CCS Business Solution by PETRONAS

A collaboration between the industries in Japan

3 September 2024

The PETRONAS Group adopts zero tolerance against all forms of bribery and corruption. We abide by the PETRONAS Code of Conduct and Business Ethics (CoBE) & Anti-Bribery and Corruption (ABC) Manual, guided by our Shared Values and Statement of Purpose.

Cautionary statement

This release contains forward-looking statements and statements of future events and similar expressions used to represent our judgements and future expectations. These statements involve risk and uncertainty because they relate to future events and circumstances and should be considered in light of various important factors. The key factors that could cause achievements to differ materially from those in the forward-looking statements include changes to domestic and international businesses and market conditions; changes in domestic and international regulatory and legislative environments; changes to domestic and international operational, social, economic and political conditions; any labour disruptions and industrial action; and the effects of both current and future litigations.

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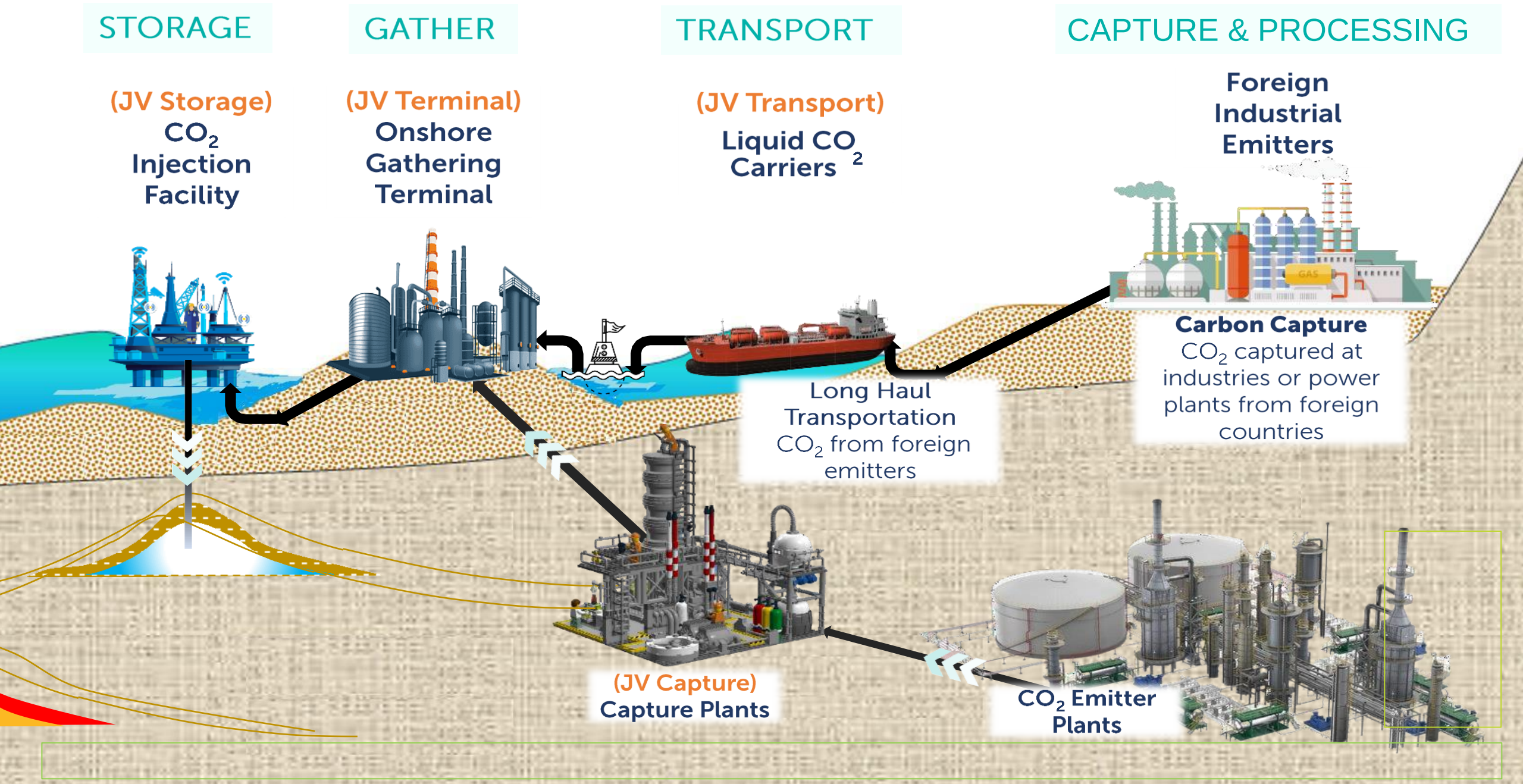

STORAGE
GATHER
TRANSPORT
CAPTURE & PROCESSING
(JV Storage)
CO_2 Injection Facility
(JV Terminal)
Onshore Gathering Terminal
(JV Transport)
Liquid CO_2 Carriers
Foreign Industrial Emitters
Carbon Capture
CO_2 captured at industries or power plants from foreign countries
Long Haul Transportation
CO_2 from foreign emitters
(JV Capture)
Capture Plants
CO_2 Emitter Plants

[Open]

Carbon permanent storage is a proven solution that has been safe in operations for over 25 years

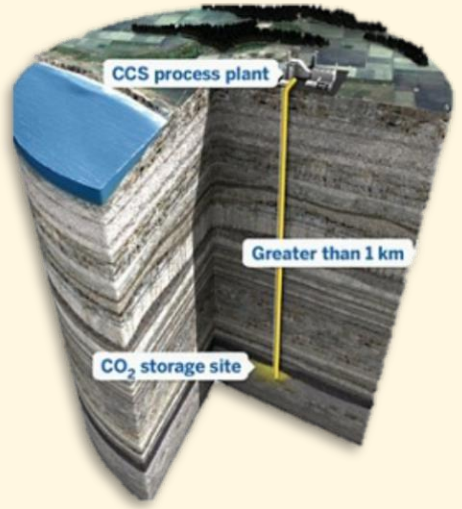
Sleipner CCS offshore of Norway is the world's 1st geological storage project for the purpose of carbon emission abatement. This project captures carbon dioxide from gas development for storage in an offshore sandstone reservoir.

The world's first and longest lasting commercial storage project (since 1996, 20+ Mt CO_2 stored).

Geological containment of CO_2
The injected CO_2 remain in Utsira sandstone for thousands of years, similar to how O&G have been trapped in deep geological formations for millions of years.

Where is CO_2 Being Stored?

CO_2 is injected to deep geological reservoirs below impermeable rocks



1 Deep Underground
Keep CO_2 underground at least 800 meters below the seabed

2 Impermeable Seal
CO_2 is sealed in place by a thick impermeable layers of caprock

3 Permanent Storage
CO_2 transform from gas into solid minerals

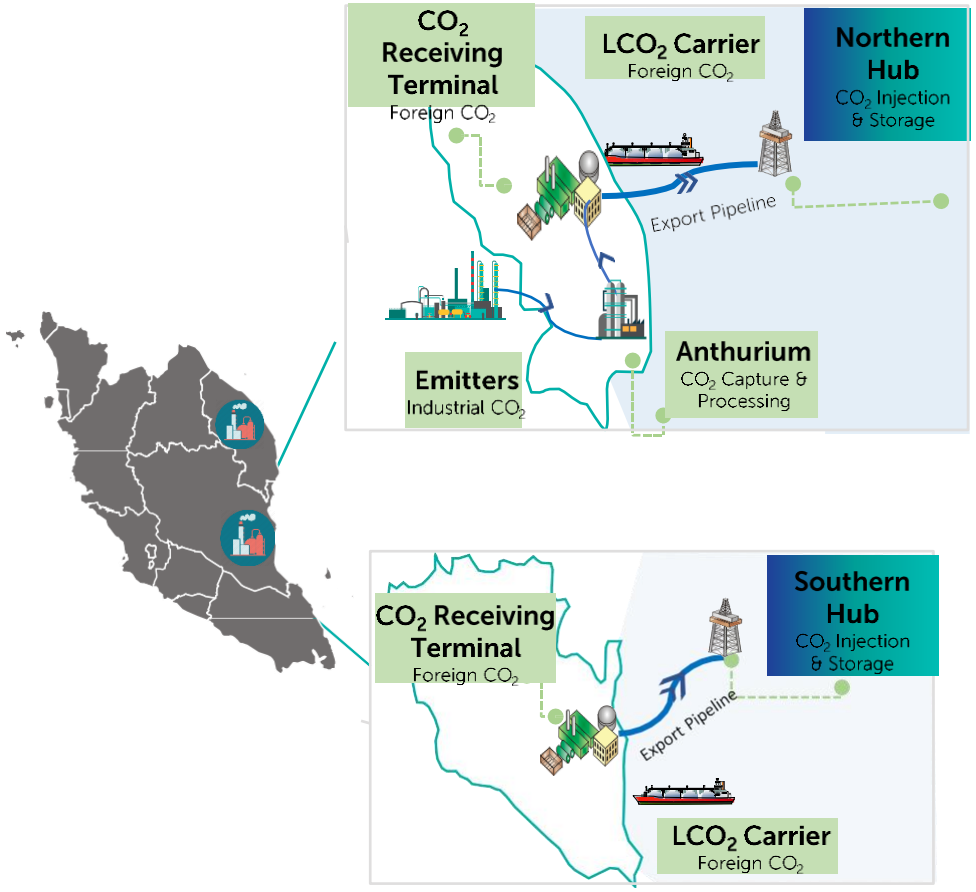
4 Closely Monitored
Underground CO_2 placement and movement is undergoing structured monitoring process

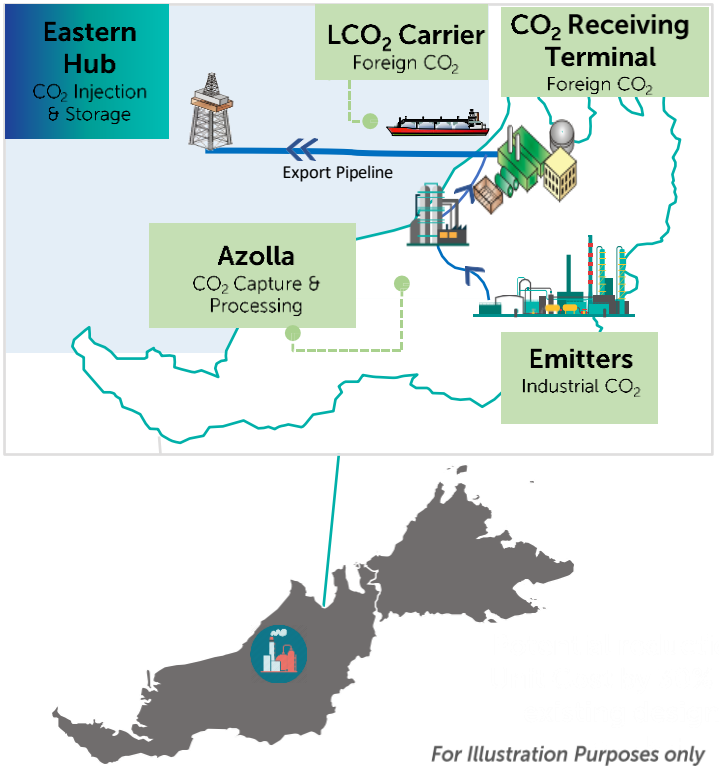
It is estimated that geological sequestration is safe with overall leakage rates at <0.001% yr^{-1} (Alcalde et al. 2018).

IPCC AR6 WG III, Pg 980

Source:
1. CCS Image Library - Global CCS Institute
2. MythBusters-Flyer_FINAL-5.pdf (globalccsinstitute.com)

Collaborative studies have progressed into CCS projects to cater for PETRONAS Sustainability Agenda and regional decarbonization effort





Short & Long Haul LCO_2 Carrier

- Completed Conceptual Design for 2 LCO_2 Carriers

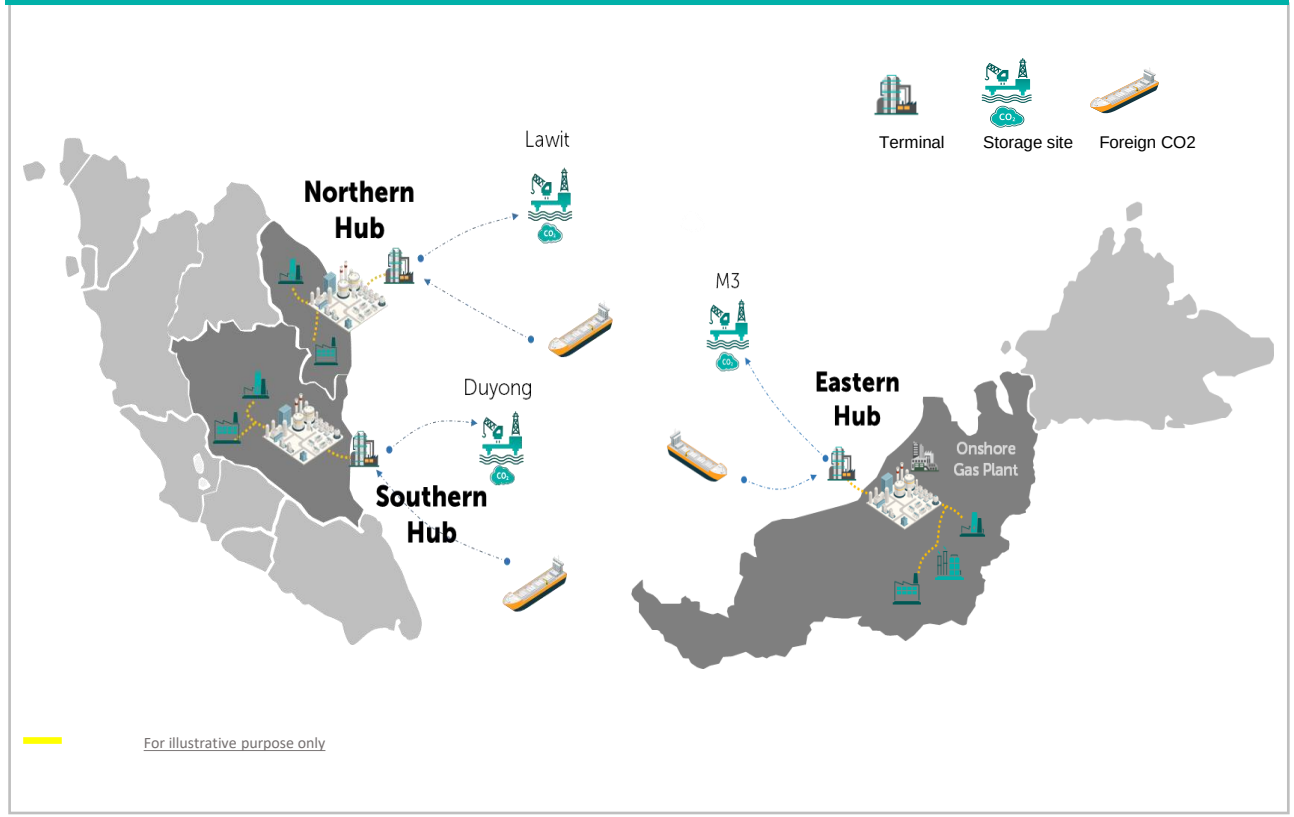
- Designs obtained Approval in Principle (AIP) from DNV/ ABS
- Potential reduction of Unit Cost by 30% from existing design in market

Eastern CCS Hub (Sarawak)	Execution of Key Principles Agreement effective 22nd September 2023 and Site Storage Agreement effective 26th February 2024.
Shipping for LCO_2 Carrier	Term Sheet for Shareholder Agreement (SHA) signed on 22nd September 2023. Followed by Joint Venture Agreement (JVA) signed on 10th May 2024.

PETRONAS has taken the approach of collaborative strategy in developing the CCS hub in which the partners are from diversified industries.

Development of CCS at Southern Hub will offer new future growth to Kuantan Port

Development of 3-CCS hubs for Malaysia as a no-regret move to achieve this target and position Malaysia as key CCS Hubs for the region



PETRONAS CCS Venture / Solutions

Terminal	Shipping	Storage Current Partnerships			Potential partnership in discussions		Certification
		Northern Cluster	Southern Cluster	Eastern Cluster	Penyu Cluster	F Cluster	
K LINE, JGC, JAPEX, PETROS	K LINE, MOL, misc	ExxonMobil	MITSUI & CO.	JGC, PETROS, JAPEX, K LINE	STOREGGA, ADNOC	SAMSUNG E&A, SAMSUNG ENGINEERING, Shell, KNOC, SK energy, Hanwha Corporation, SK earthon, LOTTE CHEMICAL	DNV

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Overview of Other Ongoing Collaboration with Japanese Companies

No	Partners	Key Areas of Collaboration	Status Update
1.	MITSUI & CO. TotalEnergies	Southern CCS Hub (Kuantan, Pahang)	Execution of CCS Development Agreement effective 16th June 2023 for duration of 2 years.
2.	ENEOS JX Mitsubishi Corporation	Joint Feasibility Study for Tokyo Bay & Ise Bay Emission for Storage in Malaysia. Note: Kanowit depleted field to be developed as potential CCS storage site and/ or store CO_2 in existing Malaysia CCS hubs. (optional)	Execution of MoU on 1st March 2024 for duration of 1 year (with option for extension of another 1 year).
3.	jera	Joint Feasibility Study to store CO_2 in existing CCS hubs and to explore High Pressure/ High Temperature shipping and terminal.	Execution of Joint Preliminary Feasibility Study Agreement on 29th March 2024 for duration of 1 year.
4.	MITSUBISHI HEAVY INDUSTRIES	Joint Feasibility Study for capturing and collecting biogenic CO_2 from Southeast Asia for storage in Malaysia.	Confirmation on ability to utilize existing NDA completed. Target to sign MoU within Q3 2024.

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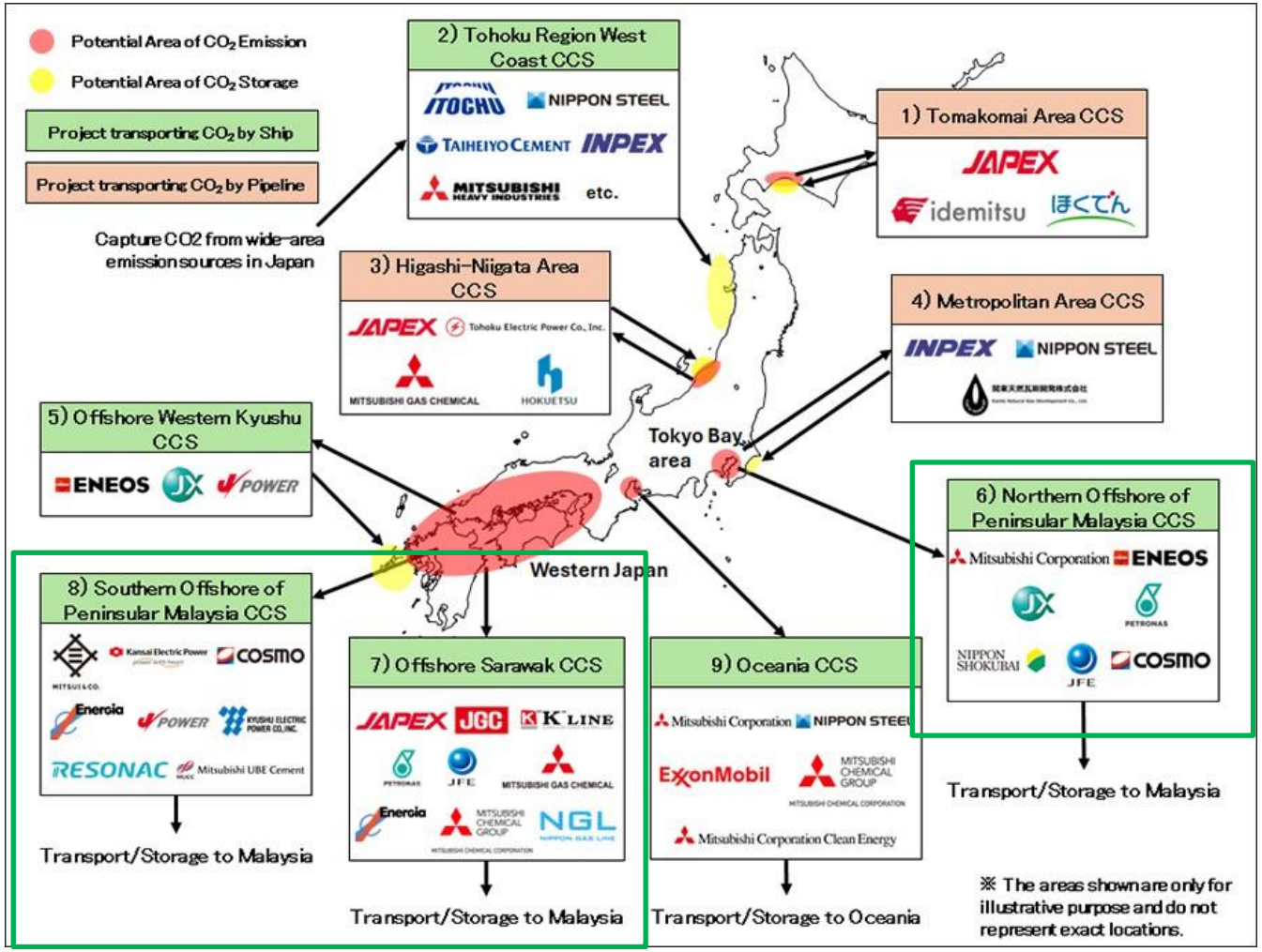
Advanced Efforts for Commercialization of CCS – 9 projects selected as Japanese Advanced CCS Projects (24th July 2024)



A total of 9 projects store about 20 million tons of CO_2 per year
Location map and proposed companies of 9 projects selected as advanced CCS projects in 2020

- FY2024, Japan Organization for Metals and Energy Security (JOGMEC) selected 9 role model projects (5 projects are planned for domestic storage in Japan, while the remaining 4 projects target storage in Asia and Oceania, which might lead to decarbonization throughout the Asia-Pacific region.) for Japanese Advanced CCS Projects. These will significantly promote decarbonization by supporting the "CCS" technology, through "**basic engineering design for CCS value chain**" and "**assessment on CO_2 storage potential**" including exploratory drilling.
- The 9 projects cover various industries, including electric power, oil refinery, steel, chemical, paper and pulp, and cement in regions with high CO_2 emissions, such as **Hokkaido, Kanto, Chubu, Kinki, Setouchi**, and **Kyushu**. The project aim to store approximately **20 Mtpa of CO_2 annually**.

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YEARS