MUFG TRANSIT

APAC Carbon Offsets

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ESG Finance Department

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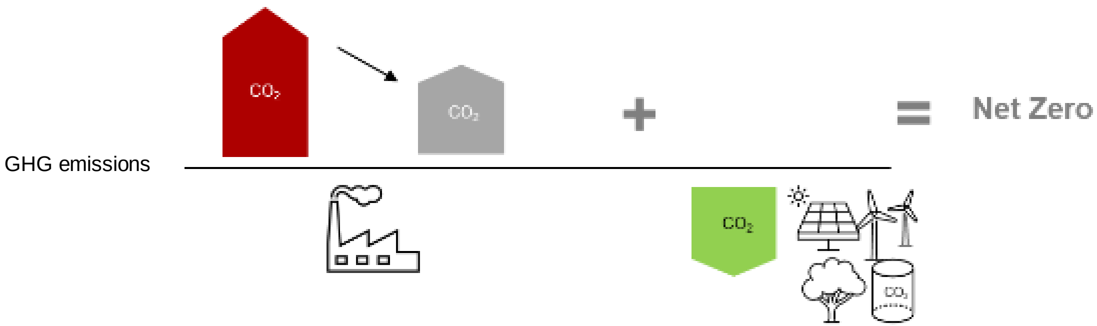
Section I: Global Carbon Offsets Landscape

Carbon Offsets | A supplementary of GHG Emission Mitigation Plans

Carbon Offsets 101

Avoid, Reduce and Remove: the primary actions to directly mitigate own emissions

Offsets: a supplementary action to mobilize resources into mitigation of GHG emissions that the country or corporate does not generate



When to offset:

Major guidelines e.g. Oxford Principles for Net Zero Aligned Carbon Offsetting, SBTi Corporate Net-Zero Standard recommend to

- Prioritise maximum efforts to reduce own emissions before opting for offsets
- Shift from avoidance/ reduction type of carbon credits to carbon removal credits towards 2050

Compulsory Market

Driven by the country's Nationally Determined Contributions (NDCs)

The GHG emission levels of carbon intensive industries are set within the limit (*cap*) & allocated to the participants according to the country's net zero pathways.

Offsets are commonly permitted within the same industry through *trading* of excess emission allowances under the emissions trading scheme (Cap & Trade) with fines/charges applying to those exceeding the limits.

Voluntary Market

Driven by the corporate's net-zero pledges

The emissions targets are set voluntarily amidst a growing movement to make corporate actions more visible with standardized frameworks through mandatory climate-related disclosures.

Offsets are performed voluntarily via purchasing of valid carbon credits. No legal impacts if the emission target is unfulfilled.

1 Carbon Credit

= 1 ton of CO_2 equivalent being reduced or removed from the atmosphere

Source: MUFG compiled from various public sources

Compliance Market I Key Regulatory Developments

Adjusting rulebooks to direct carbon credit impacts on the climate-mitigation actions

1 Carbon Border Adjustment Mechanism (CBAM) - closing an export emissions loophole

- To manage 'carbon leakage' by applying carbon price on imports preventing firms from exporting emissions via transferring carbon intensive activities to countries with less stringent carbon credit rules

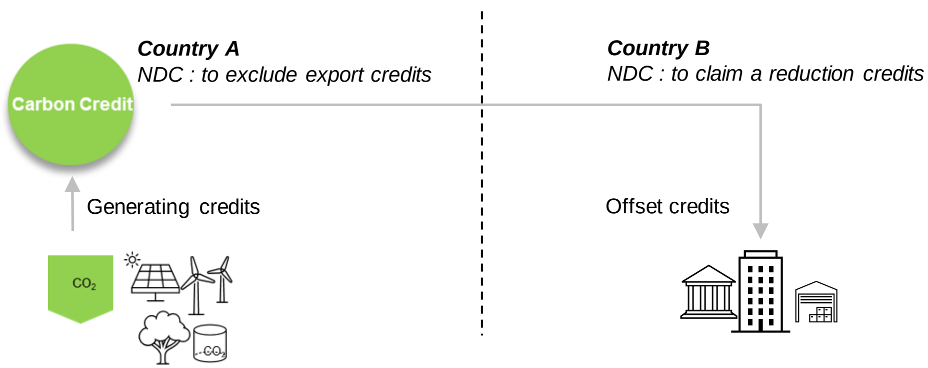
EU CBAM, under EU's Fit for 55 initiative, approved in Mar 2022, charges to apply from 2026

UK CBAM, under public consultation until June 2023

2 Paris Agreement, Article 6 : opening opportunities for international carbon credit trading

- Corresponding adjustment mechanism defines how to account for cross-border exchanges of carbon credits towards each country's NDCs, a recognition of benefits from supporting offshore climate mitigation efforts

✓ 63 member countries participated in the Paris Agreement Article 6 Implementation Partnership launched during COP27 in 2022



3 Bilateral offset crediting mechanism – a tool to support offshore climate mitigation actions

Builds on the backdrop of Article 6, a project-based bilateral offset crediting mechanism between the governments of partner countries to facilitate the implementation of climate change mitigation.

In return, the country where a mitigation project takes place will transfer the project outcomes to another country to help it meet the NDC targets under the Paris Agreement.

Japan : Joint Crediting Mechanism (JCM)

Mitigation Action

- Provide leading decarbonising technologies, funding or grants for implementation of the climate mitigation projects to partner countries (e.g. Indonesia, Philippines, Thailand, Vietnam)

Corresponding Adjustment

- A portion of generated credits as agreed under the mechanism are transferred to Japan, and will be accounted for under Japan's NDC target.

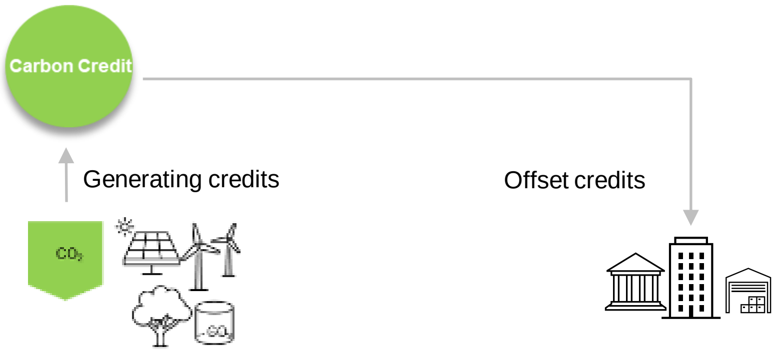
Source: MUFG compiled from and various public sources

Voluntary Market I Key Market Developments

Market integrity is fundamentally crucial for building up a scalable and sustainable voluntary carbon credit market in absence of the legal requirements

Enhancing Integrity

The industry working groups are defining industry-standards that delivers positive impact on environment and people in both demand & supply fronts of the offset market, delivering integrity & transparency in the voluntary carbon credit market (expected June 2023)



A benchmark to differentiate between good and bad credits

ICVCM's Core Carbon Principles (CCPs)

A guideline to determine which circumstance the entity can claim the credits

VCMI's Claims Code of Practice (CoP)

ICVCM : The Integrity Council for the Voluntary Carbon Market
VCMI: Voluntary Carbon Markets Integrity Initiative

Voluntary Carbon Credit Standards / Programs

A variety of voluntary carbon verification standards is defined & managed by private organisations dominated by VCS program for nature-based projects.

Several new standards are emerging from the need to overcome the backlog of traditional standards & support the emergence of technology-based credits:

Verified Carbon Standard ("VCS")	• Most established registry in offsets market, known for nature-based projects • Administered by Verra – to generate Verified Carbon Units (VCU)
Gold Standard (GS)	• 2nd largest registry in offsets market after VCS, known for energy demand & cookstove projects • Credits issued under labels of Certified Emission Reduction (CER) & Verified Emission Reduction (VER)
Others	• American Carbon Registry (ACR): 1st private voluntary GHG registry in the USA • Climate Action Reserve (CAR): USA based voluntary based GHG offset program
(New) **puro earth**	• World's first public registry dedicated to carbon removal • Majority invested by Nasdaq • Pioneered the first crediting methodologies for biochar & geologically stored carbon

Sector-Specific Standard : Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)

Industry-led initiative to legalise carbon offset requirements

- 1st standard for global market-based offsetting scheme
- 1st phase (2024-2026): flights between states which volunteered to participate in CORSIA subject to offsetting requirements
- 2nd phase: beyond 2027: all international flights will be subject to offsetting requirements

Source: MUFG compiled from BNEF, ICAP and various public sources

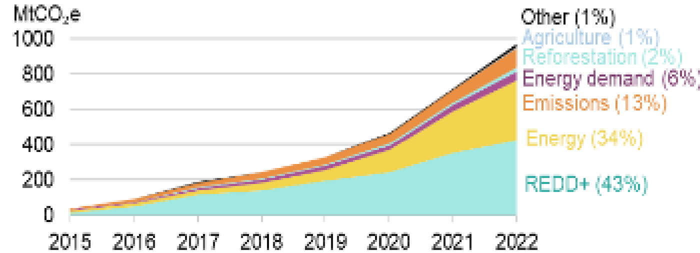
Voluntary Market I Dynamics of Carbon Credit Types

The market is demanding credits with greater climate mitigation impacts

Market Supply

- Majority of carbon offsets in the current voluntary market are nature-based due to its lower cost of development with fully matured methods that can derive results in a shorter term.
- In the long-term, owing to improved project economics & regulatory supports, technology-based projects e.g. Carbon Capture & Storage (CCS) are projected to become a more permanent & attractive solution.

Total voluntary carbon offset supply from 2015-2022, by sector



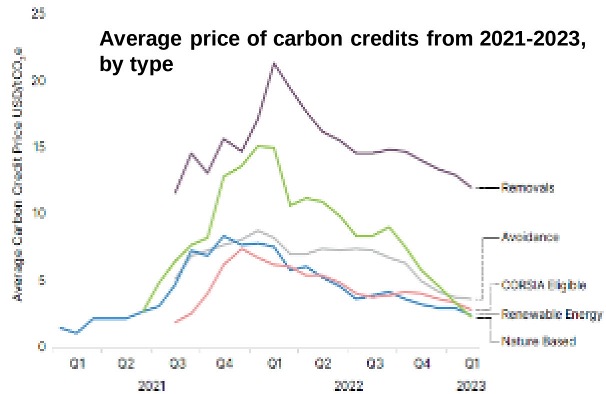
Source: BNEF Long-term Carbon Offsets Outlook, 2023

Carbon Credit Price

- Across all carbon credit types, prices have picked up from 2021 to an all-time high in Q1 2022 with the expansion of the voluntary market. The sustained decline in prices through 2022 is explained by the Russia-Ukraine conflict which dampened overall market sentiment
- Carbon credits derived from removal projects were traded at the highest premium due to higher level of investment required by the underlying project & high demand of such credits. This stems from the permanence associated with capturing carbon from the atmosphere & storing it e.g. Direct Air Capture (DAC) & CCS projects.

Type of Credits	Characteristics	Examples of Project Types
Nature-based	Activities that aim to protect, manage, enhance, & restore nature to address environmental challenges	• Re/afforestation e.g Reducing Emissions from Deforestation & forest Degradation (REDD+) program • Soil carbon sequestration • Biochar
Technology-based	Activities that provide permanent removal & artificial carbon sequestration of CO_2	• Carbon capture, utilization, and storage (CCUS) • Direct air capture (DAC) • Bioenergy with CCS (BECCS)

Average price of carbon credits from 2021-2023, by type



Source: World Bank, State & Trends of Carbon Pricing 2023

Top 3 Global Carbon Credit Exchanges

1. CBL Xpansiv	87% market share (116.1m offsets in 2022)
2. Air Carbon Exchange	7% market share(9.5m offsets in 2022)
3. Carbon Trade Exchange	6% market share (8.08m offsets in 2022)

Source: MUFG compiled from BNEF, S&P, UNEP, World Bank and various public sources

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Reporting & Carbon Accounting I Transparency in Progress

Carbon Accounting – managing double-counting challenge

With Article 6 opening the gateway for international carbon offset markets, therein lies a need to strengthen publicly available decentralized registries to ensure maximum transparency in the carbon credit market to mitigate the risk of double-counting & enhance overall integrity

- Carbon credit data sharing platform established in Dec 2022
- Joint initiative among International Emissions Trading Association (IETA), World Bank & Singapore Government
- Major registries like Verra, Gold Standard, American Carbon Registry & Global Carbon Council plan to connect to CAD Trust by mid-2023
- Transparency, traceability & integrity of carbon credits:
  - ✓ Aligns with "corresponding adjustment" mechanism from Article 6
  - ✓ Prevent the same carbon credit getting accrued to more than one country's emission reduction target

Climate Action Data Trust

Reporting – standardized disclosure

- Jan 2023: controversy regarding avoided deforestation credits put Verra in the spotlight with The Guardian claiming that 90% of Verra's rainforest credits were "phantom credits" & deemed worthless
- Shifting towards mandatory reporting regimes would pave the way for mandated disclosure of more granular details pertaining to voluntary offsets & potentially categorization of <u>'high integrity' offsets</u> & other offsets
- Disclosing corporates could face accusations of 'greenwashing' by regulators & activist stakeholders, which could lead to stricter scrutiny, enforcement action and/or litigation against companies using offsets

- Alongside the International Accounting Standards Board (IASB), International Sustainability Standards Board (ISSB) is a standard under the International Financial Reporting Standards (IFRS) for accounting rules
- Oct 2022: For each company, net emissions target(s) & <u>intended use of carbon credits to be disclosed separately</u> from gross emission reduction target(s)
- Enhance the value of disclosed information for users of general purpose financial reporting & <u>greater standardised disclosure</u>

ISSB

Source: MUFG compiled from CAD Trust, IFRS, Mayer Brown, MTI, The Guardian, The Straits Times, and various public sources

Internal Carbon Pricing (ICP) I A preparation for sustainable investments

"A planning tool to help identify revenue opportunities and risks, as an incentive to drive energy efficiencies to reduce costs, and to guide capital investment decisions" - TCFD

Benefits
- Cushions & gives the balance sheet of companies more flexibility by factoring in additional cost of producing emissions
- Helps specific management teams decide what kind of sustainability efforts will be most cost-effective

2,018

Companies use/plan to adopt ICP in the next 2 years as of 2020, increasing ~twofold from 1,018 companies in 2015

USD 25/tCO_2e

Median ICP as of 2020

USD 100/tCO_2e

UN Global Compact's call

Examples of companies with Internal Carbon Pricing in place

	Internal Carbon Price	Overall Emission Reduction Target	Description
Hitachi	Raised price from initial US$36/t$CO_2$e introduced in 2019 to US$100/t$CO_2$e in 2021	• Commitment to achieving carbon neutrality in scope 1 & 2 emissions by 2030 and in scope 3 emissions by 2050	• Price typically set based on assessment by IEA & internal survey of investment prospects for energy conservation & renewable energy • Could be used as reference for Japanese industries
JSW Energy	As of 2021, introduced shadow price of US$ 10-12/tCO_2e	• Committed to SBTi • Reduce specific GHG footprint to 0.215 tCO2 e/MWh by 2030 • Achieve net-zero by 2050	• Provides required leverage for low-carbon investments for the company
Keppel	US$20/t$CO_2$e in 2020 & progressively increase to US$50/t$CO_2$e over time	• Halve the Company's Scope 1 and 2 carbon emissions by 2030, compared to 2020 levels, and achieve net zero by 2050	• Adopted an evolutionary shadow carbon pricing policy to mitigate climate-related risks in the mid to long term • Prepare for tougher climate legislation & higher carbon prices • Avoid stranded assets
Temasek	Applies an internal carbon price of US$50/t$CO_2$e, targets to increase progressively to US$100/t$CO_2$e by 2030	• Net-zero carbon emissions by 2050 • Reduce net carbon emissions of its portfolio to half of 2010 levels by 2030	• Account for potential exposure of investment portfolio to transition risk • Manage climate-related business risks & prepare for Singapore's transition to a low-carbon economy

Source: MUFG compiled from CDP, Hitachi, RIETI, The Straits Times and various public sources

Section II: APAC Carbon Market Landscape

Carbon Credit Markets in APAC (ex-JP) | Eager for opportunities with growing commitments

APAC governments are slowly adopting carbon pricing as a legal tool to reduce national emissions in line with the NDCs while greatly welcome the opportunities that voluntary carbon credit market presents

Countries with Carbon Pricing Mechanisms enacted at National Level

Compliance Emissions Trading System (ETS)

Carbon Tax

- Australia is seeking to reform its landmark Safeguard Mechanism, a boost for domestic carbon credit market
- China's compliance ETS is the largest in the world by covered emissions
- Indonesia's mandatory ETS is the newest development
- New Zealand's ETS has maintained the highest carbon price in APAC
- Singapore was the1st country in Southeast Asia to introduce a carbon tax
- South Korea's K-ETS is expecting major policy reforms this year

Voluntary Carbon Credit Market

- Large majority of APAC markets have a growing voluntary carbon credit market except the Philippines, with Taiwan & Vietnam in progress to launch a voluntary market
- Thailand's voluntary market is increasingly active, with trade volume from T-VER rapidly growing
- Singapore is leveraging its excellent infrastructure as a regional hub for commodity trading & financial services to transform into a carbon services & trading hub

International Offsets

- Article 6 permits the use of international carbon credits for domestic offset under the correspondence adjustment mechanism
- More APAC markets are joining forces to implement such mechanism to either meet their domestic obligations or to tap into the opportunities to supply carbon credits to international markets

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

APAC Carbon Market Policies | Laying down frameworks for domestic adoptions

Majority of APAC markets are at a preparation stage to establish frameworks for a domestic compliance market, while more advanced markets are moving towards accepting valid voluntary carbon credits for compliance offsets - a boost to carbon credit projects

Country	Premise	Carbon Tax	Market Type	Description	International Offset
Australia	Reform its landmark Safeguard Emissions scheme to tighten baseline level of emissions & type of credits for compliance	Repealed in 2014	• Compliance with voluntary quota (Mixed) • ACCUs could be used to offset compliance requirements under Safeguard Mechanism	Safeguard Mechanism, Emission Reduction Fund (ERF) Price: 11/tCO_2e[1]	-
China	Expanding the limited scope of its national ETS while overcoming impending challenges such as carbon border taxes like that of the EU's	-	• Mixed • China's national ETS allows companies to use CCERs to offset up to 5% annual emissions for compliance purposes	China Certified Emission Reduction Scheme *Price:* 9/tCO_2e[2]	In progress
Hong Kong	Well-positioned to connect Mainland China with the international markets, being a world leading financial centre as a high-quality hub to recognize different standards for carbon credits	-	• Voluntary	Core Climate Exchange	In progress
India	National carbon trading market to be ready by mid-2023 with introduction of an exchange & market stabilisation fund	-	• Voluntary	Perform, Achieve & Trade Scheme	In progress
Indonesia	Prioritisation of coal-phase out prompted the launch of a mandatory, intensity-based ETS for the power sector with a carbon tax to follow by 2025	Under consideration – to launch in 2025	• Compliance	Indonesia ETS	-
Malaysia	Voluntary market BCX launched in 2022 while domestic uptake of demand & supply remains weak against the backdrop of national subsidies for carbon emissions in the petrol sector	-	• Voluntary	Bursa Carbon Exchange	-
New Zealand	Expanding coverage of carbon pricing scheme to focus on primary sector emissions, namely agriculture while its compliance ETS remains centred on upstream emitters of the supply chain	Under consideration – to launch in 2025	• Mixed • Companies under the domestic NZ ETS could cancel NZUs exceeding compliance obligations from trade	NZ ETS *Price:* 53/tCO_2e[2]	-

[1]*Prices indicated in USD as of March 2023,* [2]*Prices indicated in USD as of April 2022 from World Bank Carbon Pricing Dashboard*

Source: MUFG compiled from FSDC, ICAP, S&P, The Business Times and various public sources

APAC Carbon Market Policies | Cont'd

Majority of APAC markets are at a preparation stage to establish frameworks for a domestic compliance market, while more advanced markets are moving towards accepting valid voluntary carbon credits for compliance offsets - a boost to carbon credit projects

Country	Premise	Carbon Tax	Market Type	Description	International Offset
Philippines	Investigated feasibility of carbon tax mechanism in Philippines but held back due to domestic cost concerns. Emphasis on prioritising renewable energy instead	-	-	NA	NA
Singapore	Establishing itself as a carbon credit services & trading hub through decisive carbon tax increments into the future and cultivating an active marketplace & exchange for both domestic & international market	✓ Tax: 4/tCO_2e*	• Mixed • Companies subject to carbon tax allowed to offset up to 5% taxable emissions using international credits	Homegrown voluntary exchanges: CIX, AirCarbon Exchange	✓
South Korea	Streamlining existing K-ETS with fundamental modifications to improve the effectiveness of South Korea's carbon pricing system	-	• Mixed • Companies subject to compliance ETS allowed to offset up to 5% emissions using KCUs/international credits	K-ETS *Price:* 19/tCO_2e*	✓
Taiwan	Playing catch-up policy in this region by introducing new carbon pricing scheme looking to levy carbon tax in 2024, targeting both large direct & indirect emitters	In progress – ready in 2024	• Compliance	Under consideration	NA
Thailand	Robust voluntary market for domestic trading with FTIX & T-VER, carbon credit & REC trading with CMC. To become a key carbon-trading hub in SEA	-	• Voluntary	Leading voluntary exchanges: FTIX, T-VER, Carbon Markets Club (CMC) , ReAcc Platform	✓
Vietnam	Aims to explore untapped potential for carbon credits in energy, forestry & agriculture sector by trialing trading of carbon credits in 2025	-	• Voluntary	To pilot in 2026-2027 & launch in 2028	In progress

[1] *indicated in USD as of April 2022 from World Bank Carbon Pricing Dashboard*

Source: MUFG compiled from Bworld Online, SEAISI and various public sources

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Carbon Market Policies #1 | Australia

43% Emission Reduction by 2030

NDC sectors: Power generation, industry, building, transportation, agriculture, livestock farming & fisheries, LULUCF, waste

Carbon Tax:

- Repealed in 2014 (1st country in world)
- Effective when 1st implemented to reduce coal-dependence before the renewable energy market had grown mature
- Australian CBAM now under consideration

	Safeguard Mechanism	Emission Reduction Fund (ERF)
	• Legislation passed in Mar 2023 • Facilities must keep emissions within a given baseline (reference point against which net-emissions levels will be assessed) • Rate-based ETS: Net-emissions = covered emissions from operation of facility + any Australian carbon credit units (ACCUs) issued in relation to abatement activities occurring at the facility (i.e. CCS) - any ACCUs surrendered to Clean Energy Regulator for the facility that year • Jul 2023: government reform to tighten baseline emissions for entities would boost demand for ACCUs compared to lenient levels in the past which flooded the market with credits	• Earn ACCUs for each t CO_2-e stored/avoided emitting • ACCUs are eligible offsets under Safeguard Mechanism • Incentivise businesses to adopt new practices & technologies • A$2.55 billion provided by government, further funding to ensue in future
Sectors	Large-emitters e.g. electricity generation, mining, oil & gas extraction, manufacturing, waste	Vegetation management, agriculture, energy consumption, waste, transport, coal & gas production, industrial processes
Condition	Facilities exceeding a threshold of 100k tonnes of carbon dioxide equivalence (t CO_2-e)	
Penalty	A non-compliant facility with unresolved, excess emissions would be liable for a civil penalty of $27,500/day for a maximum of 2 years	

Market Activity

Santos' Carbon Credit Projects*

- As of 2023, Santos has been progressing trials of direct air & post-combustion capture technology & develop nature-based carbon solutions that will offset residual emissions & generate carbon credits
- Santos' Darwin LNG project supports development of West Arnhem Land savanna burning project, which has generated >1.8 million ACCUs since 2014

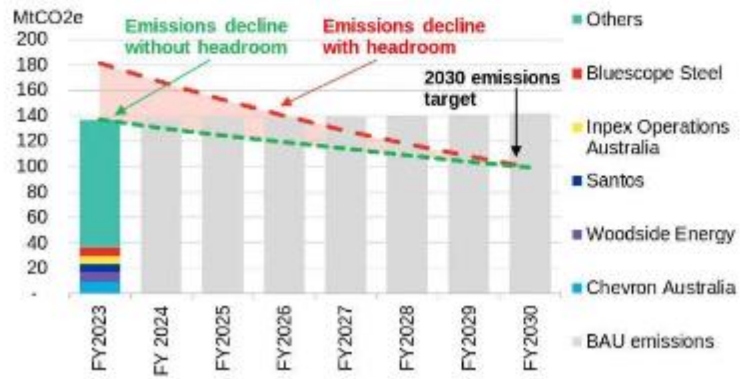
* *For more information on Santos' carbon credit projects, kindly refer to Page 16*

Source: MUFG compiled from AAAS, APH, PwC, Santos, The Guardian and various public sources

Regulatory Reforms | A boost to Technology-Based Carbon Credits Projects

Reforms to Safeguard Mechanism:

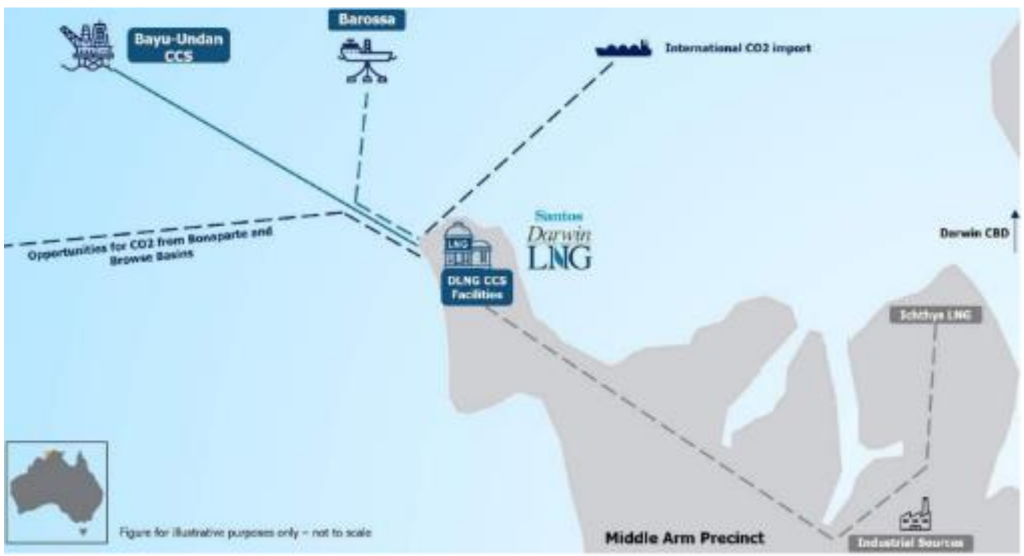
- Serve as a tailwind for carbon capture, fast-tracking such technology-based projects
- Use of domestic offsets, Australian carbon credit units (ACCUS), were generous with lenient emission baselines
- Tightened emissions baselines of entities covered under reform to above regulation in 2023
- Create additional demand for ACCUs in the long-run
- Greater degree of revenue stream certainty for CCS, making project economics more viable



Source: BNEF Long-term Carbon Offsets Outlook, 2023

"Australia is well-suited to large-scale deployment of CCS to facilitate domestic CO_2 abatement and support regional emissions reductions." - International Energy Agency in Australia 2023 Energy Policy Review

Headline Project: Santos' three hub CCS strategy



Source: Santos

Moomba CCS

- Sequester up to 1.5MT of CO_2e- per annum
- Project is 60% complete and on track for 1st injection in early 2024

Bayu-Undan CCS

- Initial injection & storage ~2.3MT of CO_2e- per annum, with target capacity of <10MT CO_2e- per annum.
- Goal to capture CO_2 from nearby projects to maximise throughout
- Santos recently signed 4 MOUs for CO_2 supply to Bayu-Undan CCS with upstream gas & LNG projects offshore Northern Territory & energy/industrial conglomerate in Korea.
- Working with companies from Korea, Japan & Singapore to look at international CO_2 transfer services
- Santos' cooperation with Timor-Leste & Australian Governments to progress necessary fiscal & legislative arrangements
- FID stage for project targeted in 2025

Source: MUFG compiled from Santos and various public sources

Carbon Market Policies #2 | China

>65% Emission Reduction by 2030
NDC sectors: Unspecified

Carbon Tax: N/A

China national ETS

- Compliance ETS launched in Jul 2022
- World's largest by volume of emissions covered at >4 billion $mtCO_2e$/year
- Managed by Shanghai Environment and Energy Exchange
- Plan to accelerate expansion of ETS in next 2-3 years
    - Gradually integrate 8 pilot ETS operating in China into national ETS
    - Cover sectors eligible under EU's CBAM, mainly cement, aluminum, iron & steel
    - China among the exporting countries heavily impacted by CBAM due to cost-competitiveness of its products, especially iron & steel, will be hit
    - Pace of sector enrolment depends on both progress of CBAM & China's economic outlook
- Locations of 8 subnational pilot ETS: Beijing, Chongqing, Fujian, Guangong, Hubei, Shanghai, Shenzhen, Tianjin

Sectors Power

Penalty Relatively light fine – maximum of USD 4600

China Certified Emission Reduction (CCER) scheme

- Voluntary ETS 1st launched in 2012 & shut down in 2017 due to low trading volume & lack of standardisation in carbon credits
- CCER scheme rebooted by China Beijing Green Exchange as necessary infrastructure for VCM, to be ready end-2023
- March 2020: CCER approved as supply mechanism of Eligible Emissions Units in pilot phase (2021-2023) of CORSIA
- CCER credits eligible for offset of China Emissions Allowances (CEAs) or national ETS
    - Limited to offset 5% of emissions exceeding target
- Future expansion plans for CCER: Hong Kong-based & overseas enterprises able to participate by including CCERs that meet international criteria into overall carbon-offsetting plan

Renewable energy generation, waste-to-energy initiatives, forestry etc.

Market Activity

Greater Bay Area, International Carbon Opportunities (Mar 2022)
China, Hong Kong

- China Emissions Exchange (CEEX) signed MOU with Hong Kong Exchanges and Clearing Limited (HKEX)
- Guangzhou-based CEEX to jointly explore development of voluntary carbon emission reduction programme in the Guangdong-HK-Macao Greater Bay Area

Source: MUFG compiled from Carbon Market Institute, EDF, S&P, SCMP, World Bank, and various public sources

Carbon Market Policies #3 | Indonesia

43.2% Emission Reduction by 2030
NDC sectors: Energy/Power, Waste, IPPU, Agriculture, Forestry

Carbon Tax:

- Based on 2021 "Law No. 7 on the Harmonization of Tax Regulations". Carbon tax was delayed & postponed from 2022 to 2025

Indonesia ETS

- Compliance ETS
- Regulation of the President of the Republic of Indonesia No. 98/2021 provided national framework for carbon pricing instruments
  - Voluntary intensity-based pilot was conducted in the power generation sector
- Oct 2022: "Guidelines for Carbon Economic Value Implementation" provided legal basis for implementation of ETS in Indonesia
- Dec 2022: (MEMR no.16/2022) "Guidelines for Carbon Economic Value Implementation for the Power Generation Sub-sector" issued
- Feb 2023: launch of a mandatory, intensity-based ETS for the power generation sector
  - Phase 1 (2023 to 2024): coal-fired power plants
  - Phase 2 (2025-2027) & Phase 3 (2028-2030): oil & gas-fired power plants & other coal-fired power plants not connected to PLN's grid

Sectors Power

Penalty Government warnings, coercion, fines and suspension or revocation of emission permits

Market Activity

Carbon Market Collaboration (Nov 2022)
Indonesia, Singapore

- MOU between Indonesia Stock Exchange ("IDX") & MetaVerse Green Exchange ("MVGX"), digital green exchange licensed & regulated by the Monetary Authority of Singapore (MAS)
- MVGX to support IDX in building a robust carbon exchange infrastructure & ecosystem
- Leverage blockchain technology which offers a transparent, tamper-proof record of performance of all green projects tied to the credits listed to give buyers and issuers assurance of the integrity of carbon credits listed on IDX's registry

Cooperation on Climate Change & Sustainability (Mar 2022)
Indonesia, Singapore

- Pilot projects, research collaborations, technical exchanges & financing solutions in areas such as carbon credit projects, CCS & renewable energy solutions to support regional decarbonisation

Source: MUFG compiled from ICAP, NCCS, Yahoo and various public sources

Carbon Market Policies #4 | New Zealand

50% Emission Reduction by 2030
NDC sectors: Economy-wide, covering all sectors

Carbon Tax:

- Under consideration - to launch new mechanism for agriculture sector by 2025
- He Waka Eke Noa climate action partnership to target primary sector
- Useful example of potential novelty approach to apply carbon tax/ETS to agricultural emissions a sector less commonly covered by most carbon pricing policies

NZ ETS

- Domestic-only compliance system
- Businesses to surrender 1 emissions unit(NZU) to the government for each tonne emitted
- Government limits quantity of NZUs supplied into scheme
- All sectors subject to reporting & surrender obligations except agriculture
- Focuses on upstream of supply chain to minimize economic disruptions to end-users like individuals/consumers
- Shift to averaging accounting & a new "permanent forest" category

Sectors Forestry, agriculture, waste, synthetic gases, industrial processes, liquid fossil fuels, stationary energy

Penalty "3 to 1" penalty: pay a cash penalty of three times the current market price for each unit that was not surrendered by the due date

Market Activity

Singapore-New Zealand Enhanced Partnership (Mar 2022)
NZ, Singapore

- Climate change and the green economy included as a new fifth pillar in this partnership
- NZ Singapore to strengthen collaborations on initiatives such as carbon markets, energy transition & waste management

Source: MUFG compiled from ICAP, The Straits Times and various public sources

Carbon Market Policies #5 | Singapore

60 $MtCO_2e$ Emission Reduction by 2030

NDC sectors: Energy, Industrial Processes & Product Use, Agriculture, Land Use, Land-Use Change & Forestry (LULUCF), Waste

Carbon Tax:

- 1st carbon pricing tax implemented in Southeast Asia
- Launched 2019 with targeted increase in increments
  - ✓ 2019-2023: fixed at S$5/tCO2e
  - ✓ 2024-2025: S$25/$tCO_2e$
  - ✓ 2026-2027: S$45/$tCO_2e$
  - ✓ By 2030: S$50-80/$tCO_2e$

Sectors: large-emitting sectors (facilities emitting>25,000 tCO_2e of GHG emissions annually)

Voluntary ETS

International market

- Companies may use high quality international carbon credits to offset up to 5% of their taxable emissions from 2024
- Facility-level limit of 5% to provide additional short-term decarbonisation pathway for hard-to-abate sectors while prioritising domestic emissions reduction
- Whitelist of acceptable credits to be published end-2023

Marketplace

- Climate Impact X jointly developed by DBS Bank, SGX, Standard Chartered & sovereign wealth fund Temasek

- Project marketplace(main product) + auctions + spot exchange(to be launched in 2023)
- Marketplace involves curated group of carbon credits listed at fixed price determined by seller
- Target:
  - Corporates/SMEs new to offsetting space to offset in small volumes
  - Projects of nature-based/energy efficiency initially approved by Verra/Gold Standard registries

Exchange:

- AirCarbon Exchange: among top 3 carbon credit exchanges in the world

Market Activity

Green Economy bilateral agreement (Jan 2023)

Singapore, Malaysia

- Collaboration between Singapore & Malaysia companies in voluntary carbon credits projects

Carbon Credits Collaboration

Singapore, Vietnam

- MOU as shared commitment to work together on carbon credit pilot projects aligned to Article 6 of the Paris Agreement

Growing potential whitelist of carbon credits

- National Environment Agency (NEA) signed MOUs with 2 more international offset programmes, American Carbon Registry (ACR) & Architecture for REDD+ Transactions (ART)
- Help Singapore companies to offset taxable emissions through & purchase/retirement of ACR & ART-issued TREES (The REDD+ Environmental Excellence Standard) credits
- Existing MOUs with Gold Standard & Verra in 2022

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

Carbon Market Policies #6 | South Korea

40% Emission Reduction by 2030

NDC sectors: Power, industry, building, transportation, agriculture, livestock farming and fisheries, LULUCF, and waste

Carbon tax: N/A

K-ETS

- Launched in 2015
- Domestic Korean Offset Credits(KOC) & international offsets to be converted to Korean Credit Units(KCUs)
    - Up to 5% of compliance obligation eligible to be met with offsets from projects developed/financed by Korean companies)
- Nov 2022 key updates to K-ETS:
    - Improve auction & benchmarking allocation: Issue more free allowances to top 10% most efficient covered entities per sector & those implementing new energy efficiency measures
    - Introduction of consignment trading for the K-ETS
    - Open up ETS to more financial firms & increase current Korean Allowance Unit (KAU) holding limit
    - Facilitate conversion of international offset credits to KCUs
    - Strengthening MRV system
- Korea Chamber of Commerce & Industry to launch a voluntary carbon credit exchange in 2H 2023

Sectors Power, Industry, Buildings, Domestic aviation, Waste, Transport

Penalty 3 times average market price of allowances of given compliance year or USD 77.40/tonne

Market Activity

Promotion of voluntary carbon market (Dec 2022)
Korea, Singapore

- Hana Securities signed an MOU with Climate Impact X (CIX)
- Embark on joint efforts for successful & stable operation of the voluntary carbon market, including promotion of an over-the-counter market & auction system

Promotion of voluntary carbon market (Jul 2021)

- Ecoeye, one of the oldest & largest carbon credit providers in South Korea, has invested $100 million in projects globally focusing on forestry, cookstove & biochar credits
- Active participant in the K-ETS carbon market

Source: MUFG compiled from ICAP, Nikkei Asia, The Korea Times and various public sources

Carbon Market Policies #6 | Thailand

30% Emission Reduction by 2030
NDC sectors: Economy-wide, excluding LULUCF

Carbon Tax: N/A

Voluntary ETS program

Thailand Voluntary Emission Reduction Program (T-VER)

- GHG emission reduction program, developed by Thailand Greenhouse Gas Management Organization (TGO)
- Promote & support all sectors to voluntarily participate by selling the reduction unit/carbon credit called "T-VER" under the voluntary domestic market
- Type of projects registered:
  1) Energy efficiency enhancement
  2) Development of renewable energy
  3) Waste Management
  4) Management in the transport sector
  5) Reforestation/Tree Planting
  6) Forest conservation/restoration
  7) Agriculture

Key Voluntary Exchanges

Carbon Market Club

- Banchak Group & 10 other major Thai companies including Krungsri founded CMC in Jun 2021
- Voluntary emissions-offset program where big emitters offset their carbon footprint by purchasing credits from companies like Bangchak's renewable subsidiary
- Earnings from trades invested in clean energy/ technologies to expedite the energy transition
- Intend to expand into a carbon-credit-trading exchange in Thailand

FTIX

- 1st Carbon Credit Exchange launched in Sep 2022
- Jointly developed by Federation of Thai Industries & TGO
- Comprises ~12,000 private companies across 45 sectors
- Serves as channel for Thai exporters to purchase carbon credits to assist them in complying with emission standards of importing countries
- Domestic trading platform to incorporate T-VER for carbon credits, renewable energy & renewable energy certificates (RECs)
- Looking towards international expansion in future

ReAcc Platform

- Developed by PTT for trading of RECs
- Create convenience in a two-way connection between renewable buyers & local renewable energy developers by leveraging blockchain technology

Market Activity

6th Singapore-Thailand Enhanced Economic Relationship ministerial meeting (Oct 2022)
Thailand, Singapore

- Both governments to work towards development of an Implementation Agreement
- Identify potential carbon credit projects for collaboration before COP28 in 2023

Support for Implementation of T-VER (Aug 2022)

- TGO signed MOU with Verra to align domestic carbon market with global standards

Source: MUFG compiled from Carbon Pulse, Lexology, Nation Thailand, PTT, TGO UNFCCC and various public sources

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