MUFG TRANSIT

APAC Low-Carbon Energy

Volume II, Aug 2023
ESG Finance Department

MUFG Bank, Ltd.
A member of MUFG, a global financial group

Table of Contents

MUFG's Global ESG Expertise

APAC

Colin Chen
Managing Director, Head of ESG Finance, APAC

Amanpreet Singh
Director, Deputy Head of ESG Finance, APAC

Angkana Meeploy
Director, ESG Finance, APAC

Archana Khemka
Director, ESG Finance, APAC

Serena Lum
Analyst, ESG Finance, APAC

Japan

Haruka Yamamuro
Managing Director, Project Finance, Oceania

Shareef Omar
Director, ESG Finance, Oceania

Miyuke Zeniya
Chief Sustainability Officer, Japan

Tomohiro Ishikawa
Chief Regulatory Engagement Officer, Japan

Daisuke Nishiyama
Managing Director, Head of Sustainable Business Division Japan

Americas

Hailey Orr
Director, Capital Markets Strategist, Americas

Leanne Rakowitz
Director, Head of ESG Coverage, Americas

Tobi Petrocelli
Director, Head of Environmental & Sustainability Management, Americas

Beth Gilroy
Director, Environmental & Sustainability Management, Americas

EMEA

Stephen Jennings
Head of Energy & Head of Sustainable Business Division, EMEA

Amanda Kavanaugh
Head of ESG Business Coordination and Strategy, EMEA

Amanda Vainio
Vice President, Sustainable Finance, EMEA

Ehsan Khoman
Head of Commodities, ESG and Emerging Market Research, EMEA

Introduction to CCUS/CCS

Carbon Capture Utilisation and Storage (CCUS) | Essential Decarbonization Technology

A deployment of carbon removal technologies is increasingly recognized as essential technology to achieve the global net zero targets amidst ongoing implementation challenges

Intergovernmental Panel on Climate Change (IPCC)

"Essential technology to bring global carbon dioxide emissions to net zero by 2050"

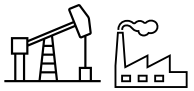
ASEAN Taxonomy

"Enabling sector for transitioning of fossil gas, co-firing with fossil fuels, hybrid fossils, bio-energy & several other activities"

ERIA Technology list for Transition Finance in Asia

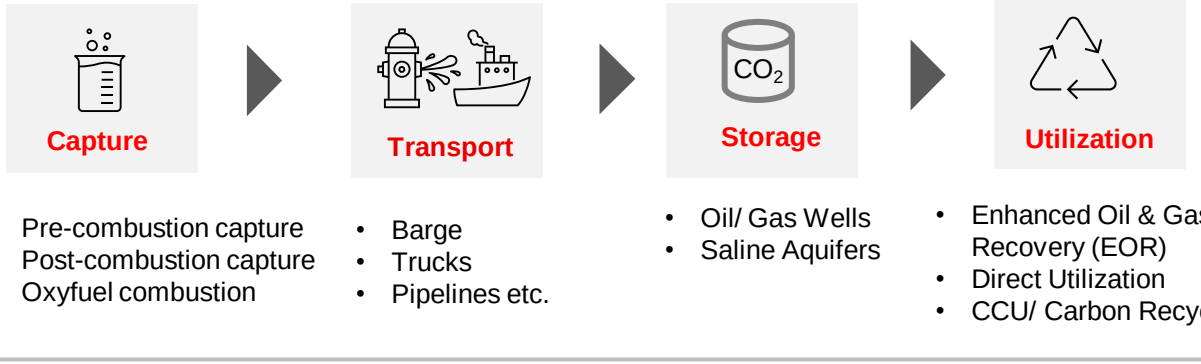
"Transition technology which could significantly lower emissions"

CCUS is the process of capturing CO_2 emissions from fossil power generation and industrial processes and then re-using it or storing it deep underground.



Carbon Emitters

- Power generation sector e.g. coal/gas power plants
- Upstream e.g gas processing
- Industrial facilities
  - Blue H_2/ammonia production
  - Cement



- Pre-combustion capture
- Post-combustion capture
- Oxyfuel combustion

- Barge
- Trucks
- Pipelines etc.

- Oil/ Gas Wells
- Saline Aquifers

- Enhanced Oil & Gas Recovery (EOR)
- Direct Utilization
- CCU/ Carbon Recycle

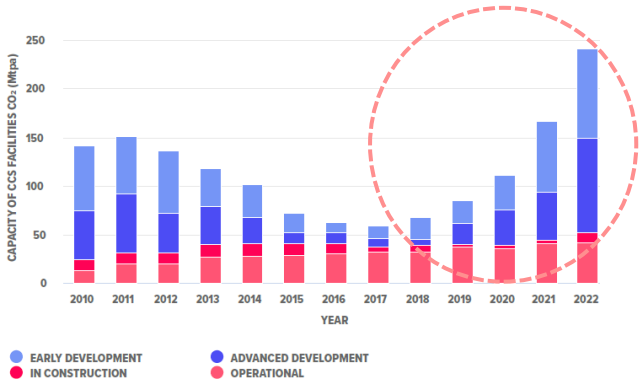
Challenges associated with Carbon Capture:

- **Unknown** effects and risks of storing CO_2 to the environment
- **Unclear** rules and regulations to manage CO_2 transportation, storage & ownership
- **High** development costs
- **Immature** technology leading to performance uncertainty
- **Controversial** impact to prolong fossil fuel productions

Source: MUFG compiled from IEA, IRENA, Penningtonslaw and various public sources

Carbon Capture | Solidifying the Projects Landscape

Globally, there has been a strong upward momentum in global carbon capture rising steadily in the past 5 years



Source: MUFG compiled from Global CCSI Report, 2022

44%

Increase in total capacity of CCS projects to 244 Mtpa) of CO_2 between 2021-2022

196

Number of CCS Facilities as of Sep 2022

Industry

Power/heat followed by hydrogen/ammonia the most prevalent industries announcing CCS projects

Storage & Utilisation

Dedicated geological storage followed by Enhanced Oil Recovery(EOR) the most prevalent end treatment of CO_2

During the same period, carbon capture activities in APAC (ex-Japan) have been expanding 3 folds with rising interest in hub cluster model

Main Locations

Australia

32 CCUS/CCS announcements, mainly from the hydrogen/ammonia sector

China

20 CCUS/CCS announcements mainly driven by EOR projects

Growing activities around a hub cluster model are observed in the countries with potential geological formations for CO_2 storage

Highlighted hub cluster projects

Moomba CCS hub
Santos

- 1st CCS scheme registered eligible to generate carbon credits under Australian government's Emission Reduction Fund
- One of the biggest & lowest cost in the world to permanently store 1.7m tonnes of CO_2/year

Shepherd CCS project
Petronas, Korean consortium

- 1st CCS hub project in Asia with goal of developing entire CCS value chain, an effort to establish Malaysia as leading regional CCS solutions hub
- CO_2 emitted from industrial complex sources to be captured in South Korea & transported to Malaysia for storage

PT Pertamina Hulu Energi OSES CCS Hub development
Pertamina, Exxonmobil

- Studying CCUS/CCS technologies in 3 oil & gas fields —Widuri field in west Java, Peciko & Badak fields in east Kalimantan with collective geologic storage potential of up to 3bn t of CO_2

Source: MUFG compiled from GCCSI, IEA, McKinsey, Penningtonslaw and various public sources

Major Global Policies for CCUS/CCS

Major CCUS Policies

Aiming to tackle with the implementation challenges, several governments are initiating CCUS tax incentives, storage licensing and regulatory frameworks to encourage further deployment and adoption of CCUS technologies in the market

USA

Inflation Reduction Act – landmark clean energy policy, 2022

Investment tax credits (ITC) under Section 45V expanded to include CCUS among other clean fuels:

- **Direct Air Capture(DAC): $130 - 180/tCO$_2$**
- **Point source: $60 - 85/tCO$_2$**

Infrastructure Investment and Jobs Act

>US$12 billion allocated for CCS & related activities:

- $2.5 billion for carbon storage validation
- >$200 million designated by US Department of Energy for CCS technology development

Clean Fuels & Products Shot, May 2023

Boost CO_2 utilisation in synthetic fuels by aiming to support alternative routes that could reduce emissions intensity of fuels & chemicals by 85% by 2035

Canada

Investment Tax Credit for CCUS, Federal Budget 2022

- Tax credit rates for non-Enhanced Oil Recovery projects from 2022-2030:
  - 60% for investment in equipment to capture CO_2 in DAC projects
  - 50% for investment in equipment to capture CO_2 in all other CCUS projects

Alberta Regulatory Framework Assessment, 2011

- Framework for technical, environmental, safety & monitoring requirements for CCUS
- Competitive process that enables development of carbon storage hubs through carbon sequestration rights
  - 25 storage hubs approved

European Union

Trans-European Networks for Energy Regulation, updated May 2022

- Focus on *linking* energy infrastructure of EU countries to align with the EU's 2050 climate neutrality objectives
- Define the *criteria* for projects of common interest (PCIs)
- Prioritize "*cross-border CO_2 networks*" includes CO_2 transport & storage infrastructure between EU member states & neighbouring countries

EU CCS Directive : 2009/31/EC

- Establish *overall legal framework* for environmentally safe geological storage of CO_2
- Include *reporting requirements* for EU countries & European Commission
  - Reporting on implementation, facilitating exchanges between authorities, publishing guidance documents & adopting Commission Opinions on draft storage permits

North Sea

- Hotspots for CCUS hubs due to active storage licensing across Denmark, Norway & UK

Source: MUFG compiled from Bloomberg, Hydrogen Insight, The Diplomat and various public sources

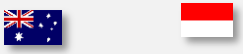
Unlocking CCUS potential in APAC (ex-JP) | National Policies

Government interventions through supportive fiscal policies and frameworks are observed in the countries with potential geological formation for CO_2 storage

Suitability for CCUS/CCS

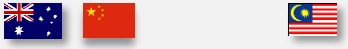
- Geological formations for CO_2 storage available
- Prominent national oil companies (NOCs)
- Australia has been a key natural resources exporter, with industrial push to decarbonize through incorporating CCUS/CCS into business models

Robust regulatory framework for commercial projects



- Australia established a robust federal legislative framework and licensing system for CCS as regulatory support for co-location of storage sites in proximity to oil & gas production bases
- Indonesia, one of the 1st in APAC to launch regulations for CCUS/CCS, providing much-needed clarity & substance to scope requirements of CCUS/CCS activities across the archipelago & complements its recent stream of regulations on carbon pricing

CCUS/CCS Fiscal incentives



- Australia aims to complement its hydrogen hub funding program with an official CCUS at scale funding program as a priority low emissions technology
- Early sign of fiscal support observed in China especially in R&D space
- Riding on the US' IRA's success, Malaysia's provision of green tax incentives specific to CCUS/CCS aims at lowering investment risk to accelerate the investment in the country

Carbon Pricing

- To boost commercial viability of CCUS/CCS projects in the longer-term, Australia is a pioneer in APAC to put in place a clear ruling system for generating carbon credits out of CCS project – opening up opportunity to monetise benefits of carbon capture projects

Source: MUFG compiled from The Business Times and various public sources

Unlocking Carbon Capture Potential in APAC (ex-JP)

CCUS Landscape in Key APAC Market #1 | Australia

Australia

Regulatory Framework

Jun 2023: Environment Protection (Sea Dumping) Amendment Bill 2023

- New legislation would enable CO_2 captured from mining & industrial sites to be imported/exported & pumped deep under seabed to prevent escape
- Markets like Japan/South Korea that are less suited to store CO_2 deep underground could export this CO_2 to Australia's potential storage sites

Storage regulations

- National Offshore Petroleum Safety & Environmental Management Authority awards & regulates storage licenses
- 2021: 5 areas of offshore acreage released for CO_2 storage rights bidding
- 2022: winning companies have <6 years to explore potential CO_2 storage sites while adhering to work commitments in each permit

State-based CCS legislation

2021 Commonwealth Offshore Act for CCS
Statutory regime for rehabilitation & restoration of CCS locations, operators must provide security to cover Monitoring, Measurement & Verification costs

2008 State Regulations
Victoria & Queensland both passed comprehensive legislation to regulate CCS

Carbon Pricing*

- Oct 2021: New rule for carbon credits in CCS projects which could be sold via auctioning to government's Emissions Reduction Fund or sold on private market

1 tonne of CO_2 emissions avoided from CCS projects	=	*1 Australian Carbon Credit Unit (ACCU)*

Fiscal Incentives

CCUS Project Funding

2021: 3 funds launched totalling A$300m

- CCUS Development Fund supporting pilot/pre-commercial projects
  - Each grant amount ranged from A$500,000 to A$25 million
- CCUS Technologies stream to fund R&D, commercialization & site identification (discont. Oct 2022)
  - Support the Australian government's priority technology stretch cost target to compress, transport & store CO_2 for <A$20 per tonne of CO_2
- CCUS Hubs stream for shared infrastructure funding

Source: MUFG compiled from Reuters, Santos and various public sources

**further details of Australia's carbon pricing & Santos' hub strategy can be found in* MUFG TRANSIT Low-Carbon Energy Vol. 1: apacnews-20230629-01-en.pdf (mufg.jp)

CCUS Landscape in Key APAC Market #1 | Australia

Key projects

Gorgon Project
Chevron
(Upstream Gas Processing)

- World's largest commercial CCS project, in operation since 2019
- Outcome of project-specific legislation which served as mechanism for transferring long-term liability for stored CO_2 to state & Commonwealth after closure

South East Australia Carbon Capture Hub
Exxonmobil
(Industrial)

- Apr 2022: announced pre-FEED studies to reduce emissions from multiple industries in Gippsland Basin, Victoria
- Previously identified by Australian Government taskforce as most attractive region for CCS in Australia
- Planned operation by 2023 with potential to capture ~2 million metric tons of CO_2

Three hub CCS strategy*
Santos
(Hub)

- Bayu-Undan gas field, Timor Sea: signed MOU with Timor-Leste & offshore field to capture CO_2 from Barossa & potentially other projects in region
- Darwin: important regional hub for CO_2 capture, transfer & storage to Bayu-Undan & other potential CCS locations offshore Northern Territory
- Moomba CCS: Sequester ~1.5MT of CO_2e-per annum, project 60% complete & on track for 1st injection in early 2024

Key partnerships

Carnarvon Basin Study
Buru Energy, Energy Resources Ltd
(Industrial)

- Apr 2022: undertaking a feasibility study using the Commonwealth Government grant for a GHG storage project in onshore Carnarvon Basin

CTSCo CCS Project
Marubeni, J-Power, Glencore
(Power generation)

- Jun 2022: Each to fund A$10 million in the project to capture CO_2 from coal-fired power plant

Ichthys CCS Field
Inpex
(Upstream Gas Processing)

- Feb 2022: announced to build one of the world's largest CCS facilities near Darwin, Australia
- Start injecting >2 million tons of CO_2 per year from its Ichthys development

North West Shelf project
Mitsubishi Corporation, Mitsui, Woodside, BP
(Hub)

- Nov 2021: announced feasibility study for a large-scale, multi-user CCS project in Australia

Source: MUFG compiled from AFR, bp, ENGIE, HyResource, Marubeni and various public sources

CCUS Landscape in Key APAC Market #2 | China

China

Current situation

- Current CCUS policies concentrated in technology research & demonstration with minimal demand-driven policies
- Expanding recognition of CCUS as integral part of the climate action plans at sub-national governments i.e. Guangdong, Shandong, Sichuan & Shaanxi

30・60 Policy : Dual carbon goal: peak CO_2 emissions by ***2030*** & achieve carbon neutrality by ***2060***

----- **From** -----
Dual control over maximum volume & intensity of **energy consumption**

----- **To** -----
Maximum volume & intensity of **carbon emissions** instead

- Power & hard-to-abate sectors are well-positioned to meet upcoming policy change with emphasis on lessons gained through "project learning by doing" & "technology R&D" development

Fiscal Incentives

Low-cost Funding Support

- Launch of quantitative policy instruments to support CCUS
  - Jan 2022: People's Bank of China's Carbon Reduction Facility (CERF) – enabling financial institutions to apply for low-cost funding for financing eligible CCUS projects

Key projects

China NorthWest Project
CNPC, OGCI
(Hub)
- Working on China's 1st CCUS hub in the Junggar Basin
- One of OGCI's defined KickStarter hubs alongside Northern Lights hub

Enping CCS Project
CNOOC
(EOR)
- Jun 2023: announced China's 1st offshore CCS Demonstration project
- Project could store >1.5 million tons of CO_2

Shengli Oilfield CCS Project
Sinopec, Qilu Petrochemical
(EOR)
- Aug 2022: China's 1st integrated megaton-scale CCUS project came into operation
- CO_2 captured & transported to Sinopec Shengli Oilfield
- Expected to inject >10 million tons of CO_2 in 15 years

Steel CCS Project
Baogang Steel Group
(Industrial)
- Build integrated 2 Mtpa-scale CCUS demonstration project for steel industry
- Started construction in Jul 2022, to be in operation by 2023

Taizhou CCUS Project
China Energy
(EOR, industrial & food production)
- Jun 2023: Asia's largest power plant project expected to capture 500,000 tons of CO_2/year

Key partnerships

Daya bay CCS hub
Shell, Exxonmobil, CNOOC
(Hub)
- MOU to evaluate potential for large-scale offshore storage hub in Daya Bay National Economic & Technological Development Zone, Guangdong
- Capture up to 10 million tonnes of CO_2/year

Source: MUFG compiled from CNOOC, GCCSI, IFRF, Offshore Energy, Reuters, and various public sources

CCUS Landscape in Key APAC Market #3 | Indonesia

Indonesia

Long-Term Strategy for Low Carbon & Climate Resilience 2050

- Submitted by the Ministry of Environment and Forestry to the UNFCCC in 2021
- Decarbonize Indonesia's power sector by 2050
  - Equipping most coal power plants with CCUS/CCS
  - Biomass co-firing in coal power plants connected to CCS (BECCS)

Regulatory Framework

MEMR 2/2023: Regulation on the Implementation of CCS & CCUS in Upstream Oil & Gas Business Activities

- Mar 2023: 1st in Asia to enact a legal framework for CCS
  - Builds on 2019 draft Presidential Decree that outlined regulatory areas for a CCUS framework
  - Focus: to decarbonize the extraction industry by supporting upstream oil & gas business activities
  - Contractor to submit an implementation plan assessing feasibility of a proposed CCUS/CCS project to the government

Key projects

Abadi LNG Project
INPEX Masela, Shell *(Upstream Gas Processing)*

- Indonesia's 1st CCS project under cost recovery based on production sharing contract framework governing upstream O&G projects
- Apr 2023: neutralize all CO_2 emitted from natural gas production at Abadi Gas Field through CCS
- FID expected later half of 2020s, production in early 2030s

Tanjung Enim CCS Project
Chiyoda, PT Pertamina *(EOR)*

- Joint Study Agreement as concrete development from MOU regarding cooperation in field of decarbonization towards realization of net zero with PT Pertamina(Persero) in Jan 2022

Tangguh LNG Vorwata CCUS
BP, Mitsubishi, Inpex, JX Nippon, KG Mitsui, LNG Japan, CNOOC *(EOR)*

- MOU between BP & SKK Migas, Indonesia's upstream regulator, for Indonesia's 1st CCUS project, cost ~$2-3 billion
- Tangguh, largest gas producer, to see its LNG plant becoming one of the world's lowest emissions removing ~90% of reservoir associated CO_2
- Target completion in 2026/2027 with 4 Mmt CO_2 injected back into reservoir annually

Key partnerships

CCUS technology
JAPEX, LEMIGAS, PT Pertamina *(EOR)*

- Jun 2021: study on technology development to reduce CO_2 emissions via CCUS methods in Sukowati oil & gas field

Energy transition
Japan Oil, Gas & Metals National Corporation (JOGMEC), PT Pertamina *(EOR)*

- MOU to conduct joint study on implementation of CO_2 injection at Jatibarang Field in West Jawa
- "CO2 Huff & Puff" to demonstrate & verify effects of EOR & underground CO_2 storage in oil & gas fields

Pulp mill BECCS
Marubeni, PT Pertamina *(Biomass production)*

- Feb 2022: MOU to jointly develop range of projects including BECCS project at Marubeni's pulp mill in Indonesia, producing biomass fuel & creating carbon credits

Source: MUFG compiled from Argus Media, Baker McKenzie, IEA, Inpex, JOGMEC, Pertamina, S&P and various public sources

CCUS Landscape in Key APAC Market #4 | Malaysia

Malaysia

Malaysia CCS landscape

- High CO_2 content of undeveloped gas reserves ranging from 8-50%
- ~46 trillion cubic feet of potential carbon storage capacity identified across 16 of Malaysia's depleted fields

Fiscal Incentives

CCS-specific tax incentives

- 2022: launched fiscal incentives to limit CO_2 emissions using CCS technologies while ensuring achievement of Low Carbon Nation Aspiration policy by 2040:
  - Companies undertaking in-house CCS activity or CCS services eligible to receive Investment Tax Allowance (ITA) of 100% for 10 years
  - Full import duty & sales tax exemption on equipment used for CCS technology from 2023-2027
  - Tax deduction for expenses within 5 years start of operation for latter companies & tax exemption of 70% on statuary income for 10 years for former companies
  - Supports capex spent on CCS

Key projects

Kasawari Carbon Sequestration project
Petronas
(Upstream Gas Processing)

- Nov 2022: Announced FID of project in offshore Sarawak
- 2025: commercial operations to start, capturing ~3.7 Mtpa from Kasawari gas field
- 1st project to benefit from Malaysia's CCS tax incentives
- Projected to become 2nd largest CCS project in the world after Australia's Gorgon

Key partnerships

Carbon sequestration hub development
Petronas, Shell

- Nov 2022: Jointly explore development of Carbon Sequestration Hubs in offshore Sarawak
- Provision of decarbonisation services to cross -border regional customers including Shell's sourced molecules from Singapore & other global future opportunities

Joint CCS development
Mitsui & Co., Petronas, TotalEnergies

- Jun 2022: Conceptual & feasibility studies on CCS value chain, including evaluation of CO_2 storage sites in Malaysia

Joint CCS study
JGC, Japex, K line
(Upstream Gas Processing)

- Aug 2022: Joint study to capture & transport CO_2 from Petronas LNG complex located in Sarawak & overseas

Joint Collaboration study
JX Nippon, Petronas

- Dec 2022: study CCS technology to monetising fields containing high CO_2 content in Peninsular Malaysia

Lang Lebah Gas Field
PTTEP
(Upstream Gas Processing)

- Onshore gas plant to have carbon capture & transportation facilities to extract CO_2 from gas stream for compress & export through pipeline for re-injection into reservoir
- FID expected in 2023, operation expected in 2027

Source: MUFG compiled from IEA, Oe digital, Shell, WoodMac and various public sources

CCUS Developments | other nascent but promising markets in APAC

India

- Primer document prepared for India's G20 presidency made references to reducing carbon emissions with CCUS
- NITI Ayog's 2022 policy report acknowledges CCUS as **only known technology** for **decarbonizing India's hard to abate/electrify sectors** such as thermal power plants, steel, cement, oil & gas, petrochemicals & fertilisers
- 2022: passed amendment to Energy Conservation Bill & authorized establishment of a domestic carbon credit trading scheme

Key projects

Blue hydrogen plant
Coal India, Dastur Energy
(Low-carbon hydrogen)

- 2022: set up a commercial scale demonstration plant in the east incorporating carbon capture

Koyali refinery project
Dastur, ONGC, Indian Oil Corporation (IOCL)
(EOR)

- India's 1st industrial-scale carbon capture project
- Apr 2022: completed Techno-Economic Feasibility & captured CO_2 to be primarily used at ONGC's Gandhar oilfields

Pata pilot project
Gas Authority of India Limited (GAIL)
(Industrial)

- Implemented pilot project for fixing CO_2 using microalgae converting inorganic carbon in an artificial pond at its Pata petrochemical complex in Uttar Pradesh

Singapore

- **Industries & power** highlighted by Singapore's National Climate Change Secretariat as **target sectors** to potentially benefit from adopting CCS to remove emissions
- CCUS & low-carbon hydrogen constitute one of the **four national supply "switches"** for decarbonization of the power sector

Key partnerships

CCS Consortium
Keppel Infrastructure, Air Liquide, Chevron, PetroChina
(Industrial)

- Sep 2022: MOU to form a consortium to evaluate & advance development of large-scale CCUS solutions & integrated infrastructure in Singapore

Keppel CCS Project
Keppel Infrastructure, ExxonMobil
(Low-carbon hydrogen)

- May 2023: MOU to develop CCS-based H_2 & ammonia for Singaporean market, Keppel aiming to use low-carbon H_2 for Keppel Sakra Cogen Plant in Jurong Island

Waste-to-energy carbon capture
Keppel Seghers, National Environment Agency (NEA)
(Waste-to-Energy)

- Jul 2023: to conduct national feasibility study by 2Q2024 to
  - examine carbon capture at waste-to-energy plants
  - explore setting up pilot carbon capture facility integrated with selected WTE plants to validate shortlisted carbon capture technologies

Source: MUFG compiled from Business Wire, GCCSI, JGC, Nikkei Asia, The Straits Times, Times of India and various public sources

CCUS Developments | other nascent but promising markets in APAC

Thailand

- Thailand's Ministry of Natural Resources & Environment (MONRE) underscored long-term strategy to achieve carbon neutrality by 2050 & net zero by 2065 to depend mainly on emission reductions in energy sector including using CCUS technologies

Key projects

Arthit CCS Project
PTTEP
Upstream Gas Processing

- PTTEP is allocating US$300m to develop Thailand's 1st CCS project in the Gulf of Thailand
- In process of preliminary FEED study, scheduled to commence operations by 2026
- Expected to store up to 1 million tonnes of CO_2 during gas production at Arthit

Key partnerships

Carbon capture technology **Siam Cement Group (SCG), Nippon Steel Engineering** *(Cement)*	• Jan 2023: Cement identified as one of the most energy-intensive, carbon-emitting industries • SCG to start testing new technology next year to capture CO_2 from one of its facilities to be converted to methane fuel
Clean energy development **Chiyoda Corp, Mitsubishi Corp, EGAT**	• Sep 2022: exchange information & ideas relating to clean energy development & related technologies such as CCUS
Decarbonization Study **JERA, EGCO** *(Low-carbon hydrogen)*	• Jan 2023: signed MOU to adopt CCUS technology & H_2/Ammonia fuels in joint study
Exploration of CCS **Inpex, JGC Holdings, PTTEP** *(Industrial)*	• Apr 2022: signed MOU on Thailand CCS Initiative, which aims to study potential development of CCS solutions to help industries including oil & gas, hard-to-abate, & power generation reduce their CO_2 emissions
Thailand CCUS Consortium **GC, PTT Group**	• Aug 2022: joined forces with national-level educational, government & private sector partners to establish "Thailand CCUS Consortium" to reinforce Thailand's Carbon Neutral & Net Zero goals

Source: MUFG compiled from Bangkok post, Business Wire, GCCSI, JGC, Nikkei Asia, and various public sources

MUFG's Value Proposition

Bankability of creating a CCUS Economy | MUFG's Involvement

Bankability is still at a nascent stage due to considerations around its uncertainty

- MUFG is a member of the GCCSI
- GCCSI is an international think tank whose mission is to accelerate the deployment of CCS
- MUFG Leverages on its membership in GCCSI to keep up to date on CCS technology status & business development worldwide to increase its knowledge of CCS-related business & contribute to realization of a sustainable society

- MUFG is part of the Asia CCUS Network
- Asia CCUS Network provides a platform for policymakers, financial institutions, industry players & academia to work together to ensure successful development & deployment of CCUS in the Asia region

Risks	Bankability Considerations
Regulatory Risk	In an undeveloped CCUS market, a lot of legal framework and governmental support is needed to make tax credits conducive and attractive. Mitigating Factor: New adoption can learn from tried and tested models, and not repeat mistakes, allowing for quicker and more effective adoption.
Technology Risk	The risk and hazards associated with large scale CCUS projects are still high with complex construction and technical processes for successful conversion and storage. Mitigating Factor: Advancement and technological development in this space, projecting to increase in adoption, cost and feasibility.
Construction Risk	EPC Counterparty Risk, Management Team, Cost Overrun, Construction Delays Mitigating Factor: Established cooperations exist in the space, many past projects in other geographies to draw experience from.
Operating Risk	Long term effects of subterranean storage is still largely unknown, with any leakages posing significant environmental degradation. Equipment or mechanical failures during transportation of CO_2 also results in lengthy business interruption. Mitigating Factor: Stringent quality controls and checks needed for the industry
Sponsor Criteria	Professional CCUS Track Record, Financial Strength.

Source: MUFG compiled internally

Contact Us

ESG Finance Department
Asian Investment Banking Division

Colin Chen
Managing Director,
Head of ESG Finance,
APAC

colin_chen@sg.mufg.jp
+65 6918 4798

Amanpreet Singh
Director, Deputy Head of ESG Finance,
APAC

Amanpreet_Singh@sg.mufg.jp
+65 6918 3475

Shareef Omar
Head of ESG Finance,
Oceania

shareef_omar@au.mufg.jp
+61 403 682 738

Angkana Meeploy
Director, Head of Market Intelligence,
APAC

meeploy@sg.mufg.jp
+65 6918 4876

Archana Khemka
Director, ESG Finance,
APAC

archana@sg.mufg.jp
+65 6918 5113

Serena Lum
Analyst, Market Intelligence,
APAC

Serena_lum@sg.mufg.jp
+65 6918 4772

Disclaimer

This report has been prepared by MUFG Bank, Ltd. (the “Bank”), for information only and is not intended for use by or distribution to any person or entity in any jurisdiction or country where such distribution or use would be contrary to law or regulations. The Bank and/or any person connected with it may make use of or may act upon the information contained in this report prior to the publication of this report to its customers.

Neither the information nor the opinion expressed herein constitute or are to be construed as an offer, solicitation, advice or recommendation to buy or sell deposits, securities, futures, options or any other financial or investment products.

This report has been prepared solely for informational purposes and does not attempt to address the specific needs, financial situation or investment objectives of any specific recipient.

This report is based on information from sources deemed to be reliable but is not guaranteed to be accurate and should not be regarded as a substitute for the exercise of the recipient’s own judgment. The recipient should obtain separate independent professional, legal, financial, tax, investment or other advice, as appropriate.

This report is based upon the analysts’ own views, therefore does not reflect the Bank’s official views. All views herein (including any statements and forecasts) are subject to change without notice, its accuracy is not guaranteed; it may be incomplete or condensed and it may not contain all material information concerning the entities referred to in this report. None of the Bank, its head office, branches, subsidiaries and affiliates is under any obligation to update this report.

Historical performance does not guarantee future performance. Any forecast of performance is not necessarily indicative of future or likely performance of the any product mentioned in this report.

The Bank and/or its directors, officers, and employees, from time to time, may have interest and/or underwriting commitment in the relevant securities mentioned herein or related instruments and/or may have a position or holding in such securities or related instruments as a result of engaging in such transactions. Furthermore, the Bank may have or have had a relationship with or may provide or have provided corporate finance or other services to any company mentioned herein.

The information contained herein has been obtained from sources the Bank believed to be reliable but the Bank does not make any representation or warranty nor accept any responsibility or liability as to its accuracy, timeliness, suitability, completeness or correctness.

Therefore, the inclusion of the valuations, opinions, estimates, forecasts, ratings or risk assessments described in this report is not to be relied upon as a representation and / or warranty by the Bank. The Bank, its head office, branches, subsidiaries and affiliates and the information providers accept no liability whatsoever for any direct, indirect and/or consequential loss or damage of any kind arising out of the use of all or any part of this report.

The Bank retains copyright to this report and no part of this report may be reproduced or redistributed without the written permission of the Bank and the Bank, its head office, branches, subsidiaries or affiliates accepts no liability whatsoever to any third parties resulting from such distribution or re-distribution.

MUFG Bank Ltd.
7 Straits View
#23-01 Marina One East Tower
Singapore 018936

www.mufg.jp/english