

JGC Group's Initiatives to Realize Social Implementation of CCUS Technologies



Enhancing **planetary health**

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Sustainability Co-creation Unit

JGC Holdings Corporation

JGC Group Overview



- Established in **1928**, has grown to become the Largest Process Plant Engineering Company in Japan
- Net Sales Over US\$ **5.5 Billion** (Fiscal '23, ending March 2024)
- Experience in over **87** Different Countries Worldwide
- The Combined Expertise of over **11,000** Personnel Available in the JGC Group

energy solutions – business domains & track records

Oil and Gas Production



Gas Processing Plant for Sonatrach, Algeria

> 60

Major Projects

Oil Refining



Refining and Petrochemical Complex Plant for Rabigh Refining and Petrochemical, Saudi Arabia

> 50

Major Projects

LPG FPSO (Floating Production & Storage Offloading)



LPG FPSO Plant for IHI, Angola

* Not including LPG FSO/FPU

100%

2 Projects

LNG



LNG Plant for Ichthys LNG, Australia

> 30%

48 Trains

Ethylene



Ethylene Plant for Chevron Phillips Chemical, US

> 40

Major Projects

FLNG



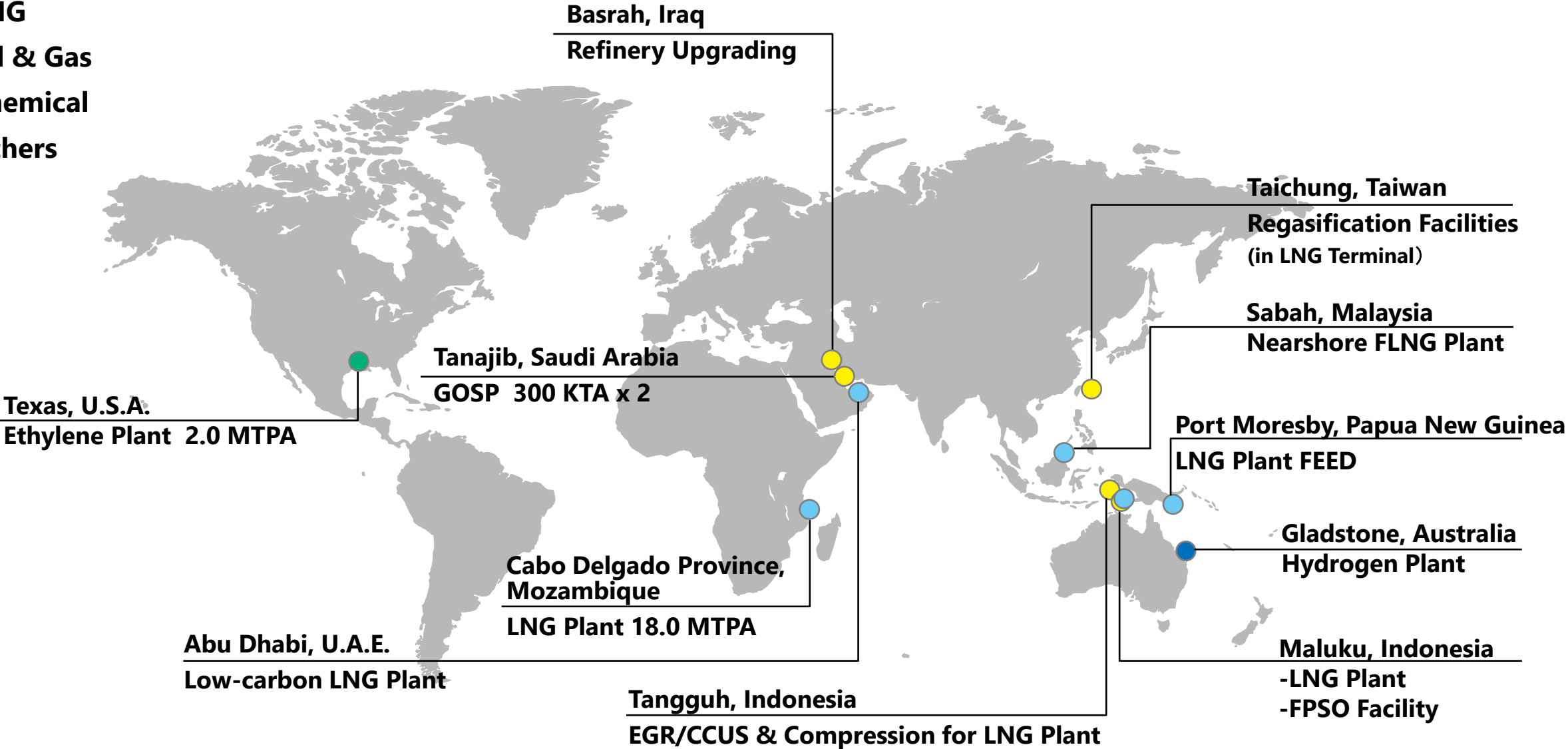
FLNG Plant for PETRONAS, Off the coast of Malaysia

75%

3 Open Sea Projects

ongoing major projects

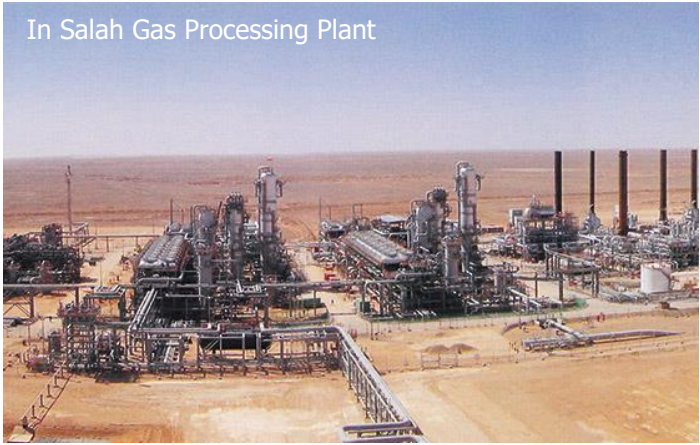
- LNG
- Oil & Gas
- Chemical
- Others



JGC as a leading CCUS engineering company

JGC Group has built a reputation as a leading contractor in CCS

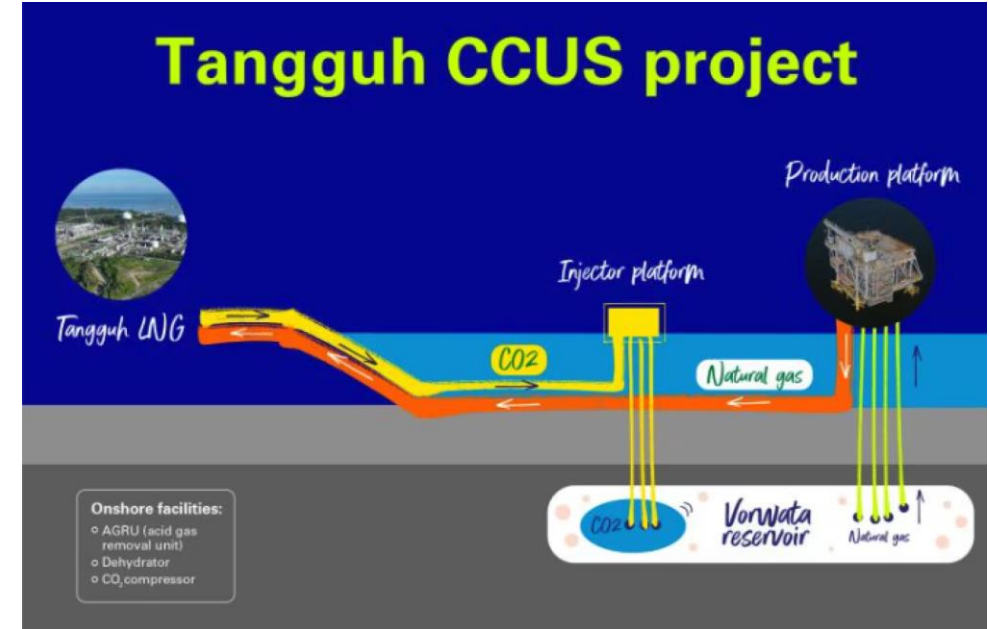
Our track record of construction includes projects such as our first CCS facility at an Algerian natural gas refinery in 2004, a CCS installation at an Australian LNG plant that is one of the world's largest, and one of Japan's first large-scale CCS pilot projects in Hokkaido.



<https://www.jgc.com/en/projects/026.html>

	Operator	Country	Industry	Capture Capacity MTPA	JGC Scope	Operation Date	Remarks
1	BP Exploration (In Salah)Ltd./SONATRACH	Algeria	Natural gas processing	1.2	FEED,EPC	2004 (EPC)	World's second CCS project for natural gas processing
2	Gorgon JV	Australia	LNG	3.4 - 4.1	FEED, EPC	Not disclosed	One of the world's largest CCS projects
3	Naftna Industrija Srbije (NIS)	Serbia	Natural gas processing	-	Licensing	2015	World's first commercial project for our CO2 capture technology - HiPACT®
4	Japan CCS	Japan	H2 production refinery	0.3 in total	EPC, Test run	2016	First CCS demonstration project in Japan
5	INPEX	Japan	Blue H2/NH3	not disclosed	FEED, EPC, Test run	2025	Japan's first blue H2/NH3 demonstration HiPACT® has been selected for CO2 capture
6	BP Berau, Ltd.	Indonesia Papua Barat Province,	EGR/CCUS for LNG Plant	Approx 5.2 (270MMSCF)	EPCI	On-going	Indonesia's first at-scale EGR/CCUS contract amount: 2.4 Billion USD.

Tangguh UCC project



<https://www.bp.com/>

project highlight

- JGC through its local subsidiary PT. JGC Indonesia is executing EPCI for the Tangguh UCC Project located in Papua Barat Province, Indonesia.
- The Project is to separate the reservoir CO2 from produced gas in LNG liquefaction plant and reinject it back into the offshore gas field for sequestration and enhanced gas recovery.
- New onshore units mainly consist of Hydrocarbon Compressors (2,350 MMSCFD) to boost natural gas pressure from the existing gas wells, EGR Compressors (270 MMSCFD) to collect and compress acid gas from the existing acid gas removal unit, and a newly-built combined cycle power plant as well as associated utilities.

JGC group's initiatives: social implementation of CCUS technologies

technology

CO₂ capture technology

high pressure
hydrocarbon



HiPACT®
DDR Zeolite Membrane

low pressure
flue gas



strategic collaboration
with SLB Capturi

engineering knowledge for CCS Supply Chain

- corrosion/material selection for acid gas service
- LPLT design knowhow
- cryogenic/BOG handling etc.

X

project delivery

plenty of experience in:

- CCUS projects
- mega scale, multi billion USD contract
- lumpsum turnkey
- experience in over 87 different countries worldwide
- CCUS value chain development
(Eastern Hub CCS, Malaysia)

etc.

**commitment to the social implementation
of CCUS technologies**

CO₂ capture technology: HiPACT®

HiPACT® - CO₂ Capture Process

■ Technology

- Chemical absorption process, using newly developed absorption solvent (jointly developed with BASF)

■ Advantages

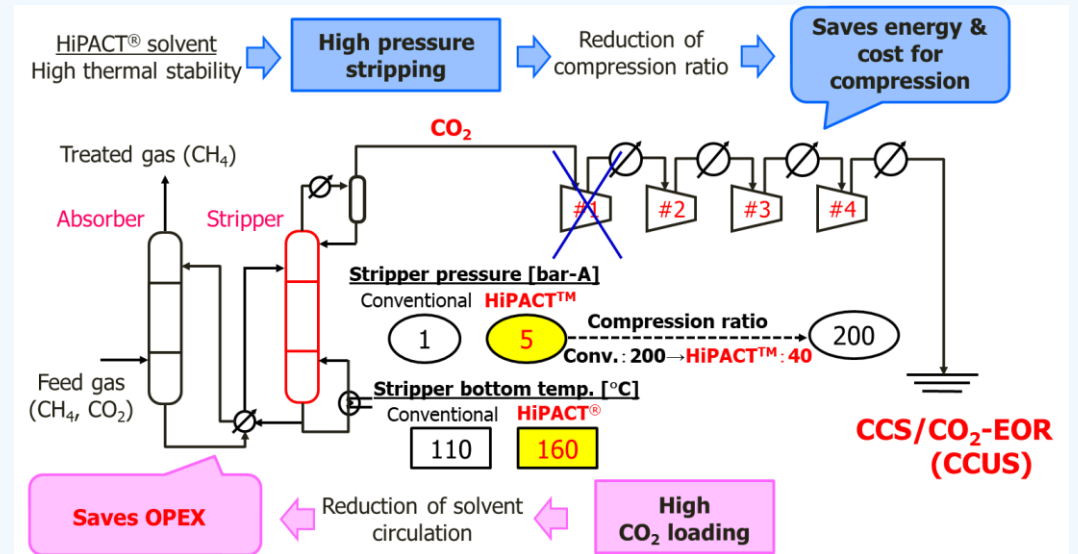
- Highly stable against thermal degradation
- Enables high pressure CO₂ stripping, leading to significant energy and cost saving (25 to 35 % reduction)

Commercial HiPACT™ plant (NIS, Serbia)*1



■ Applications

- Natural gas processing plants including LNG plants
- Synthesis gas (syngas) processing plants to synthesize chemical products, e.g. ammonia, urea, hydrogen, acetic acid, methanol and substitute natural gas (SNG).
- IGCC (Integrated Gasification and Combined Cycle) plants, especially those based on coal and heavy oils.



Details of technology:

<https://www.jgc.com/en/business/tech-innovation/environment/hipact.html>

CO₂ capture technology: DDR Zeolite Membrane

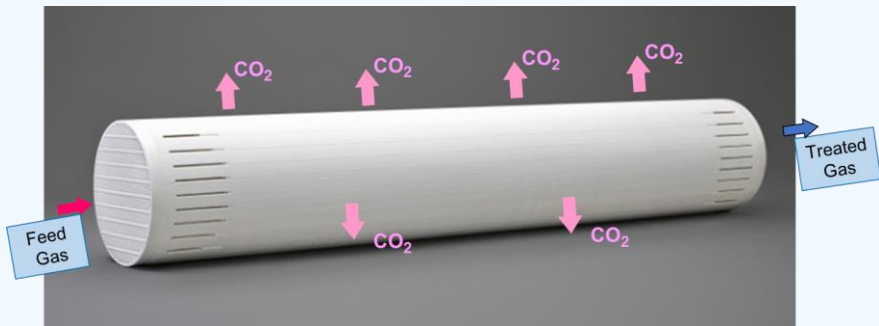
DDR Zeolite Membrane

■ technology

- Technology jointly developed by JGC and NGK
- World's largest zeolite membrane element

■ advantages

- Enhanced separation performance
= min. hydrocarbon loss
- Tough under high pressure, high CO₂ concentration
= longer membrane life
- Significant lifecycle cost saving (**20-30%**)



Detail of the technology can be found:

<https://www.jgc.com/en/business/tech-innovation/environment/ddr-membrane.html>

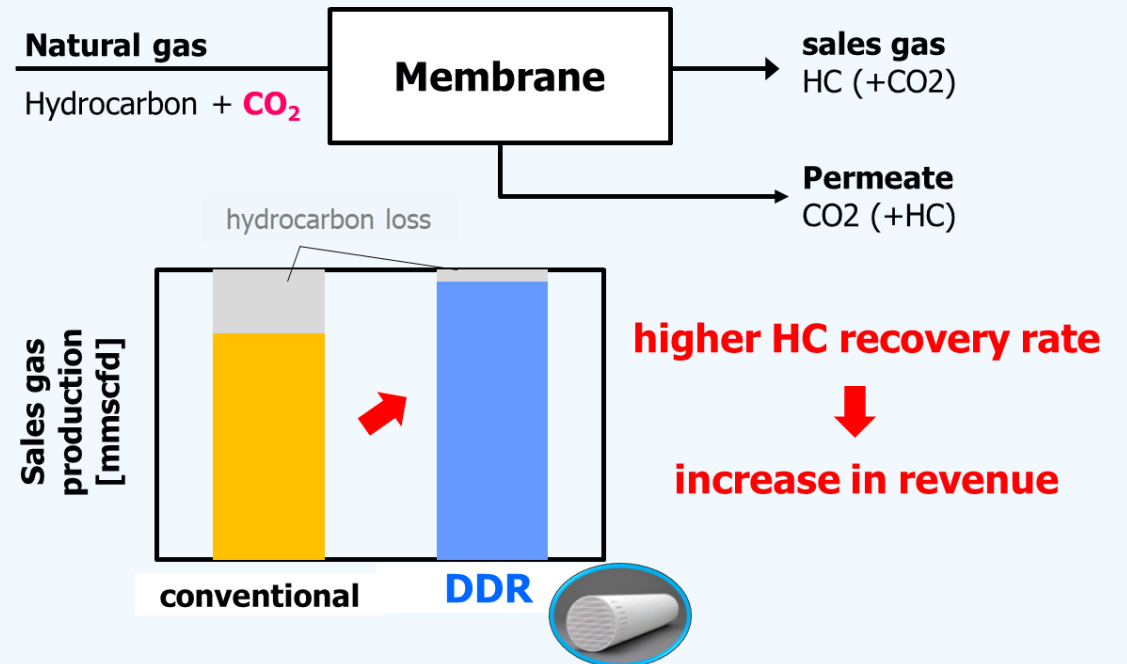
■ application

- Natural Gas Processing (CO₂ removal in CO₂ rich gas field)
- CO₂ recovery from associated gas for CO₂-EOR^(*) project

^(*) EOR: Enhanced Oil Recovery

■ technology Development Status

- Field test at U.S. oil field (2017, completed)
- Commercial scale field test at U.S. oil field in progress (from 2020, completed)



CO₂ capture technology: flue gas application

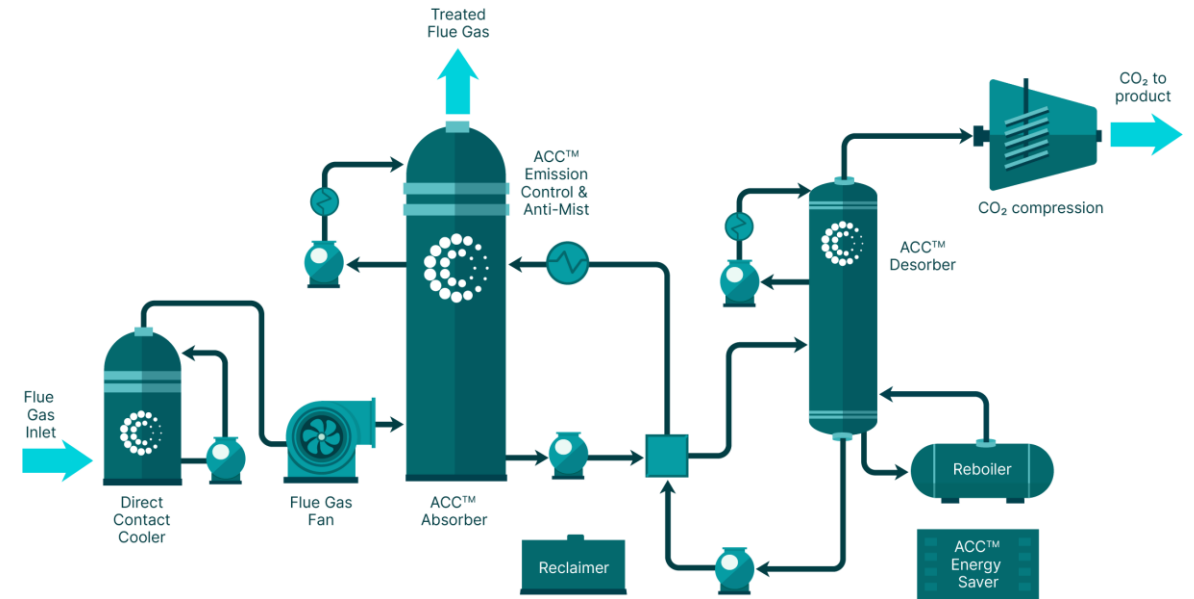
JGC and SLB Capturi concluded MoU and initiated a strategic collaboration dialogue.



Jon Christopher Knudsen (right)
Chief Commercial Officer, (SLB Capturi)
Tomohide Muraoka (left)
Executive Officer, Technical Officer (JGC)

photo in Japan CCUS Summit, 2025

Market leading CO₂ capture technology for flue gas application



- ❑ The technology has been delivered to 7 plants in Europe (up to 1.4 mtpa).
- ❑ Applied to hard to abate industry:
Cement, Biomass Power, Waste Energy



Delivering Brevik CCS

- World first CO₂ capture to Cement Plant – delivered by SLB Capturi
- Capture capacity: 400,000 metric tons CO₂ per year
- CO₂ transport by ship to permanent storage as part of Northern Lights

Cement

Heidelberg Materials, Norway

2020
Project start

March 2024
All heavy lifts
completed

Dec. 2024
Mechanical
complete

June 2025
Official opening of
plant and first CO₂
shipped

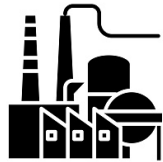
Eastern Hub CCS, Malaysia

- CO2 from hard to abate industry in Japan and Malaysia is being stored in large depleted gas fields in Sarawak, Malaysia.
- 5 mtpa of receiving termina is considered (potentially scale up to 10 mtpa).
- **Selected for “Advanced CCS program” hosted by the government in Japan.**
- Basic design (FEED) has been commenced in 2024.

international collaboration between Malaysia and Japan team

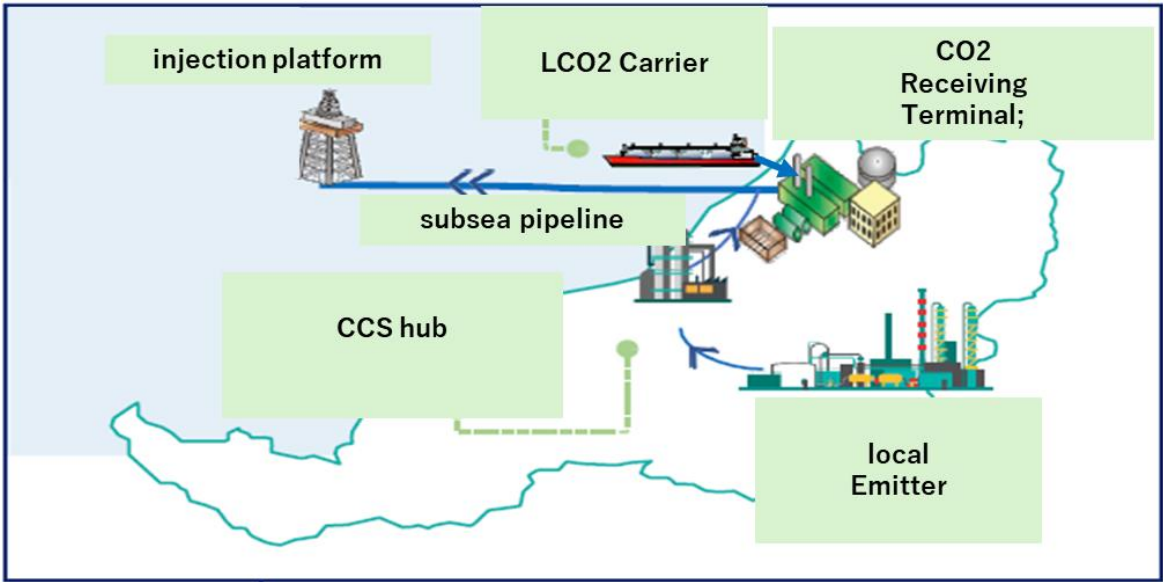
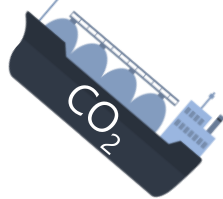
storage at scale : large depleted gas fields in Sarawak re-purposed (confirmed capacity and leak risk)

emitter	JFE Steel, Chugoku Power, Mitsubishi Chemical, Mitsubishi Gas Chemical
transport & storage	JAPEX, JGC Holdings , K Line, Petronas CCS Ventures
domestic transport	Japan Gas Line



Hard to abate

- iron
- power
- chemical



summary

- JGC Group has built a reputation as a leading engineering company in CCUS.
- We have been involved in mega-scale CCUS projects, development of CO2 capture technology and strategic collaboration with stakeholders and technology suppliers.
- JGC as a leading engineering company commits to leverage such technology, knowledge and experience for the realization of the socialization of CCUS technology into the industry.