XODUS

Enabling Infrastructure for Cross-Border CO_2 Transport

SPE Conference

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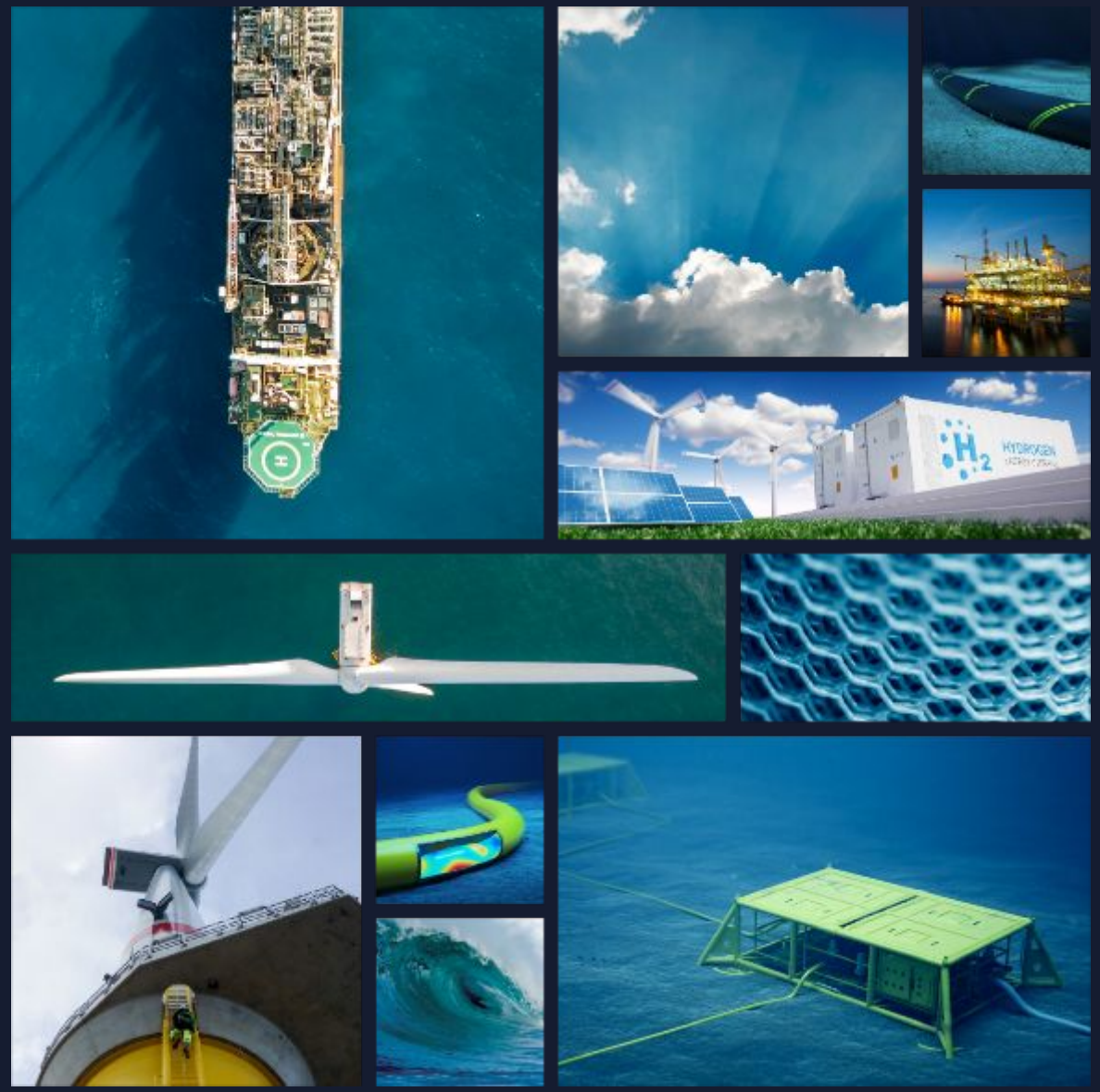


Net Zero Technology Centre
Technology Driving Transition
ebn
Port of Rotterdam
gasunie
oeUK
CCSA
THE CROWN ESTATE
Department for Energy Security & Net Zero

Enabling Infrastructure for Cross-Border CO_2 Transport

A large infrastructure build-up

Storing as much Co2 as we are producing natural gas in the North Sea may require over 100 stores

Cross border is key

Cross-border CO2 can save emitters over 25% in T&S cost

In preparation

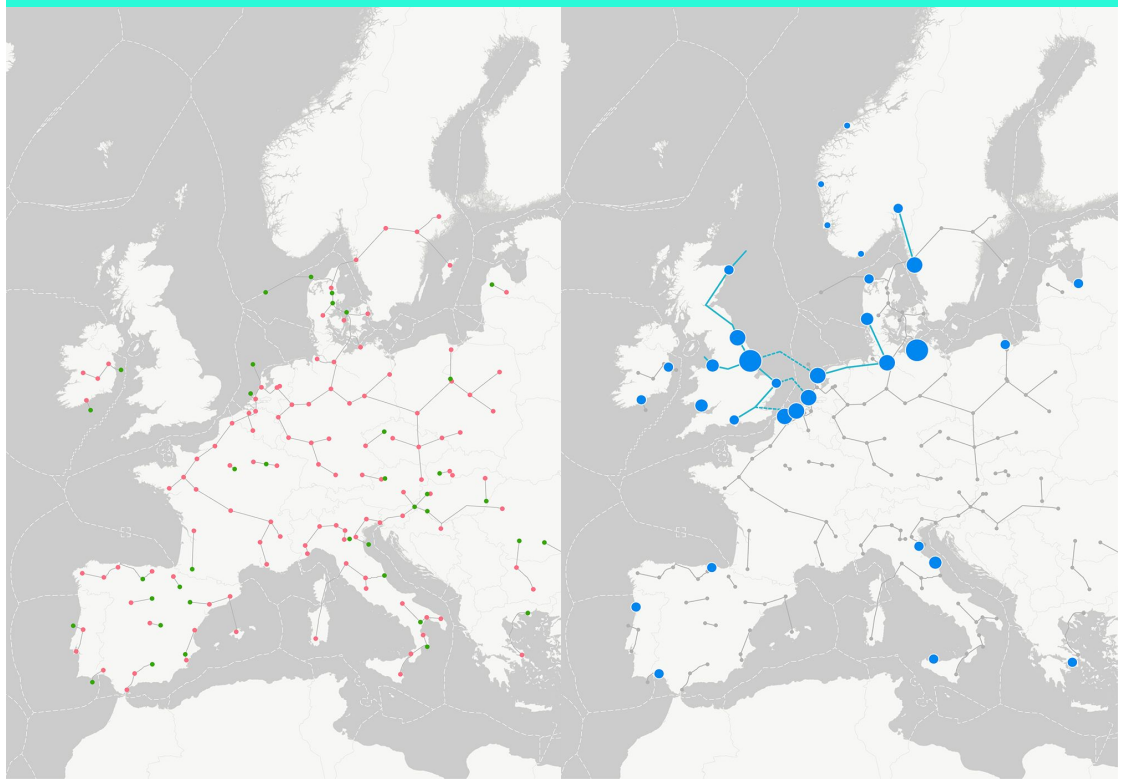
Focussed assessment on port infrastructure

Source – JRC

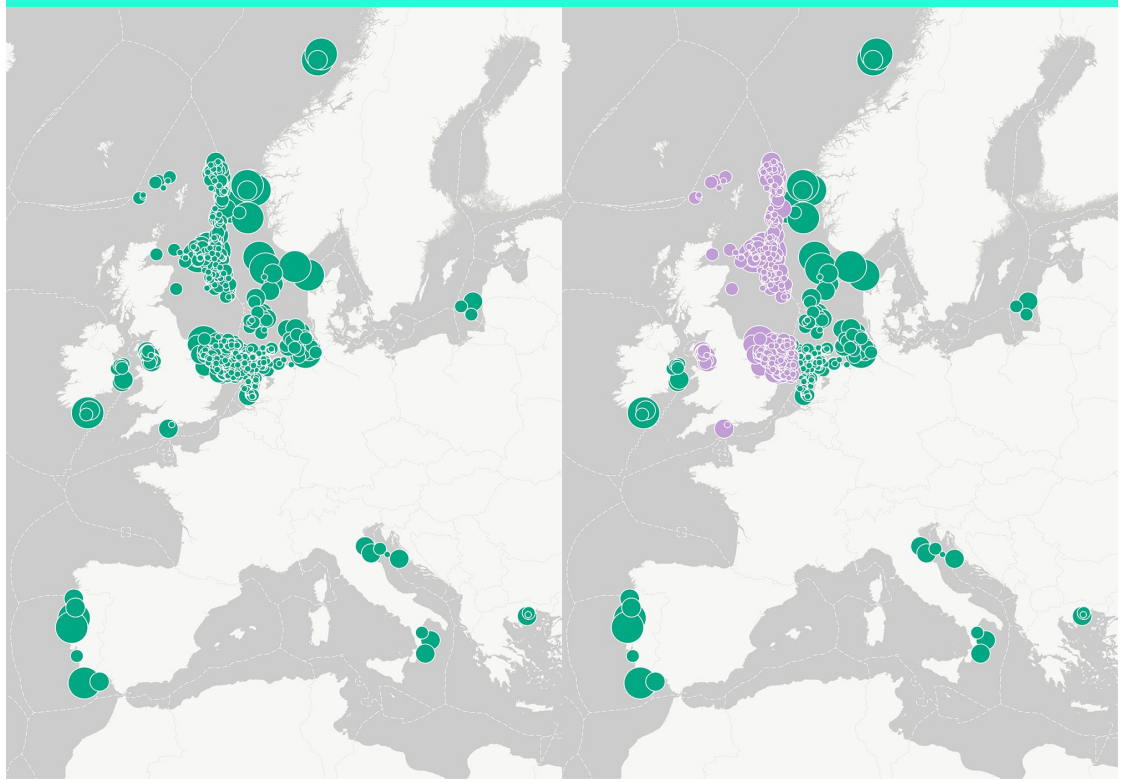
Accelerating a Europe-wide CO_2 Storage Market

Previous work by Xodus on behalf of the CCSA identified significant savings if cross-border transport was accelerated in Europe.

Demand - 243 MTPA by 2040



Supply - 506 offshore storage options



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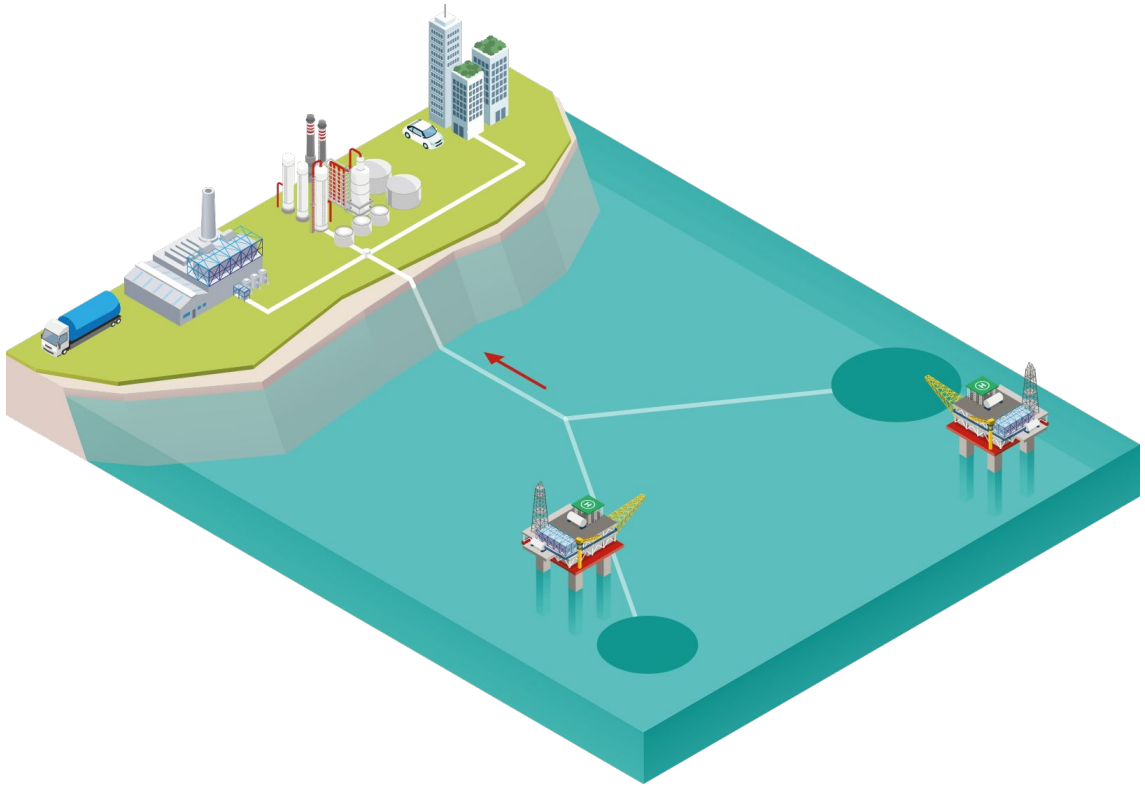
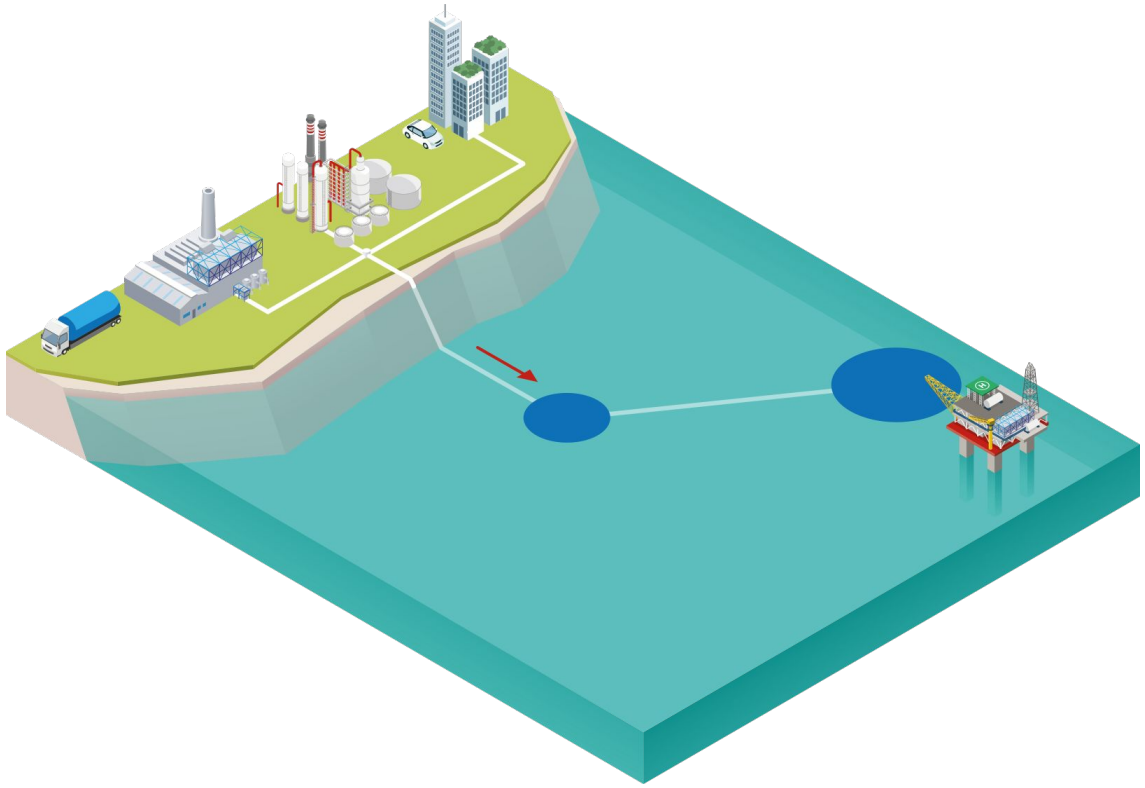
Accelerating a Europe-wide CO2 Storage Market

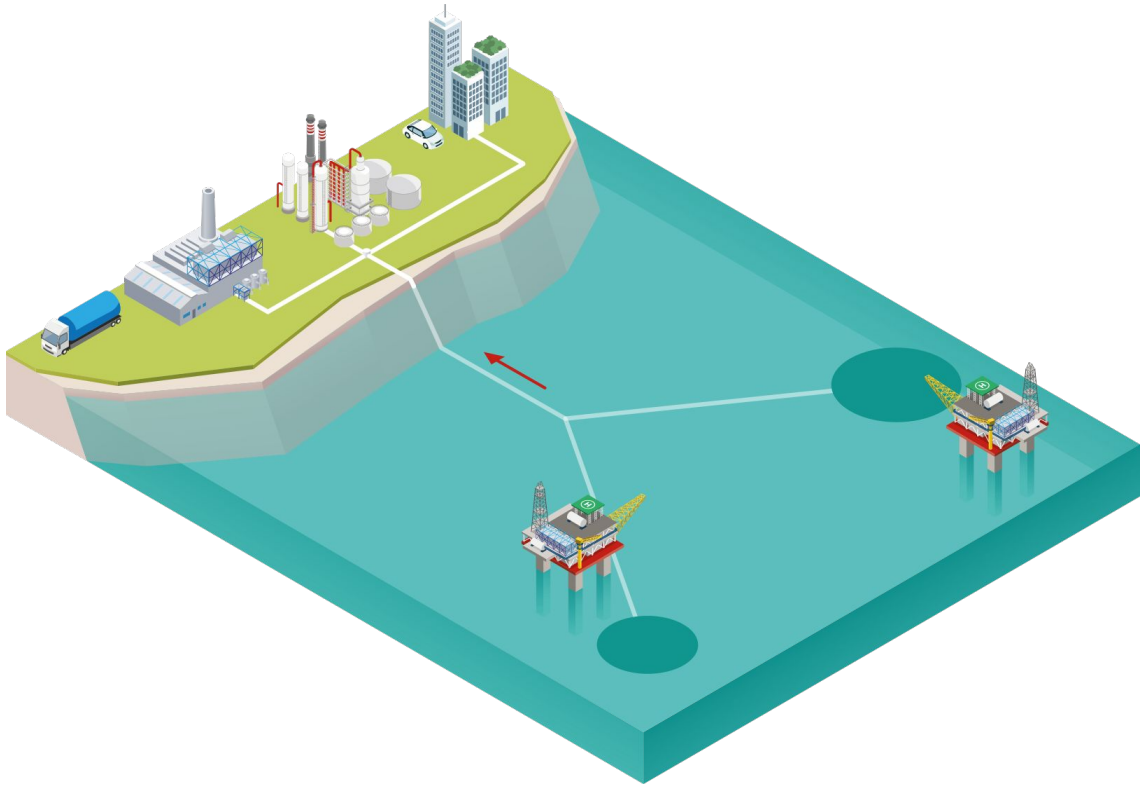


Natural Gas Infrastructure
We know the location of both the consumers and production fields



CCUS Infrastructure
We know the location of the emitters but can choose a wide range of storage options including refurbishment

Accelerating a Europe-wide CO2 Storage Market



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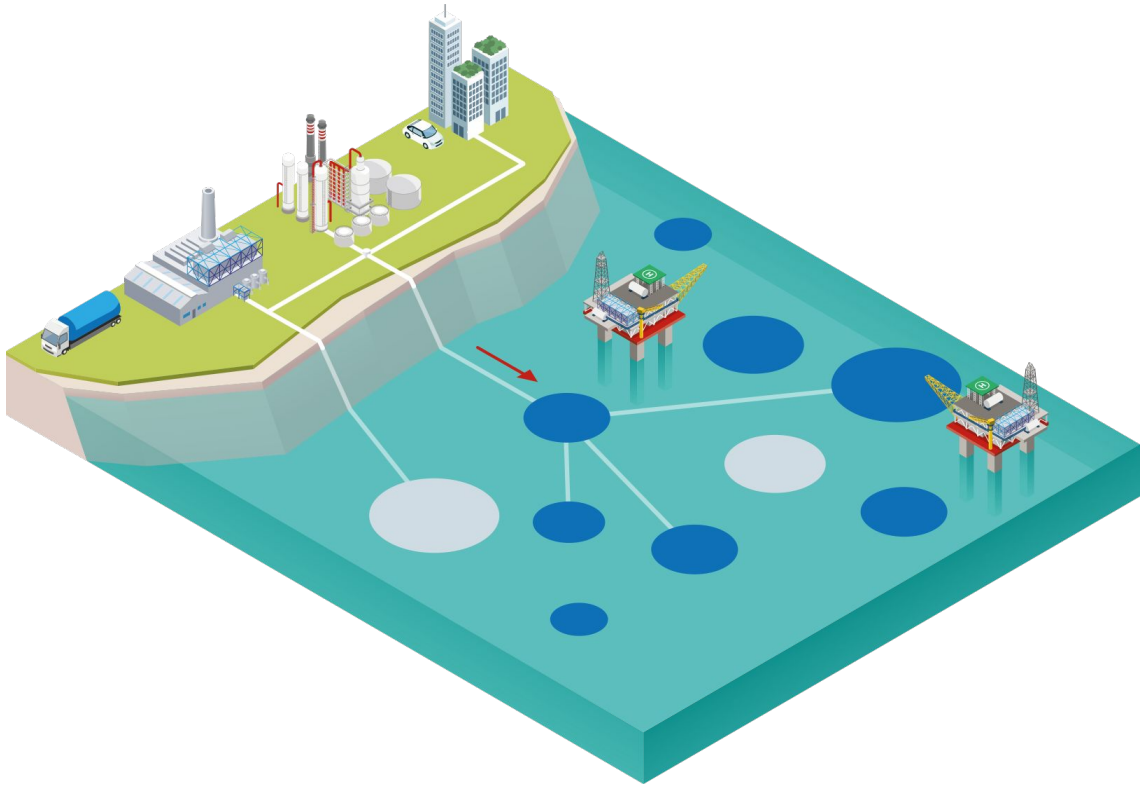
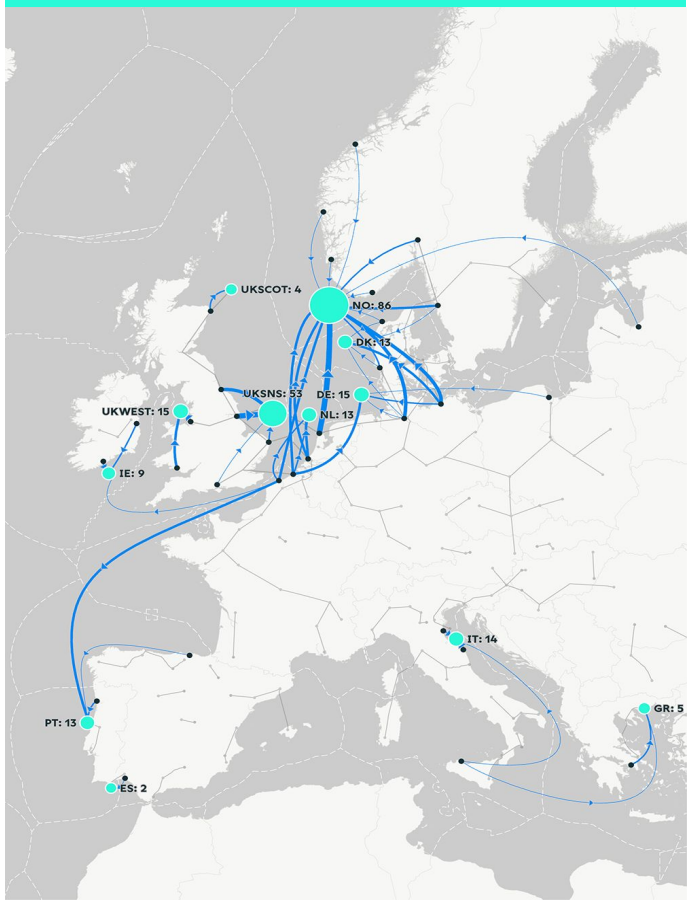


CCUS Infrastructure
We know the location of the emitters but can use a wide range of storage options

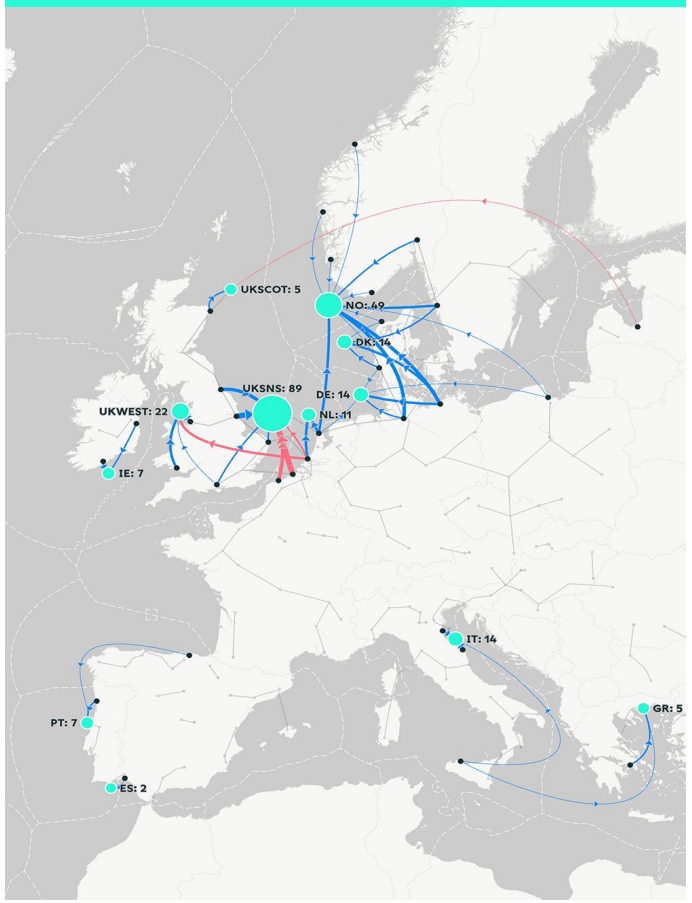
Accelerating a Europe-wide CO2 Storage Market

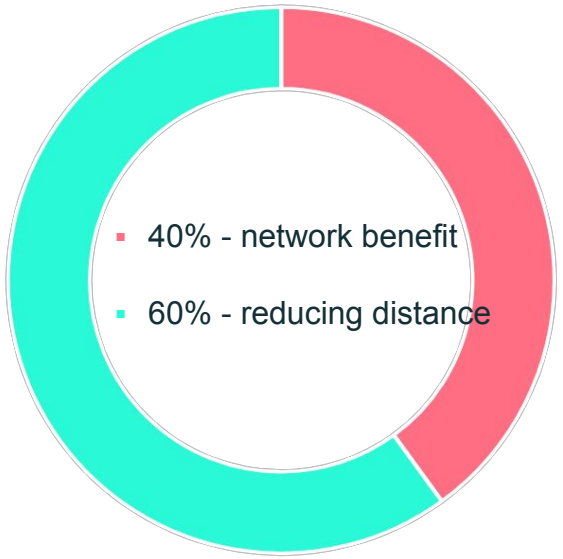
€2.7billion saving per year by 2040

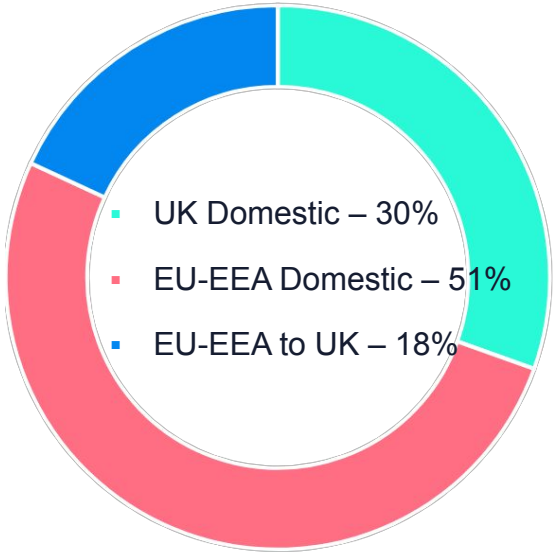
No Cross Border - €52 per tonnes



Cross Border - €41 per tonnes







Transitioning to Practical Cross-Border CO_2 Transport

Macro	Emerging Reality	Micro
• Strategic Modelling to bbenefits of UK–EU CO_2 transport. • Pipeline-dominant infrastructure.	• Clusters (track#1) • Increasing role of dispersed emitters and non-pipeline capture networks (Northern Lights)	• Focus on shipping logistics, port infrastructure • Advising on real-world deployment: modular hubs, vessel types, regulatory alignment.

Benefiting from the experience of the study sponsors in setting-up such infrastructure.

Next Steps: Enabling Infrastructure Study

Build on previous work to understand where and what infrastructure should be located to enable cross border CO_2 transport. Scope split into three main areas:

- Port assessment: Assessment of the scale and suitability of existing **port infrastructure** across Europe and the UK needed to support gathering of CO_2 and transport of those emissions to ports located near to cost efficient offshore storage.

- CO_2 volume assessment: Assessment of the potential volumes of CO_2 emissions that may be transported between countries within Europe and UK **via ship** at 5-year time intervals from 2030 to 2050.

- Technology description: Assessment of the **CO_2 storage and treatment infrastructure** likely to be required for transport and port infrastructure, including a high-level understanding of capital investment requirements for that infrastructure.

Port as interface

Ports act as “hubs” interfacing emitters and stores, with a changing dynamics over time.

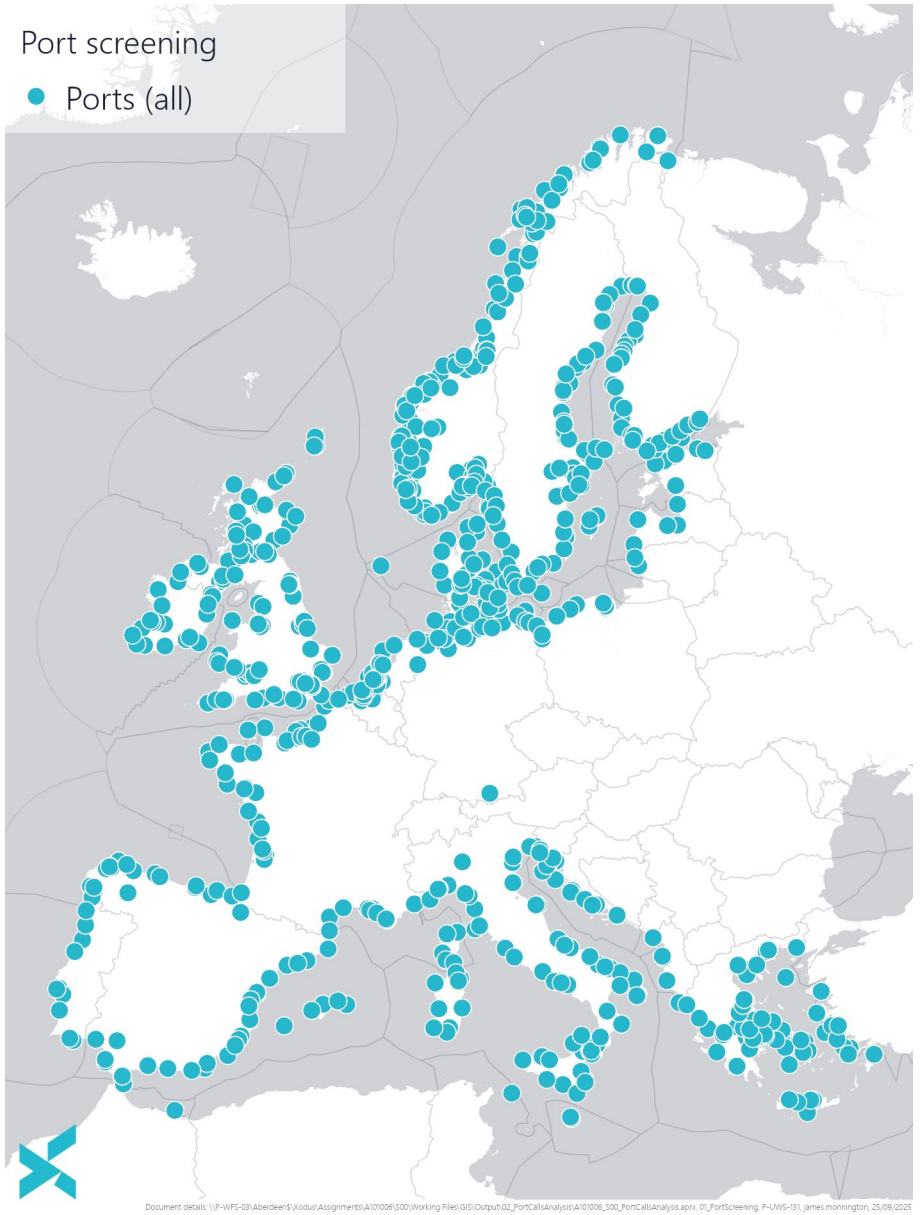
How many emitters would select that port

Offshore T&S Costs

Cost, feasibility and sizing of the port infrastructure

Port Assessment

- Reviewing every port across Europe and UK for CO_2 ship suitability by using historic ship movement data.
- 1.3 million activities across approximately 850 ports reviewed to screen ports not suitable for handling frequent visits from likely size of CO_2 ships.
- Circa 200 ports assessed as being potentially suitable.
- Each suitable port being assessed for:
  - How well they are located to gather locally captured CO2 (emitter score).
  - How well they are located to access identified CO_2 stores (store score).
- Result of analysis will highlight key ports in each country across Europe and the UK that can enable cross-border CO_2 transport.



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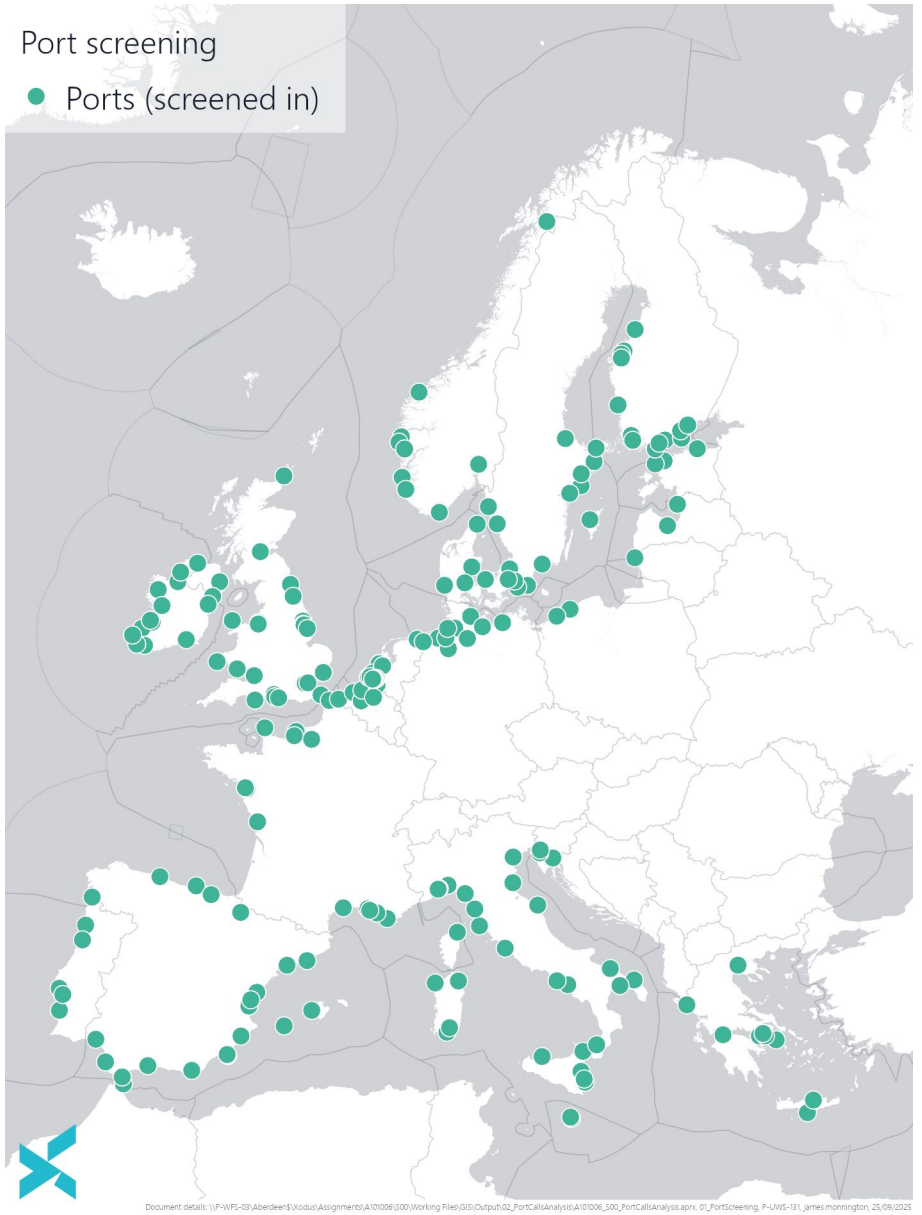

Technology Description

Assessment of the technology for four main areas to transport captured CO2 from source to store:

- Transport method from source to gathering point (e.g. road tanker, rail tanker, barge, pipeline).
- “Emitter port” to enable buffer storage and export between emitters and export transport method
- Transport method from emitter port to store port (e.g. pipeline, ship).
- “Store port” to enable buffer storage and export to store (pipeline).

High level capability of transport methods and technology requirements for ports examined.

Indicative CAPEX for a typical “store port” developed.

FIND OUT MORE

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