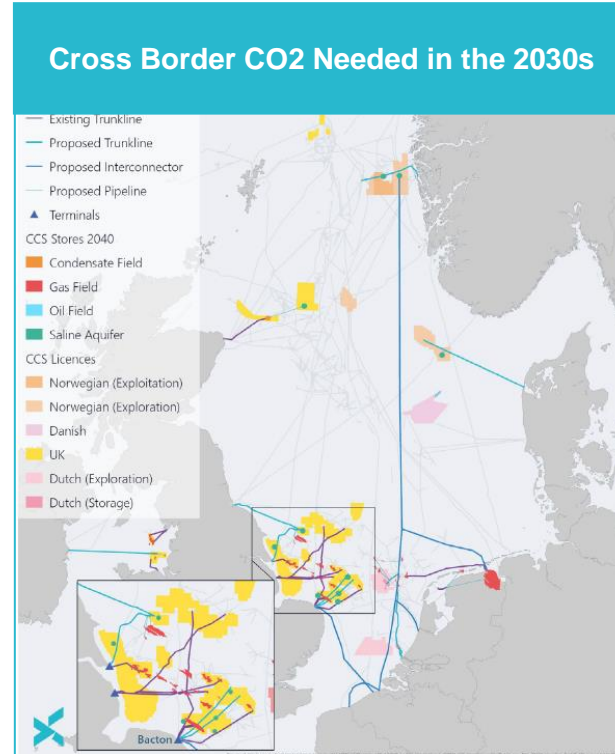


Cross Border CO2 Transport is Needed to Reduce Costs for Everyone

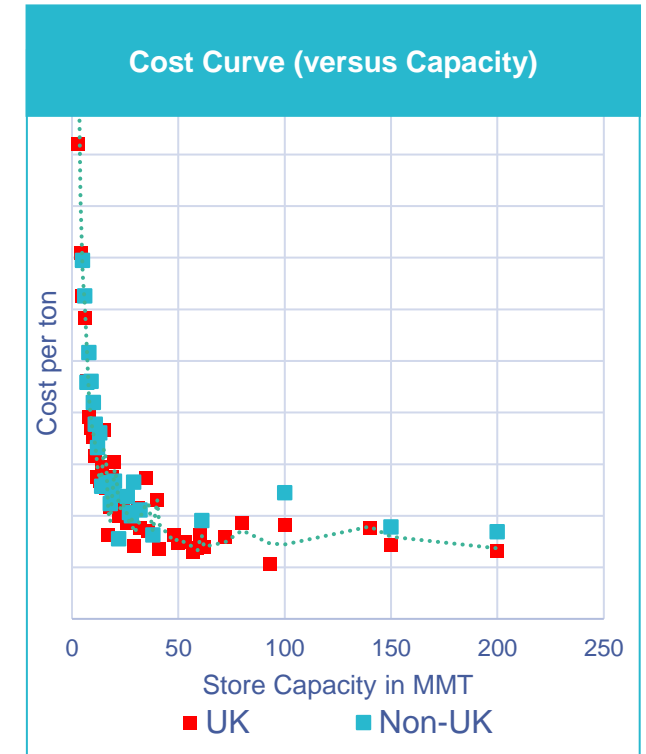
- A significant majority of the selected storage sites (based on volume) were located in the UK Continental Shelf (UKCS). When we compared the storage sites between the UKCS and Netherlands/Norway, we found that the cost difference could be in the order of 25% (1).
- We also observed that cross-border CO2 transport was required early on to provide emitters access to more affordable infrastructure.



Xodus Analysis, Underlying data from "Forecasting the North Sea CCUS Infrastructure by 2050". Selected Sites by 2050, high Case Scenario



Xodus Analysis, Xodus Analysis, Extract from "Forecasting the North Sea CCUS Infrastructure by 2040"



Xodus Analysis, Underlying data from "Forecasting the North Sea CCUS Infrastructure by 2050".

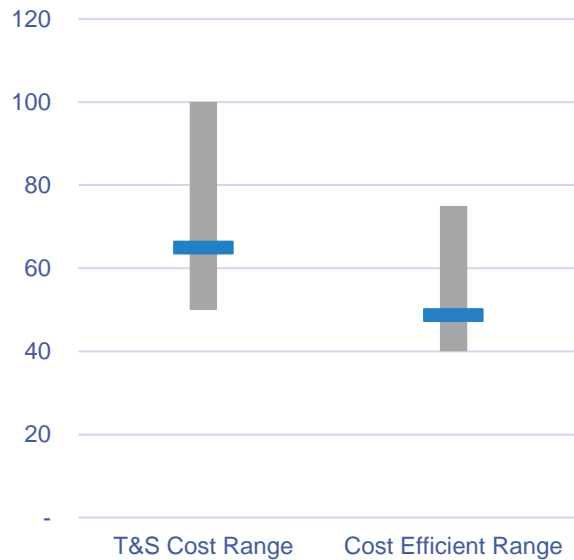
(1) After removing the smaller sites (in terms of storage capacity), the inclusion of these sites would show a much higher cost differential.



Cross Border CO2 Transport Could Realise Significant Savings

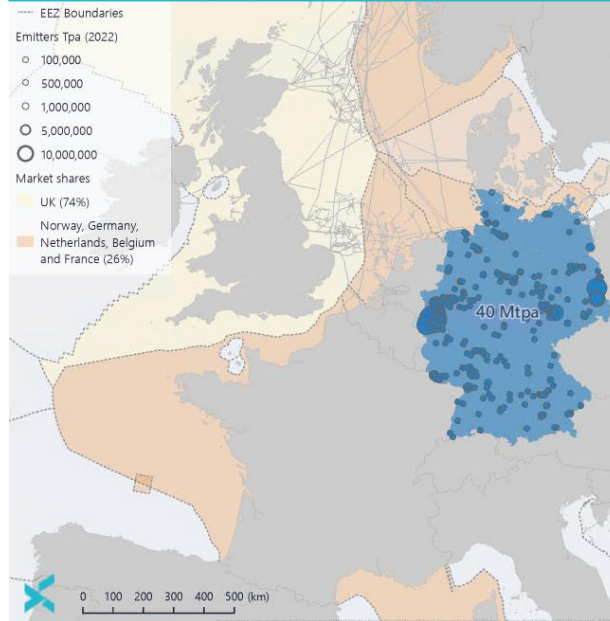
- Transportation and storage play a significant role in the cost of CCUS. Considering the potentially large scale of CCUS infrastructure, a 25% cost reduction would result in billions of euros in savings.
- Many cost-effective options also have lower construction carbon footprints as they re-use more infrastructure and are more closely located with emitters.

T&S Storage Cost Range (euro per ton)



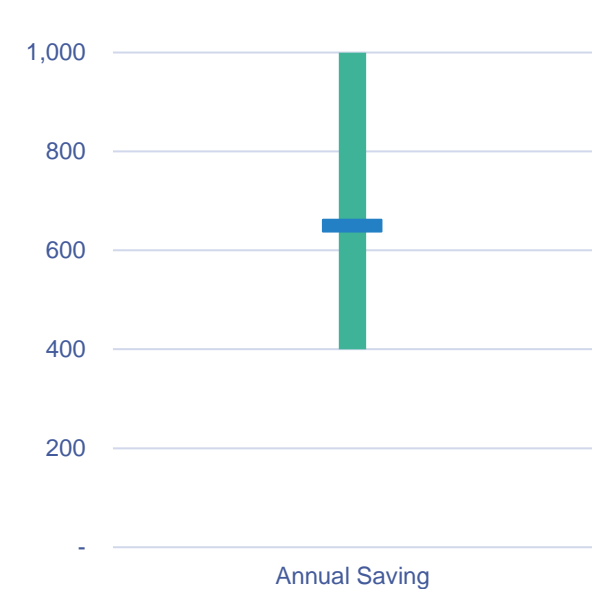
Xodus Analysis.

Est. Germany CO2 requirement by 2040 (MTPA)



Xodus Analysis on behalf of client. Estimated CCUS annual in Germany by 2040 (industrial Demand),

Savings Applied to Germany Estimated CCUS needs (Euro mn)



Xodus Analysis.



More Work is Needed to Quantify Benefits for all of Europe

- We are **collaborating** with the **CCSA** to further assess and refine our initial analysis, with the aim of publishing a **Cross-Border CO2 Transport and Storage Report** this Autumn.
- Our **analysis** is being expanded to cover the **entire European region**, and we are integrating the initial CO2 emission locations into our assessment.
- The main **goal** of this report is to **offer a detailed breakdown** of the economic advantages associated with cross-border CO2 transport and storage and compare policy options.
- We will **present** these economic benefits in terms of overall transport and storage costs in euros for emitters across Europe.



TOGETHER  THE SUM OF ALL OUR PARTS