XODUS

FORECASTING THE APAC CCUS INFRASTRUCTURE

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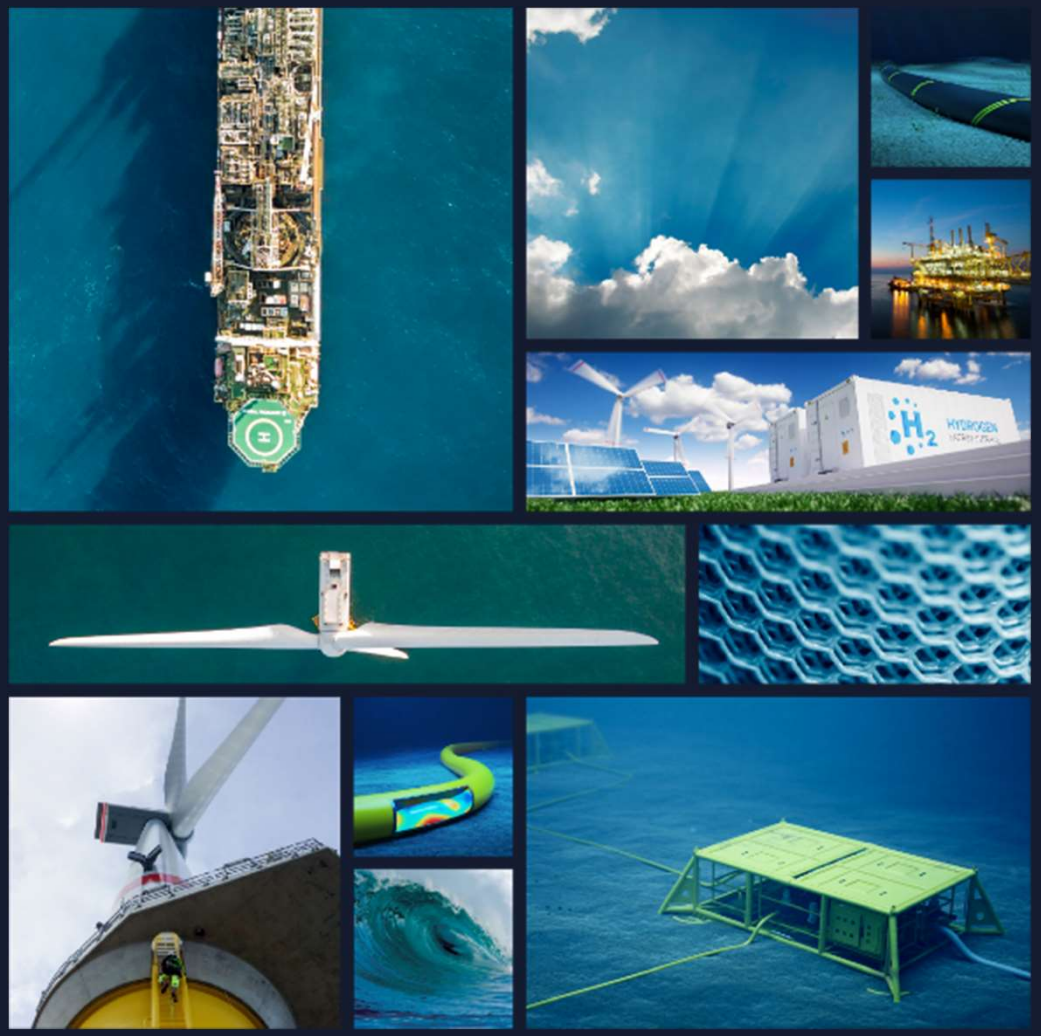

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CARBON CAPTURE, UTILISATION & STORAGE

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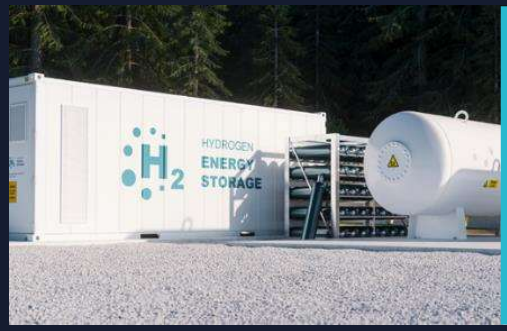

HYDROGEN AND ENERGY VECTORS

ENVIRONMENTAL APPROVALS & REGULATION

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XODUS
FORECASTING THE NORTH SEA CCUS INFRASTRUCTURE TO 2050
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CCSA
Accelerating a Europe-wide CO_2 storage market
December 2024
XODUS
FORECASTING THE APAC CCUS INFRASTRUCTURE
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Premise

APAC lags the North Sea and the US in deploying commercial scale CCUS projects. Yet, with over half of global CO_2 emissions, it should become a leading CCUS market in the coming decades.

Aim

Understand the likely outlook for offshore CCUS infrastructure in the APAC region, from 2035 to 2055.

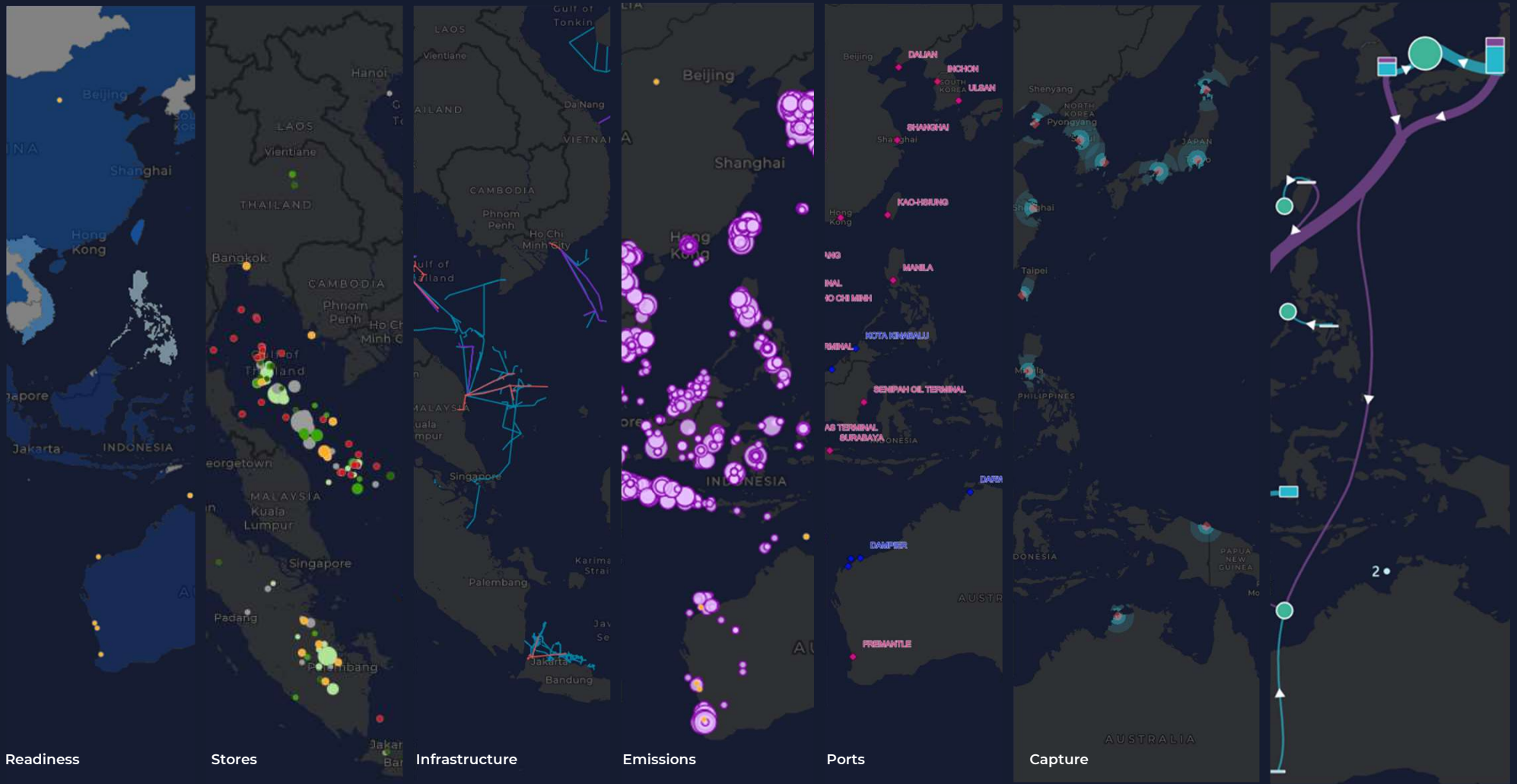

INPUT
CCUS Demand Forecast
All-in Transport and Storage Tariffs
Offshore CCUS Storage Sites, Available Subject to Readiness
MATCH
Allocate
Emissions to Available Low-Cost Stores
OUTPUT
CO2 Flows
Infrastructure Requirement
Tariffs

11
Countries

700+
stores

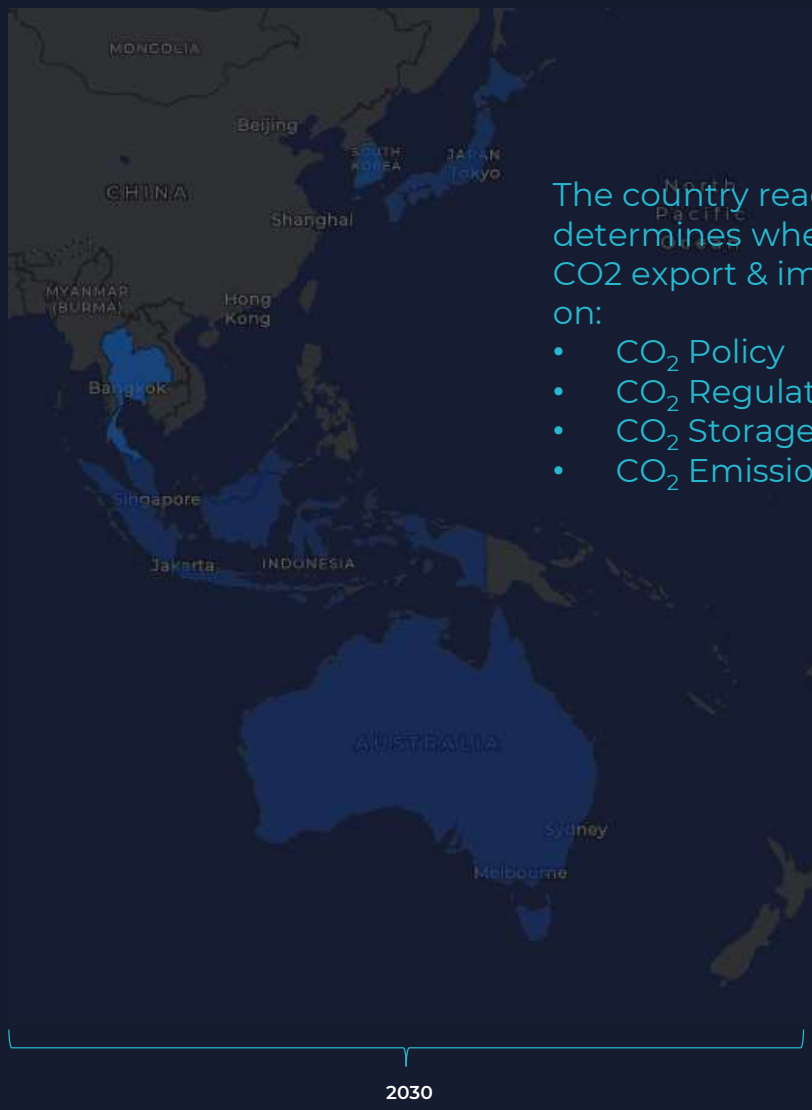
8300
Emitters

Assessed Factors

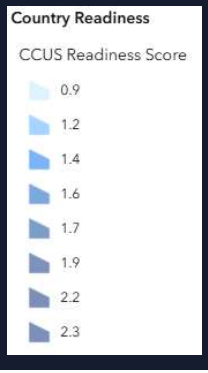


The country readiness score determines when it is available for CO2 export & import and is based on:

- CO_2 Policy
- CO_2 Regulatory Framework
- CO_2 Storage Potential
- CO_2 Emissions



2030

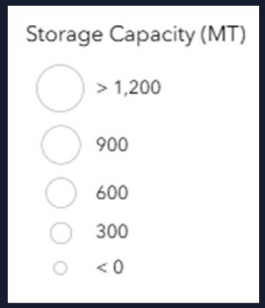


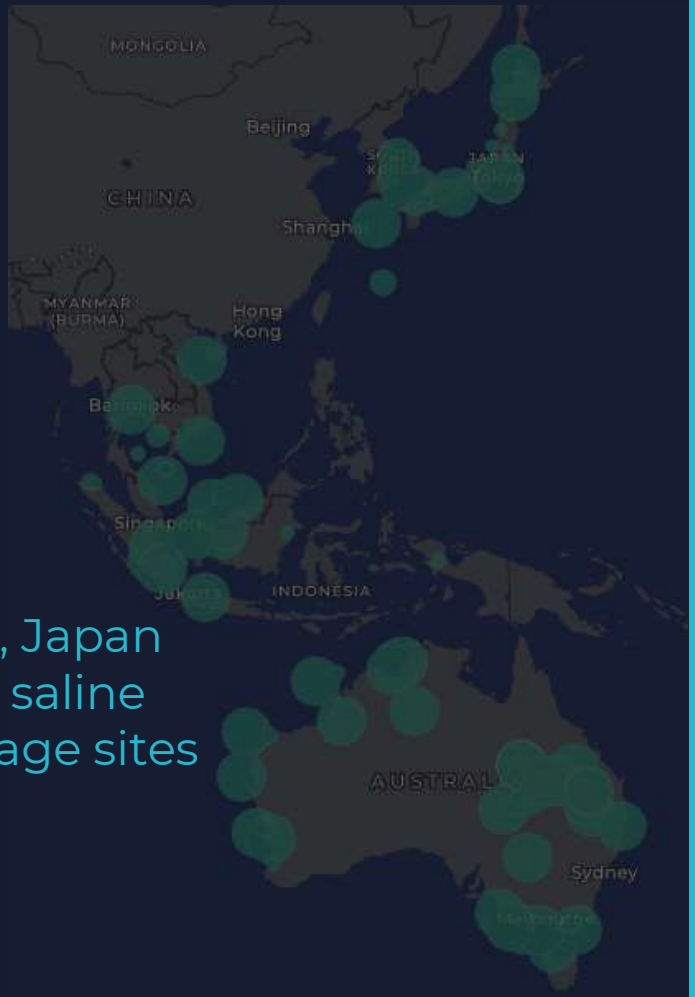
2050

Japan and Korea have relatively limited quantity of Hydrocarbon Reservoirs in which to store CO2

Although less proven, Japan and Korea have large saline aquifer potential storage sites

Hydrocarbon Reservoirs

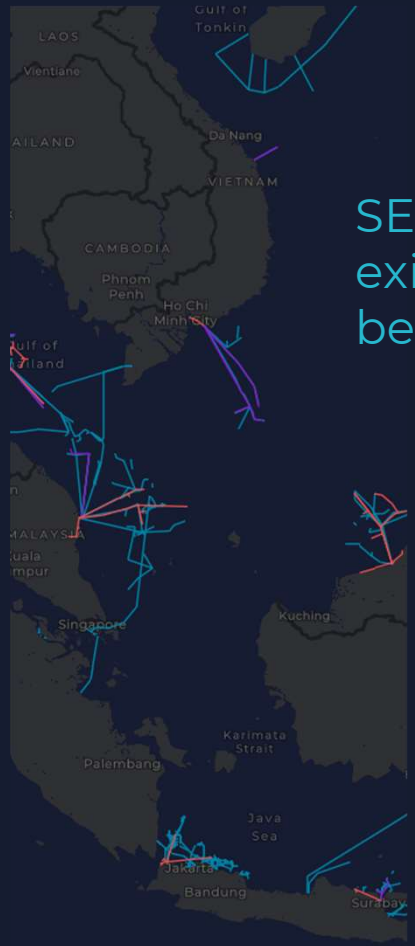




Saline Aquifers

SE Asia and Australia have significant existing offshore infrastructure which will be ready for re-use prior to 2050

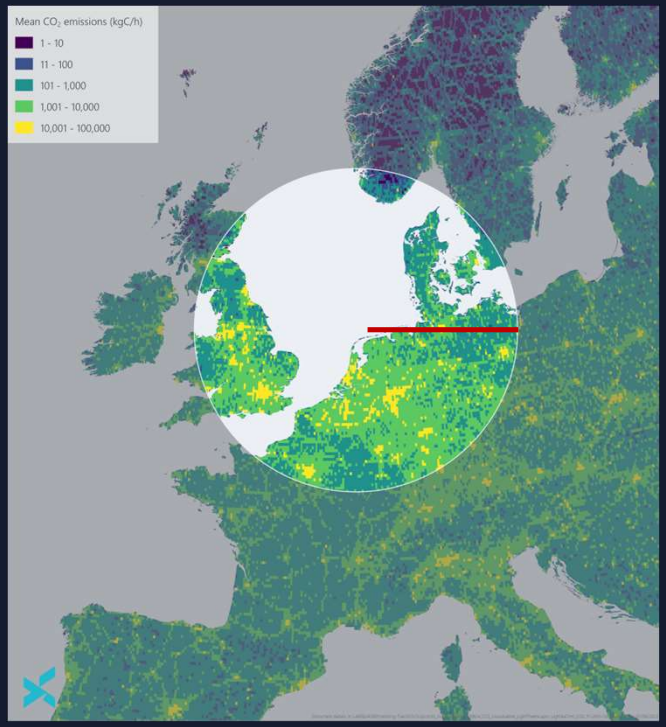
There is a location mis-match between emissions and proven storage, particularly in Japan and Korea

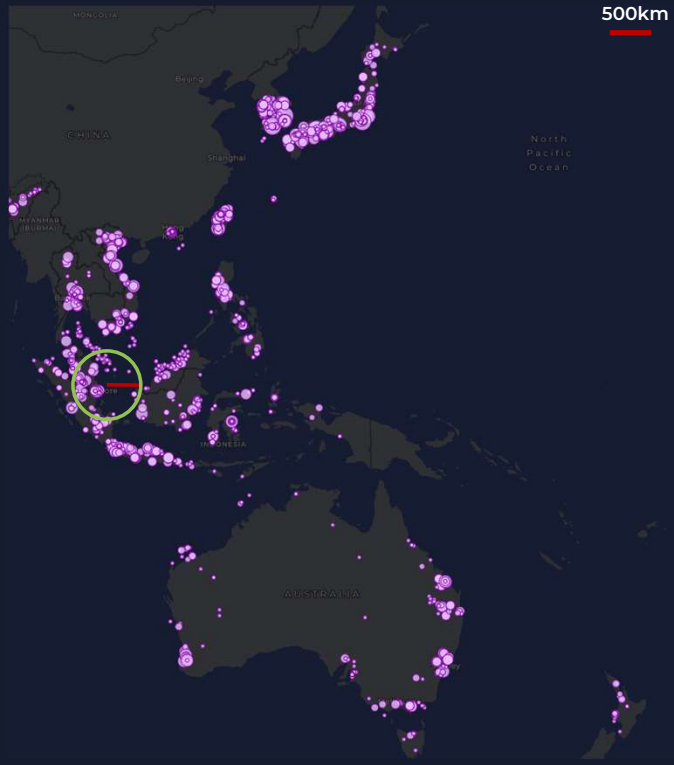


Hydrocarbon Infrastructure

Emissions

Concentration of Emissions





40% of European industrial emissions are generated within 500km of the North Sea.

APAC emissions are very concentrated in some locations in Japan and Korea facilitating low cost gathering networks.

Economics will drive use of shipping for long distance CO2 transport between store and emitter

Europe's longest CO2 shipping route – Yara Sluiskil to Northern Lights

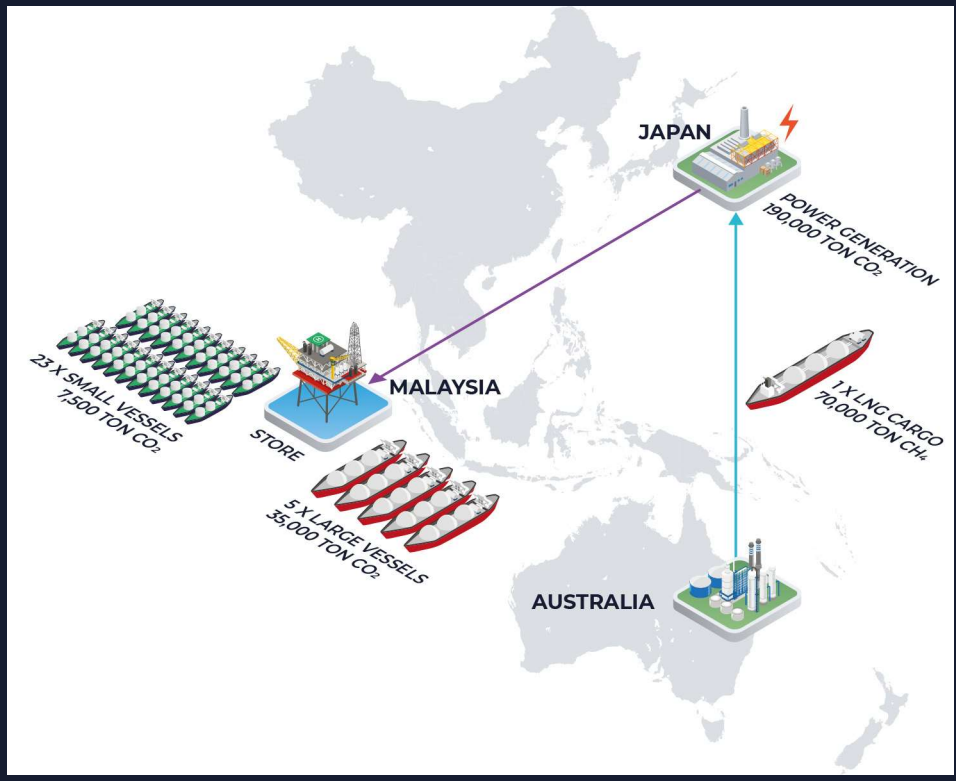
1,000km

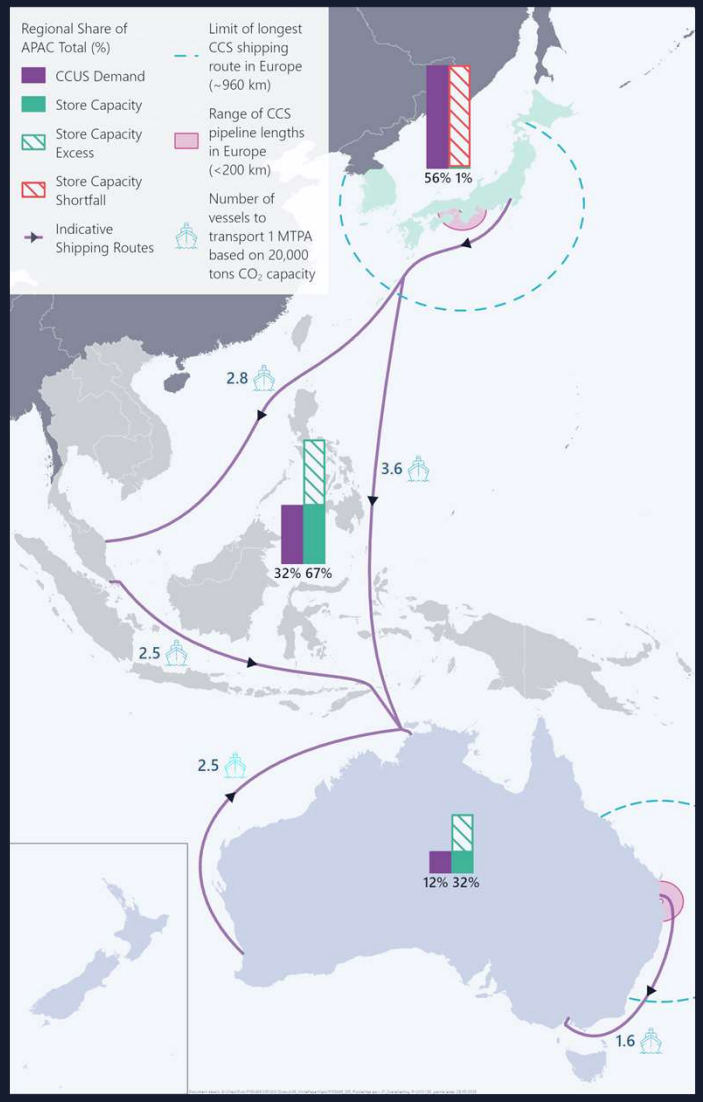
Japan/South Korea to storage in Southeast Asia / Northern Australia

5,000km

Scale up of CO2 carriers will be important to cost minimisation in transportation

Current largest CO2 carriers are for Northern Lights ~7,500 m³ capacity





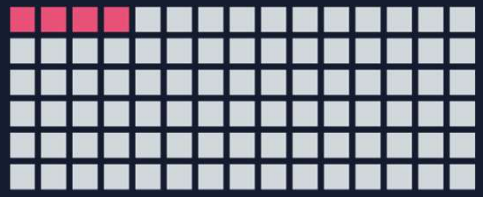
Transportation distances are far larger than European shipping (960km) or pipelines (<200km)

1 Mtpa of CO2 from Japan to Australia requires 3.6 CO2 carriers (at 20,000m^3 capacity each)

This reduces to 2.8 CO2 carriers for transport from Japan to Malaysia giving closer stores the economic advantage

2035

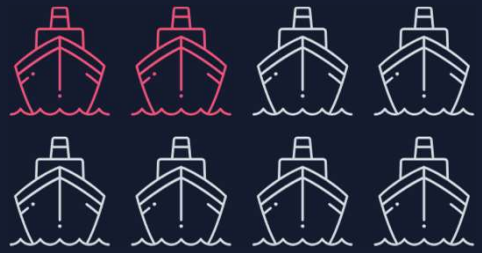
STORES AND PIPELINES



4 Stores

1,525 km Pipeline

SHIPPING



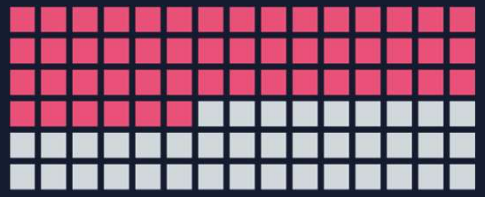
18 Vessels

5,455 km Average Transport Route

40% Market Share

2045

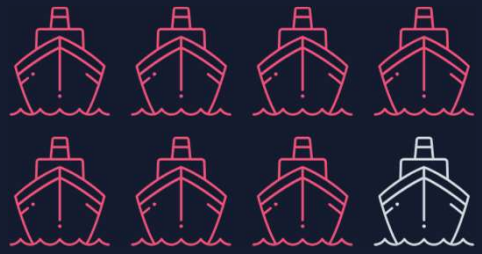
STORES AND PIPELINES



51 Stores

4,034 km Pipeline

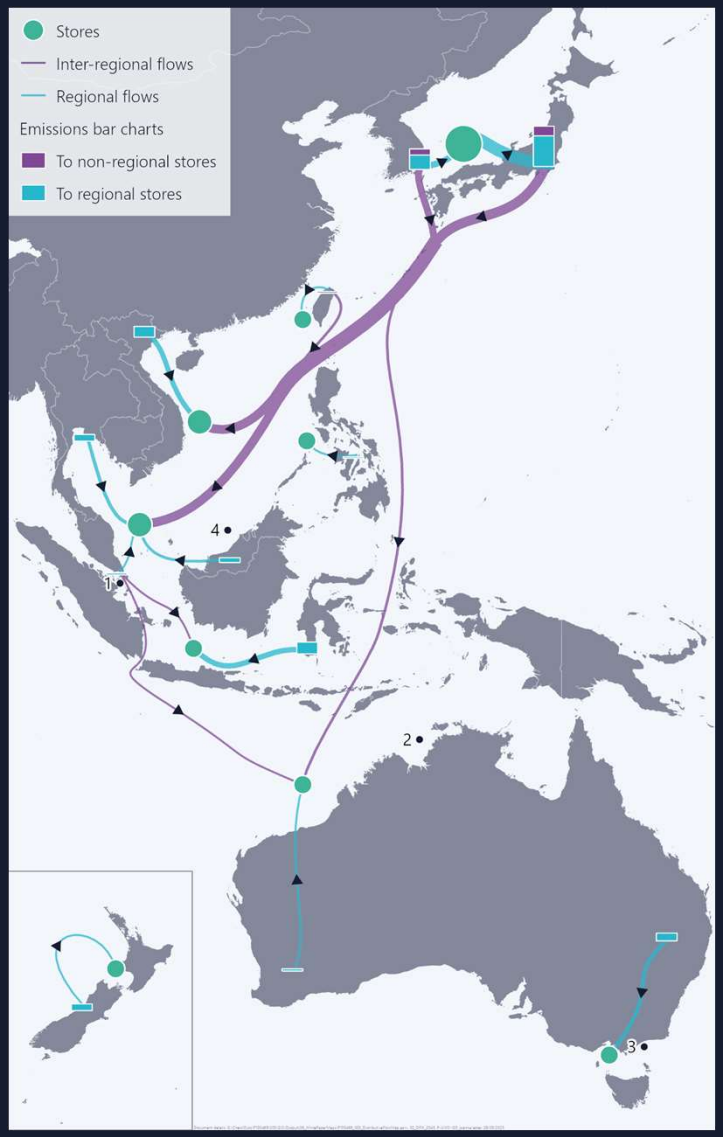
SHIPPING



68 Vessels

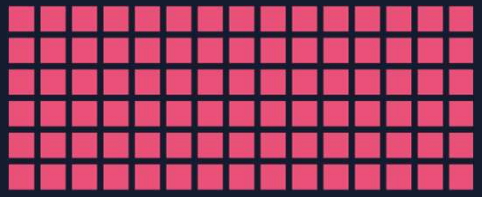
4,334 km Average Transport Route

16% Market Share



2055

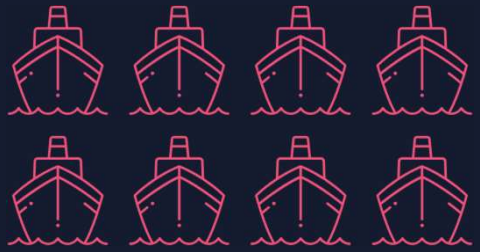
STORES AND PIPELINES



90 Stores

7,815 km Pipeline

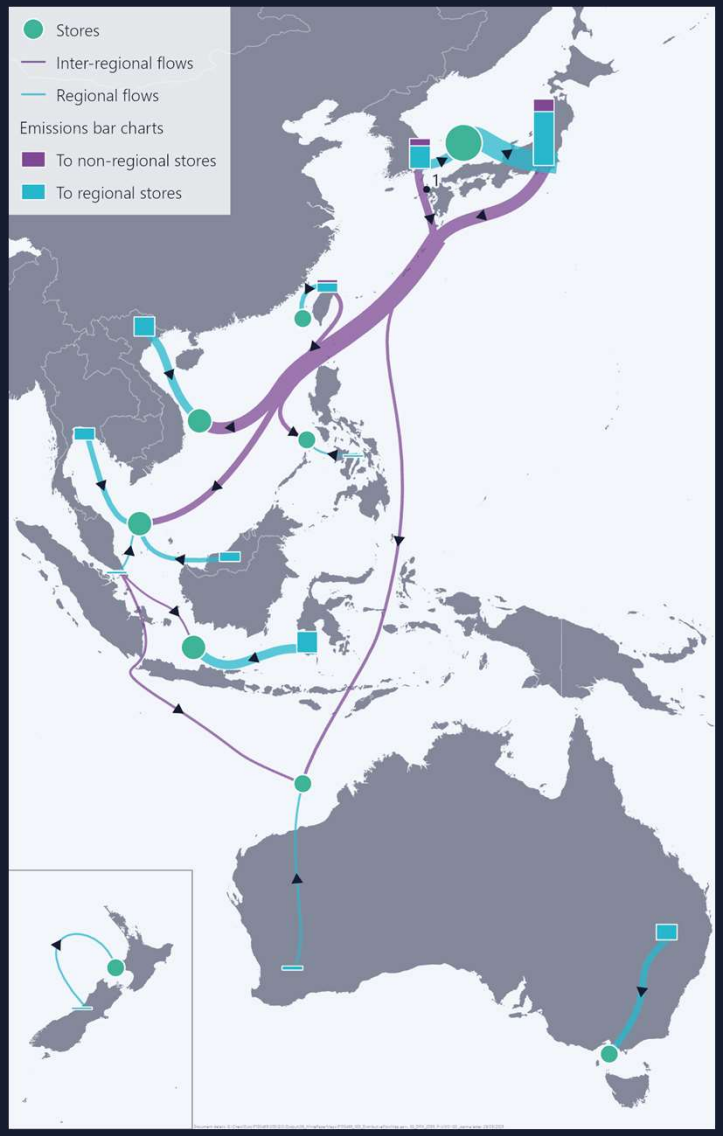
SHIPPING

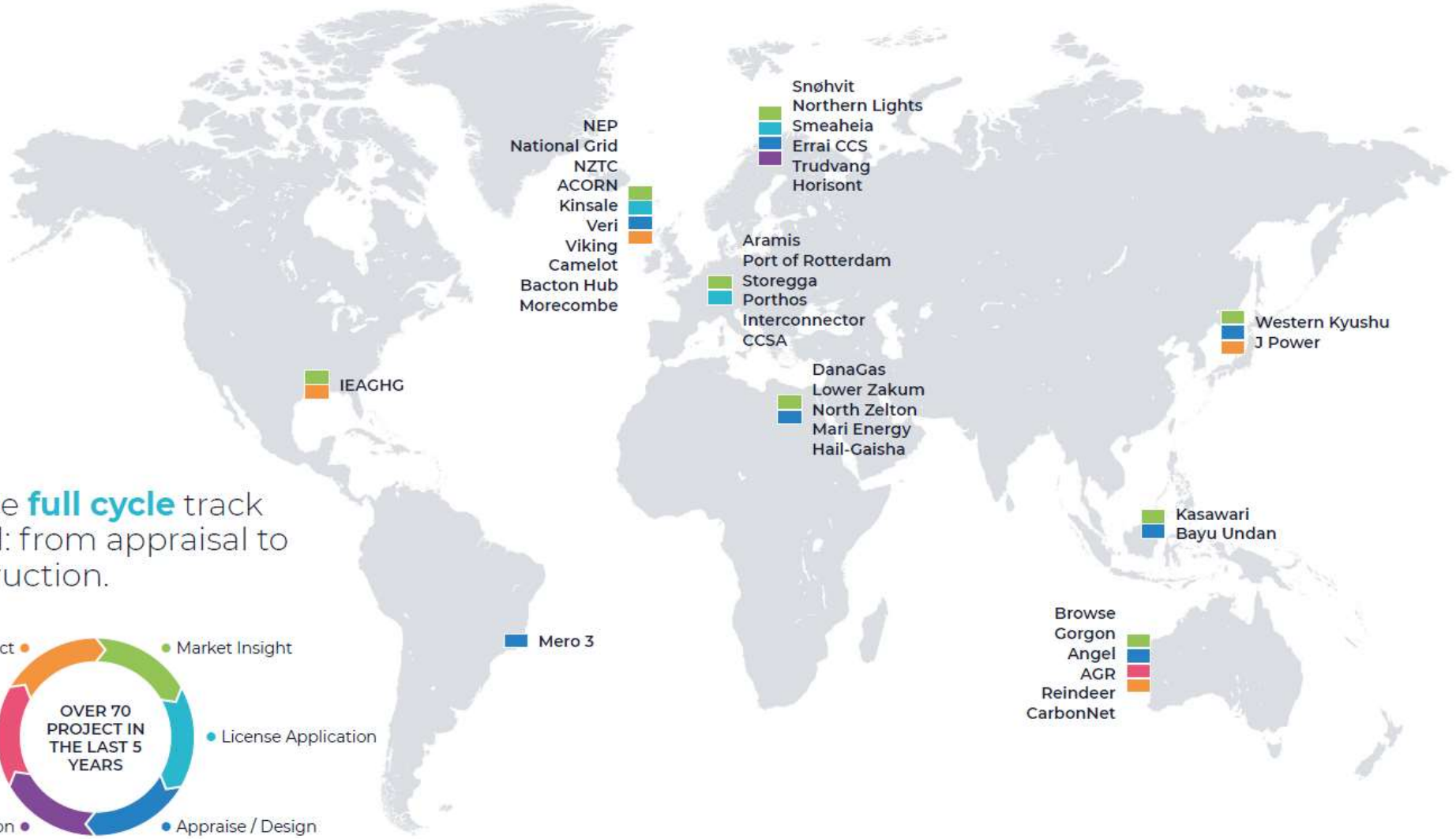


78 Vessels

3,928 km Average Transport Route

12% Market Share





Unique **full cycle** track record: from appraisal to construction.

Six Signals – shaping APAC's CCUS future

- MASSIVE SCALE
- FROM INTERNATIONAL TO REGIONAL
- THE WORLD'S LARGEST CO2 SHIPPING MARKET
- SIGNIFICANT COST SAVINGS FROM SHARED-USE CCUS
- A NEW OFFSHORE INDUSTRY FOR JAPAN & SOUTH KOREA
- COST EFFICIENCY WILL IMPROVE RAPIDLY

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