



# **“K” LINE’s Initiatives on LCO2 Transportation for CCS**

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Kawasaki Kisen Kaisha, Ltd.

December, 2025

## Corporate Profile

Name	Kawasaki Kisen Kaisha, Ltd. (" <b>K" Line</b> )
Established	April 5, 1919
Employees	5,783 (consolidated)
Business Lines	Marine, Land and Air Transportation
Head Office	Tokyo, Japan
Affiliates	286 (including affiliated companies)



## "K" Line's Group Fleet Composition

Total Number of Vessels in Operation : **443**

### Energy

**90** vessels



**46** LNG Carriers



**24** Thermal Coal Carriers



**13** Tanker & LPG Vessels

Other:  
FPSO, Drill Ship, LNG Bunkering vessel

### Others

**358** vessels



**95** Car Carriers



**177** Dry Bulk Carriers

Other: Coastal Vessels, etc.

### ONE

OCEAN NETWORK EXPRESS



**38** Container ships

(As of end of June 2025) **2**

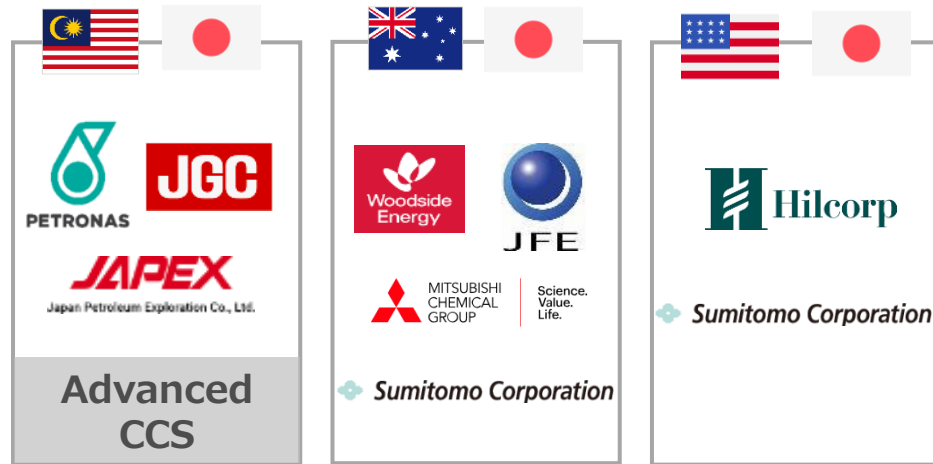
## World's First Full-scale CCS



By Northern Lights

Commercialized

## Malaysia/Australia/Alaska CCS

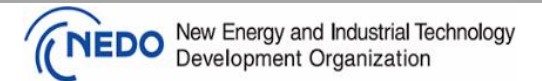


Advanced CCS

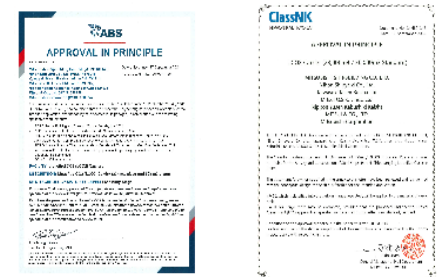


Commercial Development

## Low-Pressure Transportation



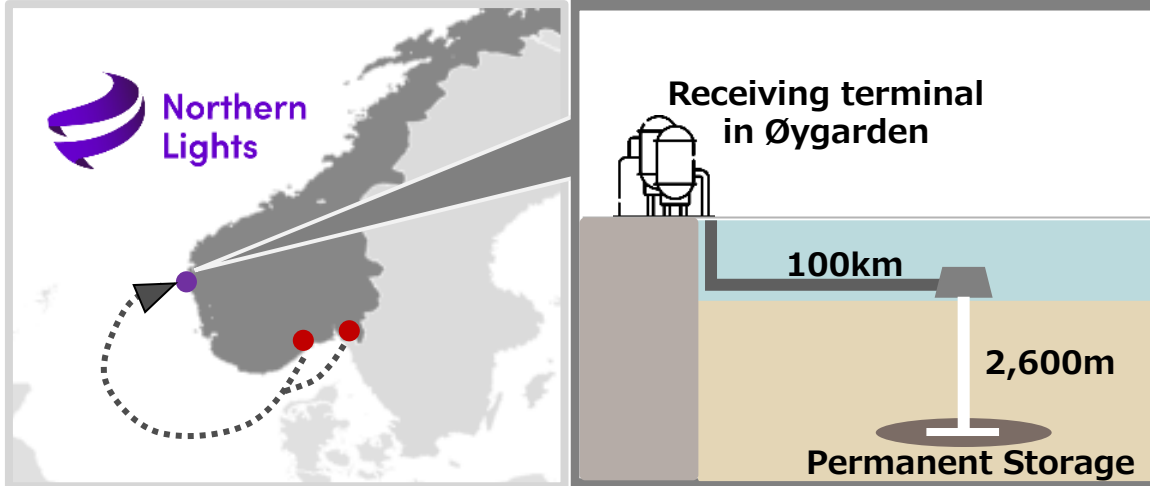
By NEDO



Technical Development

# Commercialized Northern Lights Project

## Northern Lights Phase 1



- ▶ Phase 1: 1.5 million tonnes of CO2 per annum  
**First injection started in August 2025**
- ▶ Phase 2: A minimum of 5.0 million tonnes of CO2 per annum  
First injection in late 2028



## Role of "K" Line

- ▶ "K" Line and Northern Lights JV DA signed BBC and TC contracts for 3 x 7,500m<sup>3</sup> LCO2 carriers.
- ▶ Ship management by "K" LINE ENERGY SHIPPING (UK)
- ▶ Crew training and ship/shore interface management
- ▶ First two vessels have started operation in North Sea in 2025



Class	DNV	Length	130 m
Capacity	7,500 m <sup>3</sup>	Width	21.2 m
Condition	MTMP	Draught	7.5 m



## Northern Lights Vessels Journey and Milestones



Northern Lights JV DA Photo byDSIC

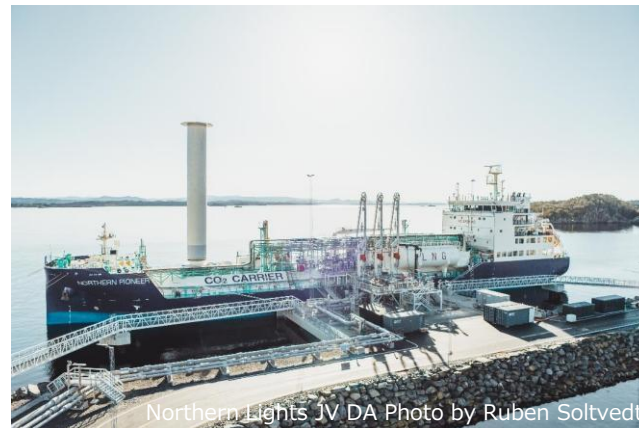
**NORTHERN PIONEER Ceremony in Dalian**



Northern Lights JV DA Photo by Tom Haga

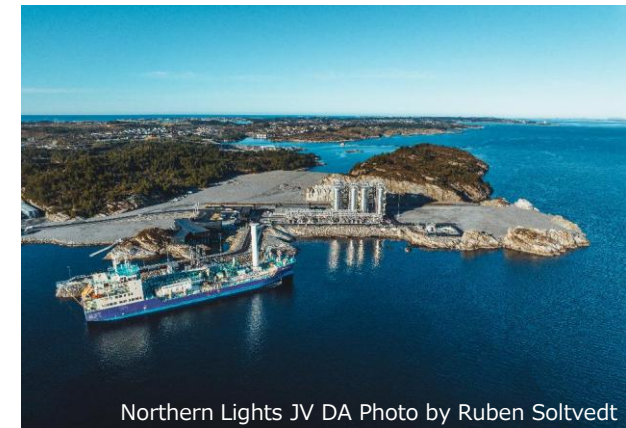
**NORTHERN PIONEER in Norway**

- ▶ Nov.2024: Delivery of Northern Pioneer (1st Vessel)
- ▶ Dec.2024: Delivery of Northern Pathfinder (2nd Vessel)
- ▶ Feb & Mar.2025: 2 vessels arrived in Norway
- ▶ Jun.2025: Completed 1st loading at Brevik
- ▶ Jun.2025: Completed 1st unloading at Øygarden
- ▶ Aug.2025: **1st injection at Øygarden**



Northern Lights JV DA Photo by Ruben Soltvedt

**CO2 offloading in Øygarden**



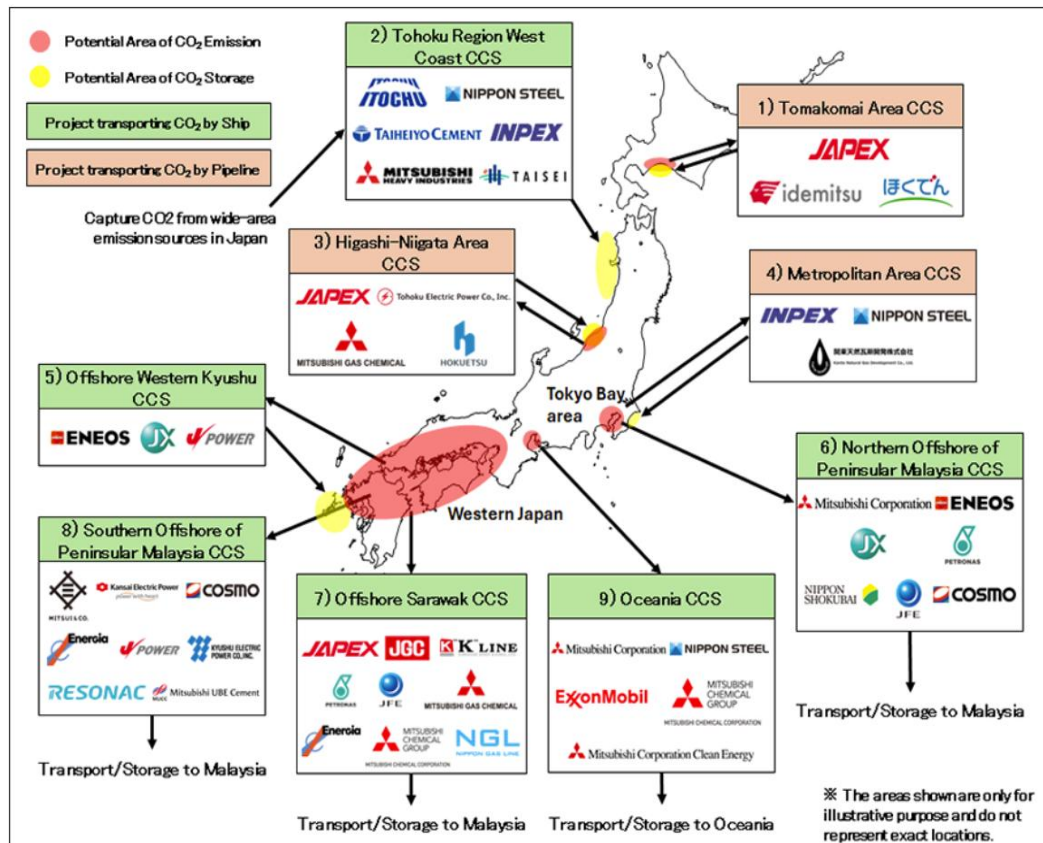
Northern Lights JV DA Photo by Ruben Soltvedt

**Receiving terminal in Øygarden**

## "Advanced CCS Project" – Offshore Sarawak CCS

### Malaysia Offshore Sarawak CCS Project

- ▶ Ministry of Economy, Trade and Industry (METI)/JOGMEC selected 9 projects as **"Advanced CCS Project"**



### Project Overview

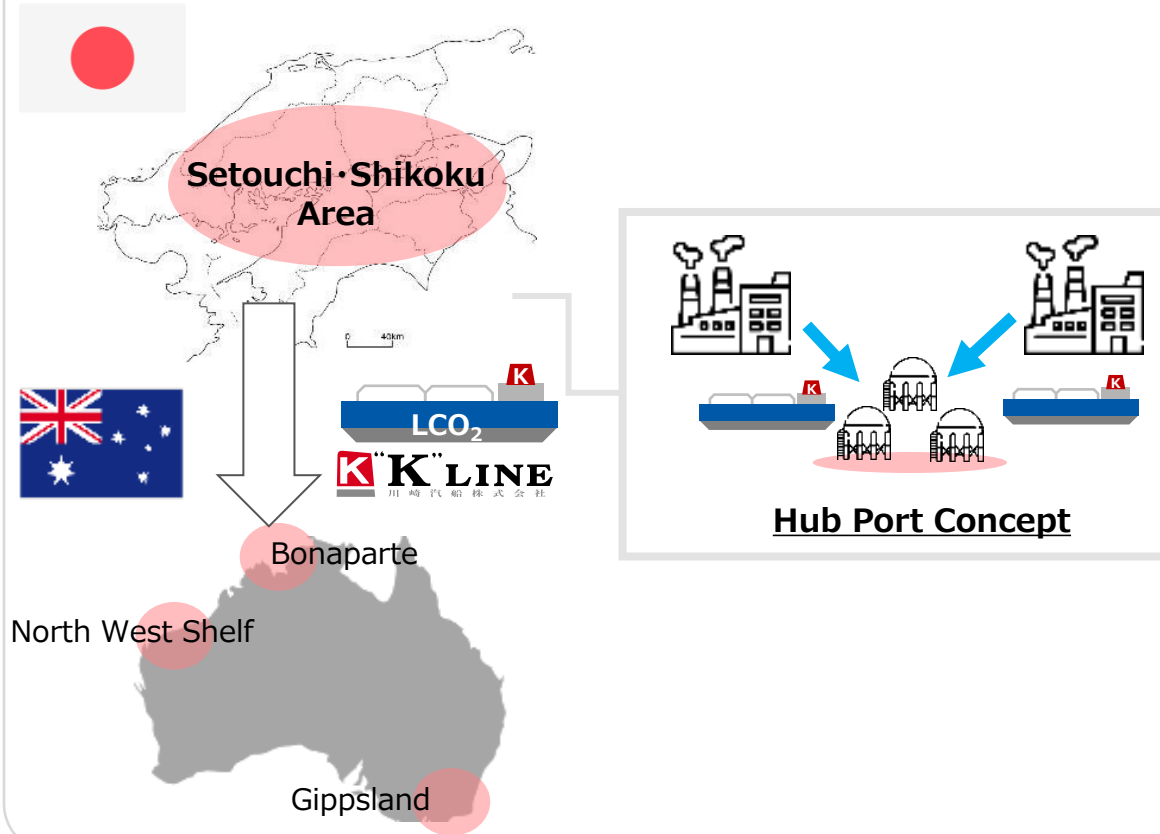
- ▶ Aggregate CO<sub>2</sub> in Japan and transport to storage CO<sub>2</sub> at offshore Sarawak, Malaysia
- ▶ Selected as **"Advanced CCS Project"**, Japanese government's subsidy program
- ▶ Project owners : **"JAPEX"**, **"JGC"**, **"Petronas"** and **"K" LINE**
- ▶ Entered FEED stage in 2024
- ▶ "K" LINE participates in the entire value chain development

#### ▶ "K" LINE is responsible for :

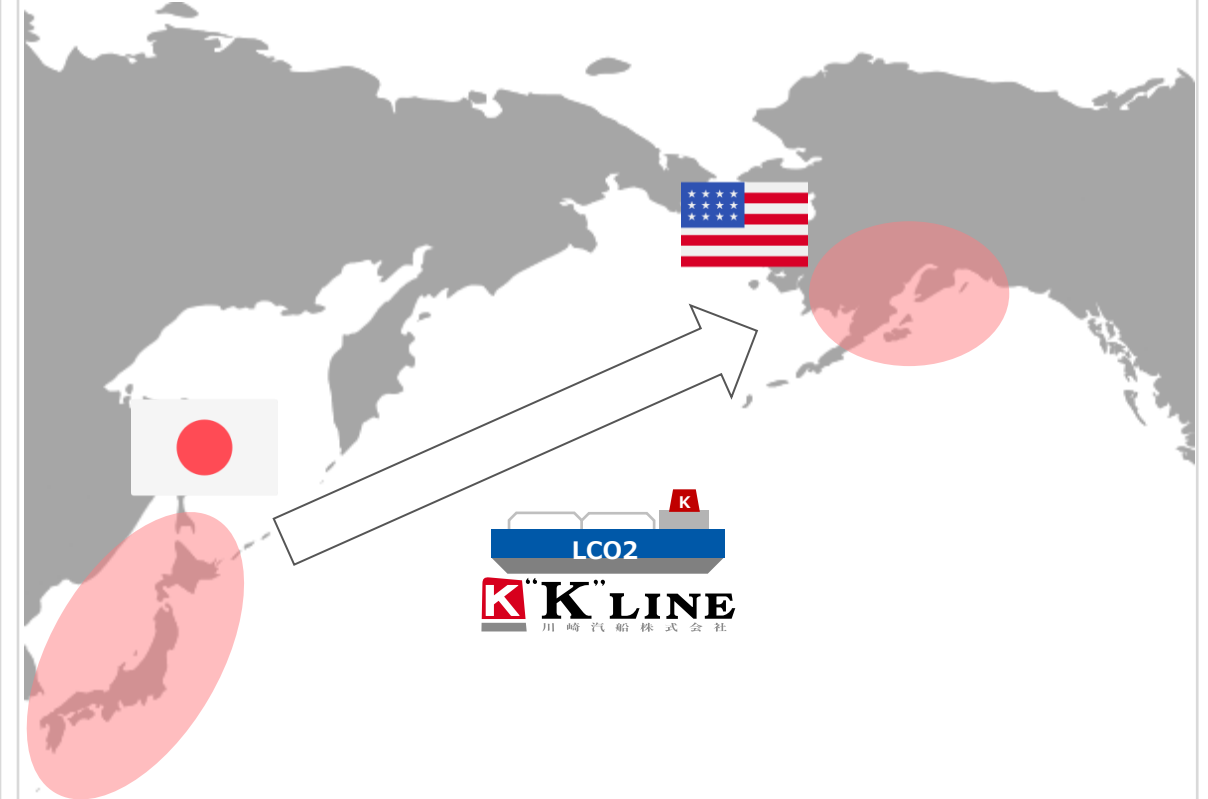
- Design development for LCO<sub>2</sub> carriers
- Considering ship shore interface for cargo handling
- Cost evaluation for LCO<sub>2</sub> carrier operation
- Risk assessment for shipping and cargo operation

## CCS Projects between Japan and Australia/Alaska

### Setouchi CCS Hub Project



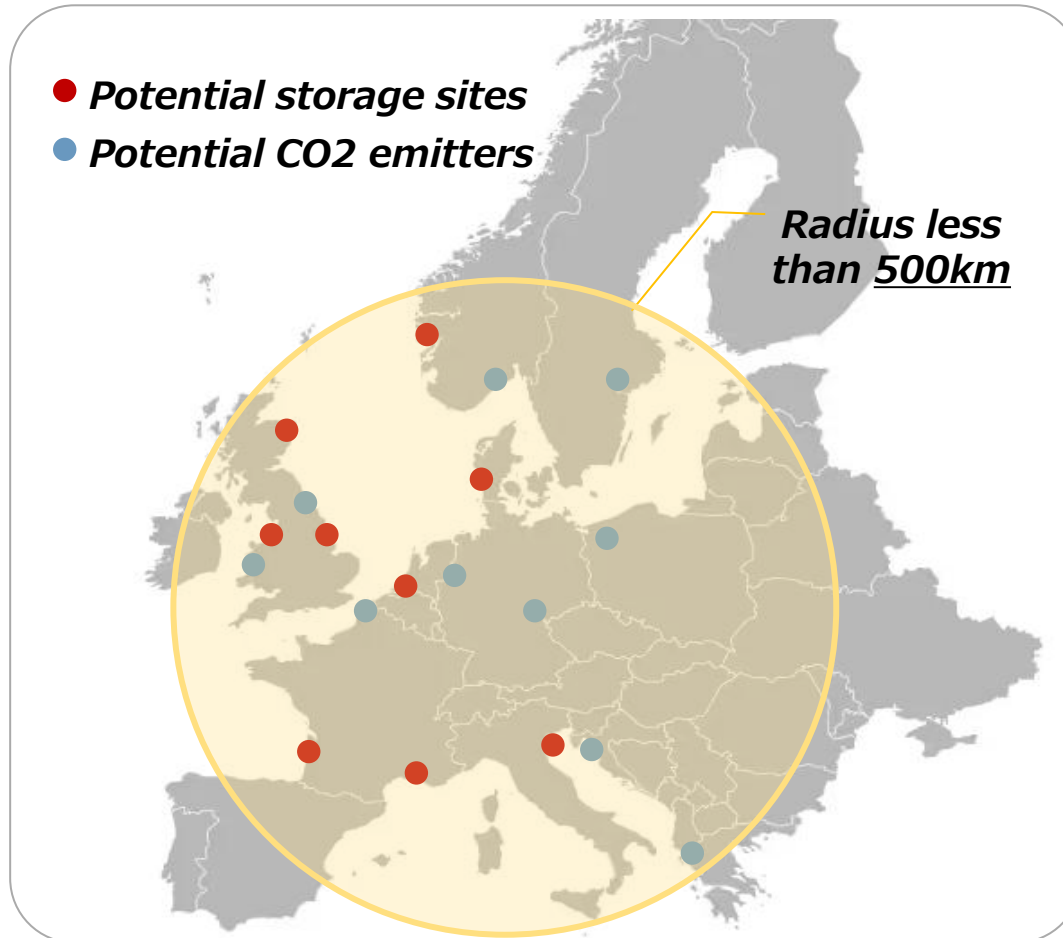
### Japan-Alaska Cross-Border CCS



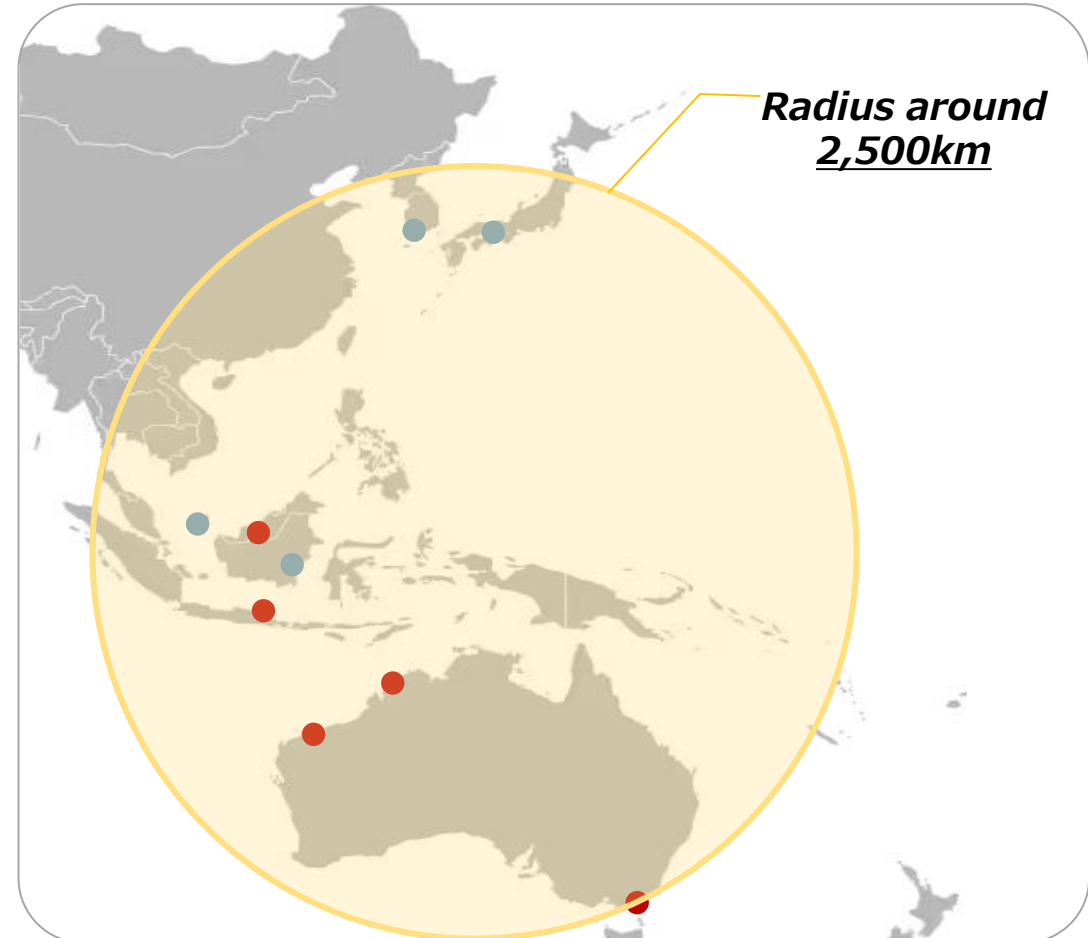
- ▶ Feasibility study for building a CCS value chain between Japan – Australia/Alaska
- ▶ Aiming to achieve large-scale transportation and cost-reduction
- ▶ "K" LINE is responsible for : voyage simulation, risk assessment, cost evaluation, ship shore interface etc

## Necessity of Large Scale LCO2 Carrier

### CCS Overview in Europe



### CCS Overview in Asia Pacific



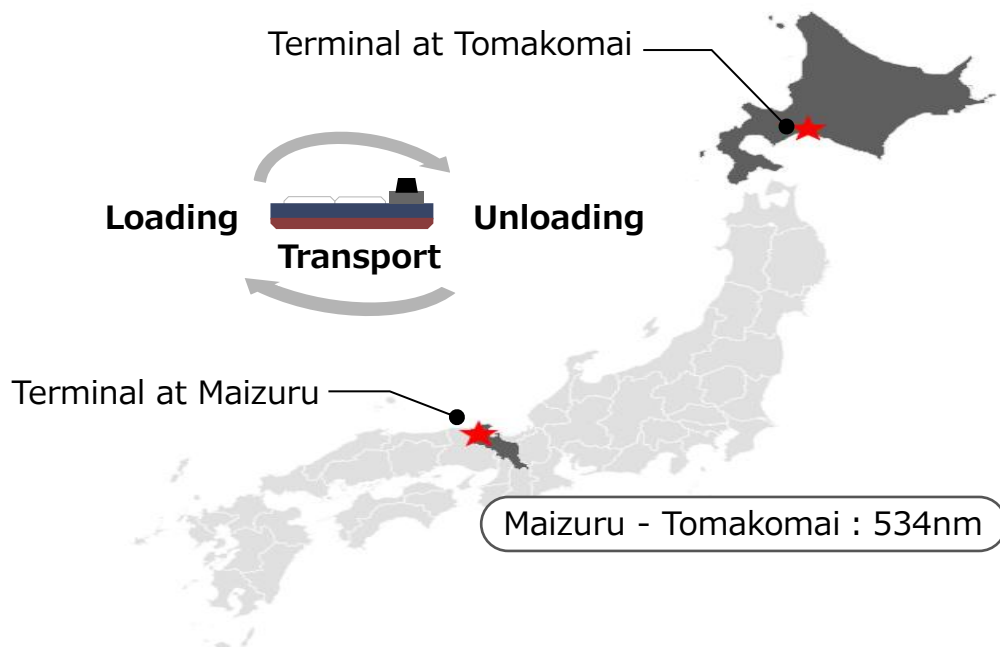
- ▶ Europe : Multiple storage sites and emitters are concentrated within a relatively small area
- ▶ Asia Pacific : Fewer storage sites and emitters are widely and finely dispersed
- ▶ For cost-effective transportation in the Asia Pacific region, large scale LCO2 carrier will be required



### Demonstration Ship "EXCOOL"



Class	NK
Capacity	1,450m3
Length	72m
Draught	4.5
Cargo tank	Pressurized



\*NEDO : New Energy and Industrial Technology Development Organization

\*LTLP : Low Temperature and Low Pressure

\*MTMP : Medium Temperature and Medium Pressure

### Demonstration Overview

#### Background

- ▶ Aim to establish a technology for the large-volume and long-distance marine transport of liquefied CO<sub>2</sub>
- ▶ "Excool" dedicates to carry out the demonstration of LTLP cargo operation to establish a safe and cost-effective technology

#### "K" LINE's role

- ▶ Safety assessments of loading/offloading operations and
- ▶ Formulation of technical guideline for the social implementation of LCO<sub>2</sub> shipping.

#### What's done as of today

- ▶ July 2024: Cargo handling demonstration by "Truck to Ship" method
- ▶ October 2024: Cargo handling demonstration from onshore facility ("Shore to Ship")
- ▶ December 2024: Transportation demonstration test using LCO<sub>2</sub> around -50°C categorized in LTLP
- ▶ June 2025: Handling demonstration with faster LCO<sub>2</sub> flow speed
- ▶ Continuously conducting transportation and cargo handling operation on an ongoing basis

## Joint development of 50,000m3 and 23,000m3 LCO2 carriers

### AiP for large-scale LCO2 Carriers

- Approval in Principle (AiP) certifications for LP type liquefied CO2 carriers have been acquired from ABS and Class NK
- Vessel size : 50,000m3 and 23,000m3
  - Aiming for standardization of large-scale international marine transportation
- "K" LINE as shipowner contribute to develop vessel design jointly with ship builder.
- Plan to collaborate to contribute to the further progress of a decarbonized society by developing low emission ships using decarbonization technologies (such as ammonia fuel)

### Participants

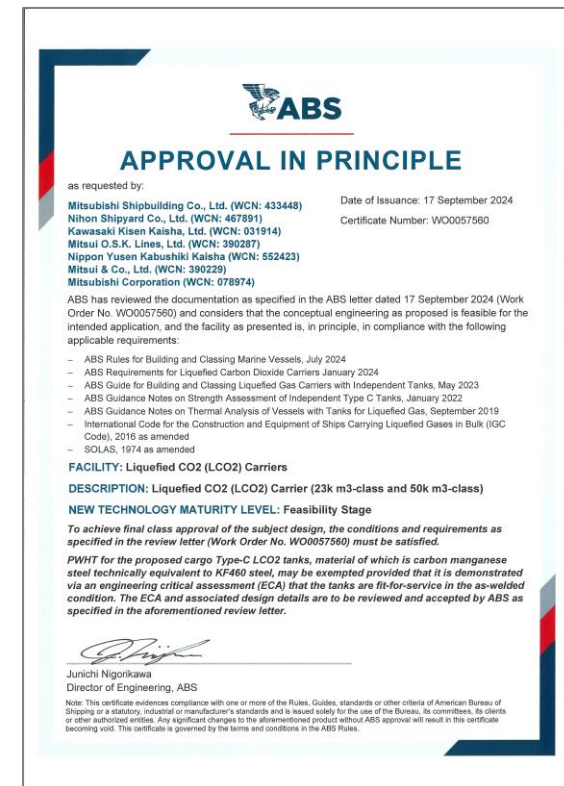
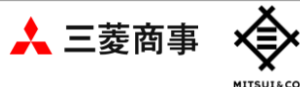
#### Ship Builder



#### Shipping Company



#### Business Developer



**AiP presentation ceremony at  
Gastech Houston in 2024**