MUFG TRANSIT

APAC Carbon Offsets
CBAM and its Impact on APAC Iron & Steel Sector

Aug 2024
ESG Finance Department

MUFG Bank, Ltd.
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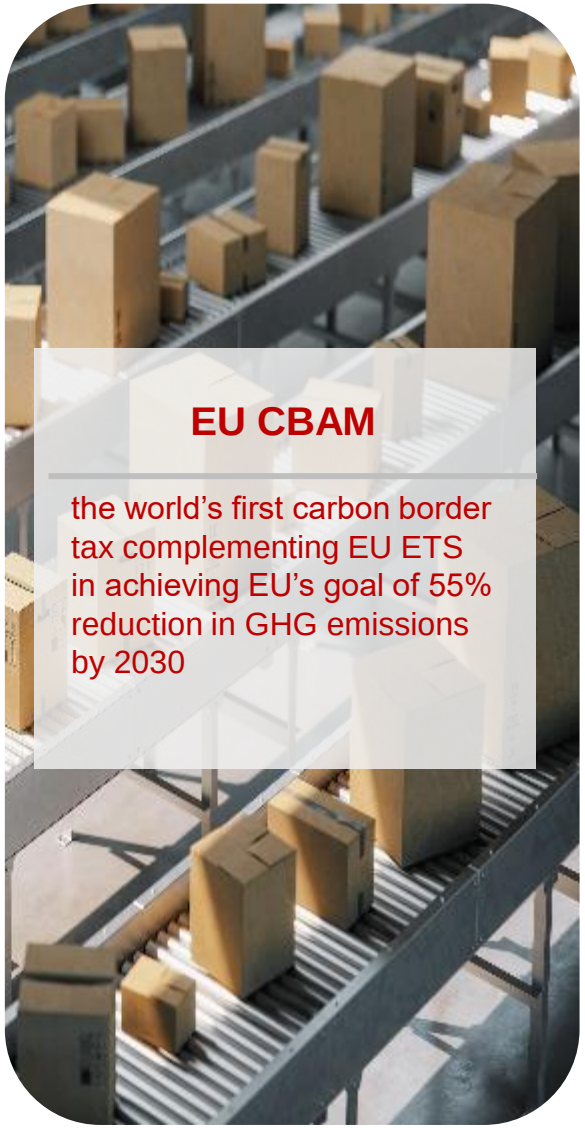
Table of Contents

Section I: Introduction

Carbon Border Adjustment Mechanism (CBAM) | The European Union (EU)'s carbon border tax

CBAM aims to address carbon leakage by putting a fair price on carbon-intensive imports from non-EU countries



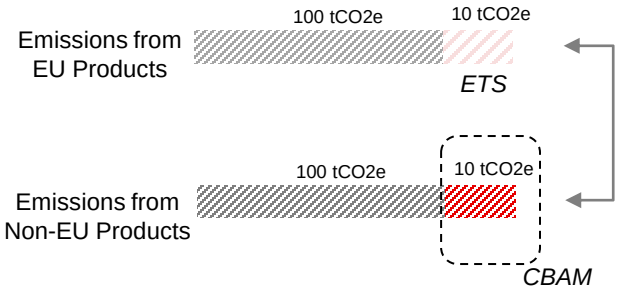
EU CBAM

the world's first carbon border tax complementing EU ETS in achieving EU's goal of 55% reduction in GHG emissions by 2030

Defining CBAM

CBAM is a tariff by European Union on imports of carbon intensive products.

When carbon intensive products enter the EU territory, a CBAM certificate corresponding to the product's embedded emissions needs to be purchased by the importer.



- CBAM aims to **harmonise** the EU's domestic carbon pricing policy (ETS) with that of its imports by putting a price on emissions beyond a certain threshold.
- As a **supplementary** measure to ETS, CBAM attempts to address the carbon pricing disparity between domestic and imported goods.

Phase I - Sectors under the scope of CBAM

Iron and Steel | *Cement* | *Aluminum* | *Fertilisers* | *Electricity* | H_2 *Hydrogen*

Which emissions would be liable for CBAM?

**Note: Scope 2 and Scope 3 emissions are partially included*

Source: MUFG compiled from Baker McKenzie, Wood Mackenzie, Roland Berger, Taxation and Customs Union, PwC and various public sources.

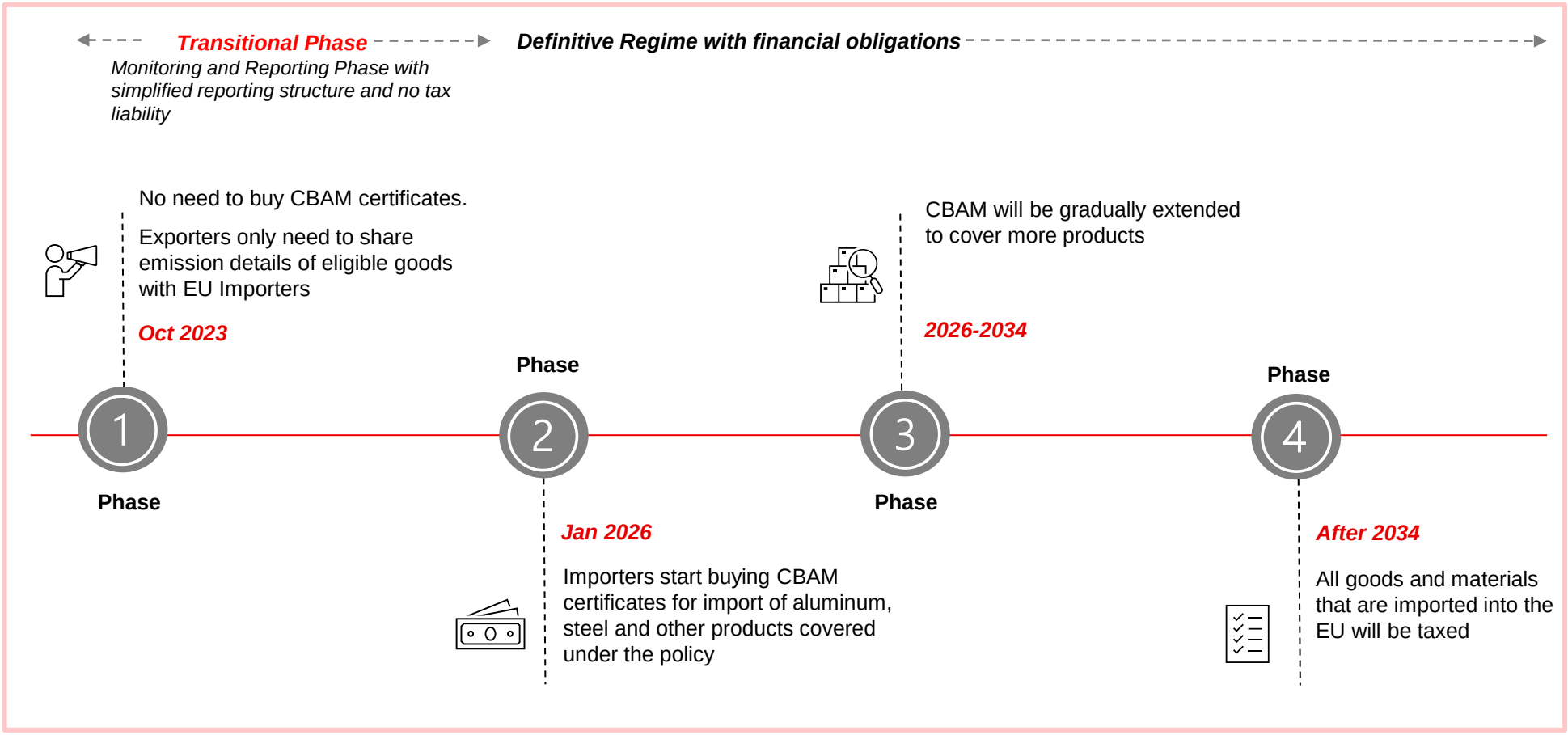
Scope and Timeline of CBAM | From transitional to implementation phase

CBAM is currently in its transitional phase till 2025 and will apply in its definitive regime with financial implications from 2026

Scope of CBAM

- Apply to carbon intensive goods (excluding military goods) that originate from non-EU countries and are imported to the EU
- Exclude certain countries who participate in the EU ETS (e.g. *Ireland, Norway, Switzerland and Liechtenstein as of May 2024)*

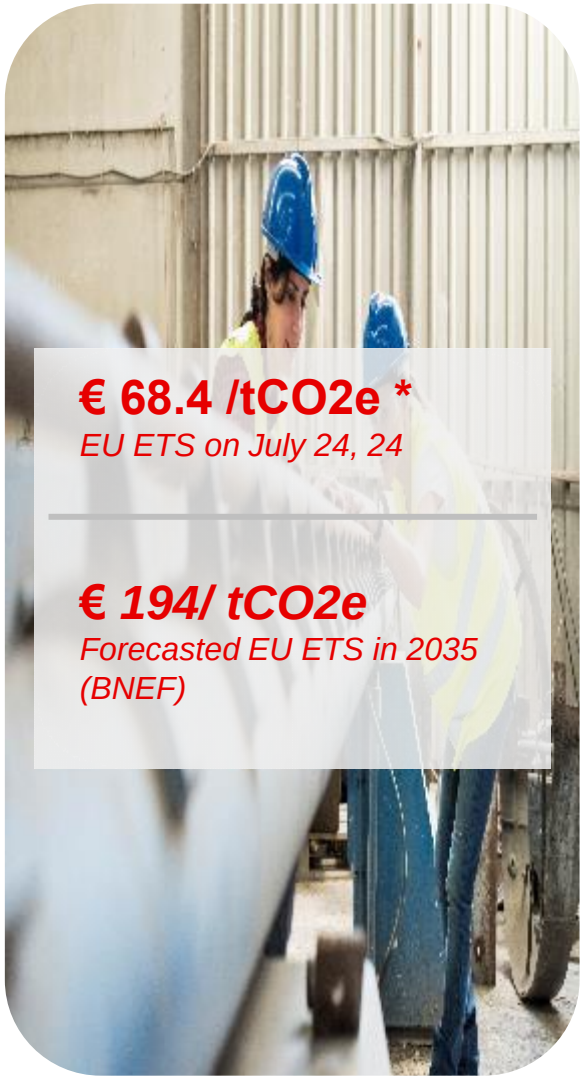
CBAM Implementation Timeline



Source: MUFG compiled from EY, PwC, Taxation and Customs Union and various public sources.

Pricing in the Impact of CBAM | Pegging with the EU ETS

CBAM certificate price is pegged to EU ETS, with possibility to offset carbon price paid in home-country against CBAM obligation



Producers facing an ETS and / or CBAM

Total Emissions — 100 tCO2e | 10 tCO2e → Emissions liable for ETS or CBAM

Scenario 1: Base Case - EU Products

Total Cost of Product = Basic Cost of production of good (+)

EU ETS Price
(Taxable Emissions **x** Applicable ETS price)

or

Scenario 2: Non-EU Products (+)

CBAM Certificate Price
(Taxable Emissions **x** Applicable CBAM price)

or

Scenario 3: Non-EU Products with domestic carbon price recognised by the EU (+)

Applicable CBAM price (+) Carbon price paid in a producing country

$

Equal financial obligation

**tCO2e : tonne of CO2 equivalent*

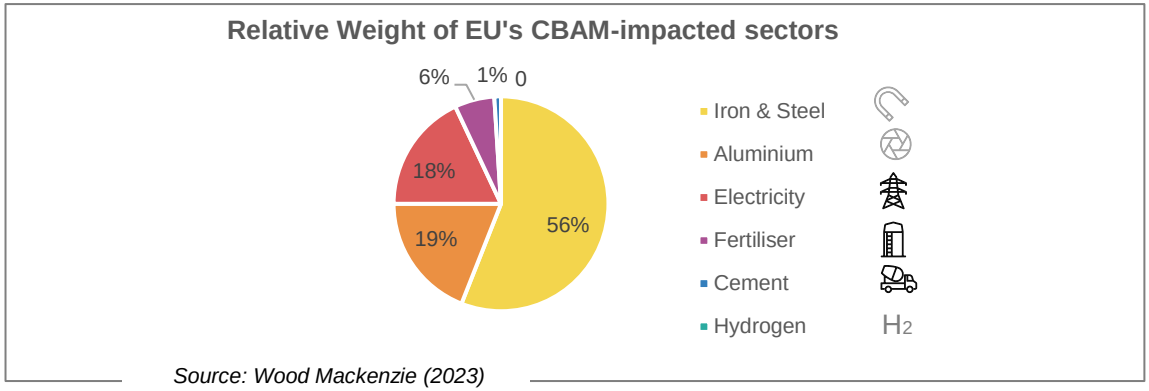
Source: MUFG Analysis with inputs from various public sources, BNEF.

Section II: CBAM Potential Implications on APAC

CBAM Phase I | Weighing in the relative impact on each market

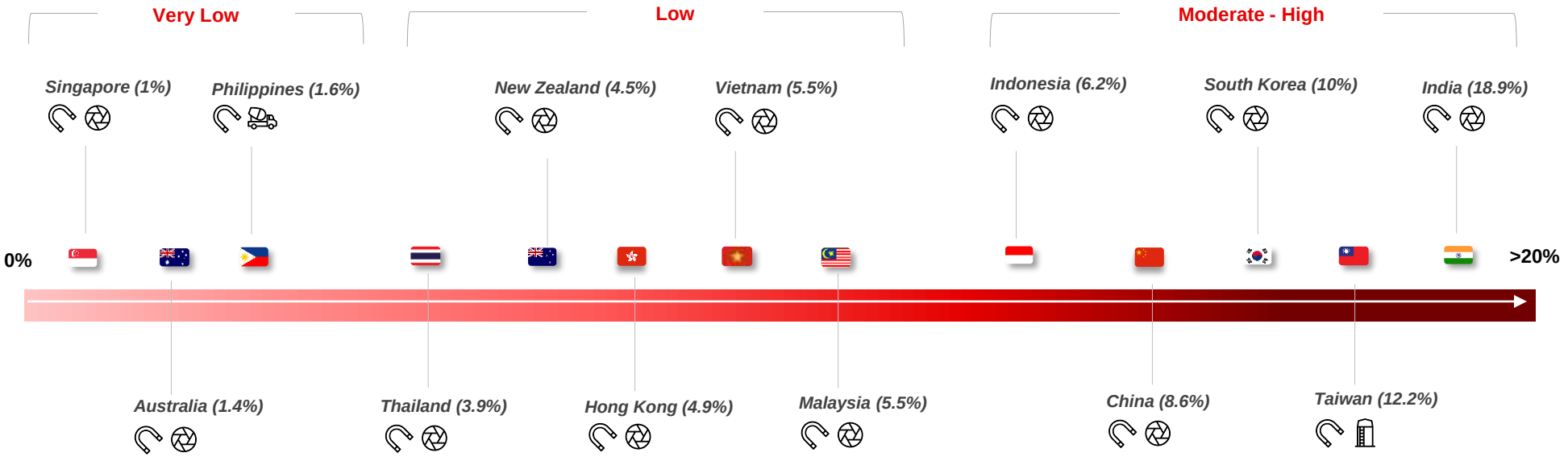
Iron, Steel and Aluminum from India, Taiwan and South Korea are expected to be impacted most from CBAM measurement in Phase I

EU's Global Import of CBAM Impacted sectors
(% of total EU imports value globally - 2022)



Source: Wood Mackenzie (2023)

Expected impact of CBAM Phase I on APAC
(% of the respective country's CBAM-impacted products exported to the world)



Source: MUFG compiled from World Integrated Trade Solution, Trading Economics, World Bank, International Trade Association and various public sources as of May 2024.

APAC Preparedness | Carbon Pricing and ETS in place

A potential recognition of carbon price paid in a producing country under CBAM*, particularly for those with compliance regimes, encourages APAC markets to implement a robust domestic carbon pricing mechanism within the market

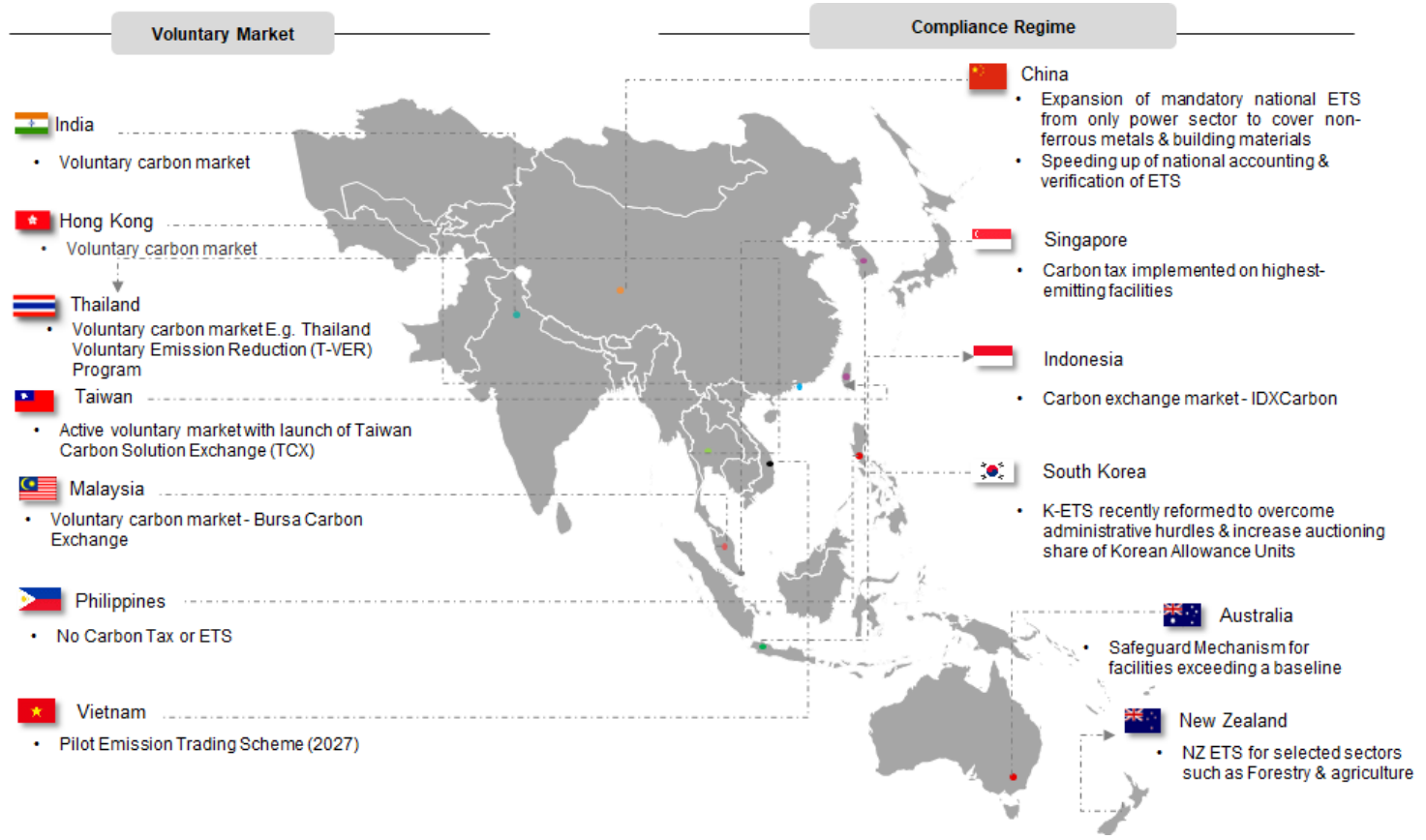
Definition of CBAM's Carbon Price Paid in a Third Country

"The monetary amount paid in a third country, under a carbon emissions reduction scheme, either in the form of a tax, levy or fee or in the form of emission allowances under a greenhouse gas emissions trading system, calculated on greenhouse gases covered by such a measure, and released during the production of goods;"

Article 3 (29) of the CBAM Regulation

Further implementation guidance expected in 2025

The current APAC Carbon Pricing Landscape



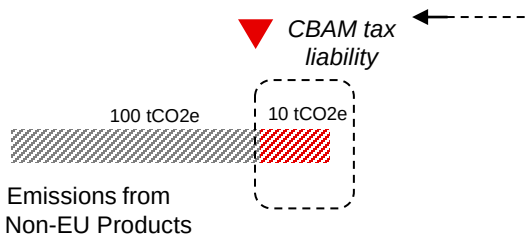
**CBAM Article 9(4) – Provides conditions to be recognised for a carbon price "effectively paid in the country of origin"*

Source: MUFG Analysis with data sourced from earth.org, and various public sources.

Market Reaction | Too early to commit

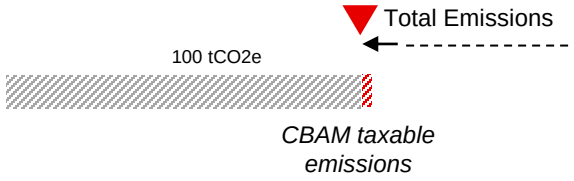
it is clear that achieving a permanent emission reduction is necessary to stay competitive in the EU markets. However, today's upfront costs still outshine the future benefits

Minimising CBAM obligation



	Mitigation Strategy	Market Situation
1	**Recalibration of trade flows to reap cost savings** • Direct low-carbon exports to the EU while redirecting carbon-intensive exports to other regions • Restrict affected goods to domestic usage	• EU announced intention to assess & monitor trade strategies to prevent evasion & dumping of goods in other markets • Complexity in redirecting good flows in the future as CBAM coverage would expand from raw materials to downstream/finished goods
2	**Hedging strategy** • Companies could hedge their CBAM exposure by purchasing EUA futures to lock in the cost of CBAM certificates which are linked to price of EU ETS (excess certificates could be held up to 2 years)	• CBAM certificate price is expected to increase significantly, making it less cost efficient to pursue hedging in the long-term

Eliminating GHG emissions



3	**Investment in decarbonisation technologies for business operations to permanently reduce embedded emissions** • E.g. Renewable energy, Carbon capture, low-carbon hydrogen etc.	• High upfront investment and immature technologies slow down the corporate's adoption. • A removal of the EU ETS' free emission allowances in 2024 is expected to push CBAM fees up further, narrowing a gap between upfront investment and a future saving.

Source: MUFG compiled from Aither, S&P Global, GMK Center and various public sources

Section III: Sustainable Financing and Way Forward

Iron & Steel | APAC's Most Impacted Sector under CBAM Phase I

APAC's steel production is in need of a greener technology with greater efficiency to break away from fossil fuel-based technologies, echoing the global concerns that the sector is lack behind its 2050 net zero target

- Iron and Steel accounts for nearly 8% of global CO2 emission as a result of heavily dependence on technologies with high emission intensity.
- Asia accounts for nearly 70% of the global steel production and about 81% of this steel is produced using coal-based blast furnaces i.e., primary method of steel production.

The Global Emissions from Steel Production

Production Method	Key technologies	Emission Intensity	% Use Globally
Primary	DRI, BF-BOF	↑	78%
Secondary	EAF	↓	22%

BF-BOF - Blast Furnace and Basic Oxygen Furnace
DRI - Direct Reduced Iron
EAF - Electric Arc Furnace

Decarbonisation policy of the world's leading steel producers
(IEA, 2023)

- Recognise the importance of sectoral decarbonisation but muted on technology commitment

China – the world's largest steel producer, produced more than 50% of the world's steel in 2022

- Announced that its ETS will begin covering emissions from heavy industry in 2023 or 2024.
- Prioritising the creation of a circular economy, as part of the 14th Five-Year-Plan (2021-2025), to increase the use of scrap steel to 320 Mt by 2025 and peak steel production and sectoral emissions before 2030.

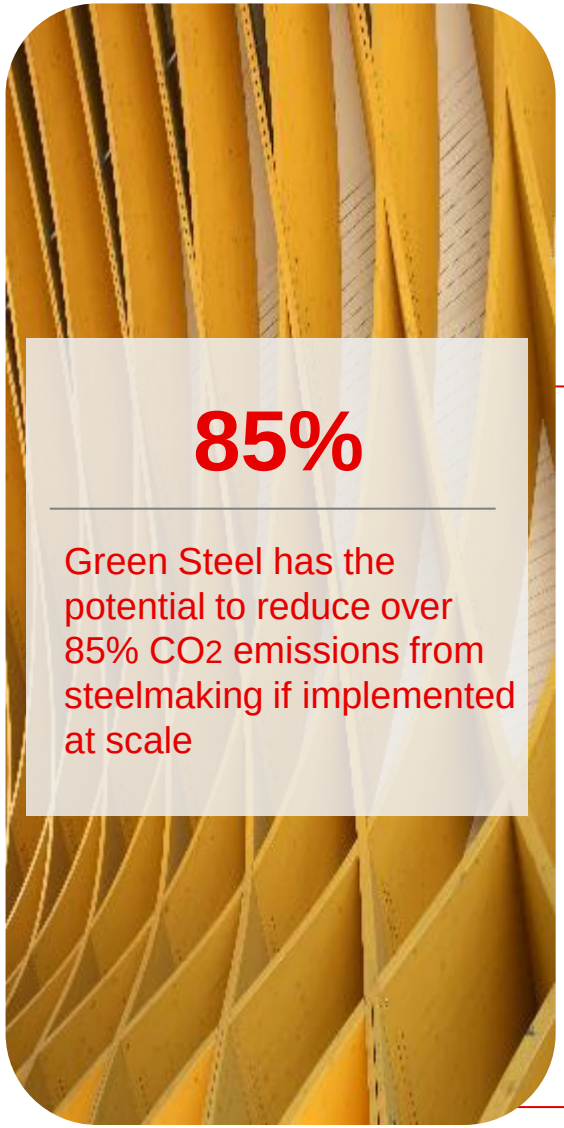
India – the world's second largest steel producer

- Identified the importance of scrap as a means to halve the CO_2 intensity of its domestic steel production by 2030.
- Providing concessional finance and long-term loans to steel producers

Source: MUFG compiled from World Economic Forum, MUFG Transition White Paper (2022) and various public sources.

APAC Iron & Steel Industry | Trial –and- Test decarbonisation technologies

Steady adoption of emerging green steel technologies is indispensable to decarbonise APAC Iron & Steel industry



85%

Green Steel has the potential to reduce over 85% CO_2 emissions from steelmaking if implemented at scale

Green Steel. albeit a lack of universal definition, commonly refer to manufacturing pathway as the following:

- Manufacturing of steel **without use of fossil fuels** (WEF, 2022)
- Strategy aimed at making the steelmaking process **greener & more sustainable** (SSAB, 2024)

VS

Near-zero steel production however, has an assigned threshold of **0.05-0.4 tons of CO_2/steel tonne** (IEA, 2022), expected to be achieved through ambitious, innovative technologies & collaboration between steel ecosystem players to provide an enabler

Emerging Green Technologies	Current Outlook
H2-Direct reduced iron (H2-DRI) - Replaces carbon with hydrogen to reduce iron ore & produce water as by-product instead of CO_2 ***Use Case** – Nippon Steel and POSCO*	• *~90% Decarbonisation potential of green H2* • *Challenges: cost of electrolyser, storage & transportation.*
Scrap-Electric Arc Furnace (Scrap-EAF) - Utilises electricity to melt scrap steel instead of using coke to reduce iron. ***Use Case** – Baowu Steel and Tata Steel*	• *~80% Decarbonisation potential & can be integrated with H2-DRI to enhance efficiency* • *Challenges: High cost of scrap steel & electricity*
CCUS - Captures CO_2 from steel plants to reuse in process or store underground to prevent it from entering atmosphere ***Use Case** – JSW Steel and Tata Steel*	• *~90% Decarbonisation potential* • *Challenges: High upfront CCUS investment, limited availability of CO_2 for storage/transport*
Renewable Electricity - Used to power EAFs for recycling scrap steel or process DRI, significantly reducing Scope 2 emissions ***Use Case** –Tata Steel*	• *Critical to leverage other emerging green technologies* • *Challenges: Scaling up requires public support & private financing to build enabling infrastructure*

Source: MUFG compiled from JSW Steel First Climate Action Report 2024, Integral New Energy, Climate Bonds, World Economic Forum, H2 Green Steel and various public sources.

APAC Iron & Steel Companies | Decarbonisation in Action

APAC recorded nearly USD 6.5 bn worth of bonds and loans in the Iron and Steel sector (2021-23), as companies push for decarbonisation*

Strategy — Action

Company	Strategy	Finance raised	KPI / UoP Description
JSW Steel	*Develop implementation of H2-DRI, CCUS and scrap-based EAF*	**USD 1 Bn** Sustainable-linked Bond (2021)	To reduce CO_2 emissions intensity of steel production
BAOWU	*Increase usage of Hydrogen in the EAF with modifications and improvements to Blast Oxygen Furnace (BOF)*	**CNY 5 Bn** Sustainable-linked Bond (2021)	To reduce Nitrogen Oxide emissions intensity of steel production
NIPPON STEEL	*Utilisation of H2-DRI and improved scrap-based EAF technology with offsetting remaining emissions by CCUS*	**JPY 50 Bn** Green Bond (2023)	To produce eco-friendly car motors
posco	*Accelerate deployment of H2-DRI , use renewable electricity and other process improvements in BOF*	**USD 500 Mn** Green Bond (2024)	Build new Electric furnaces for low-carbon steel

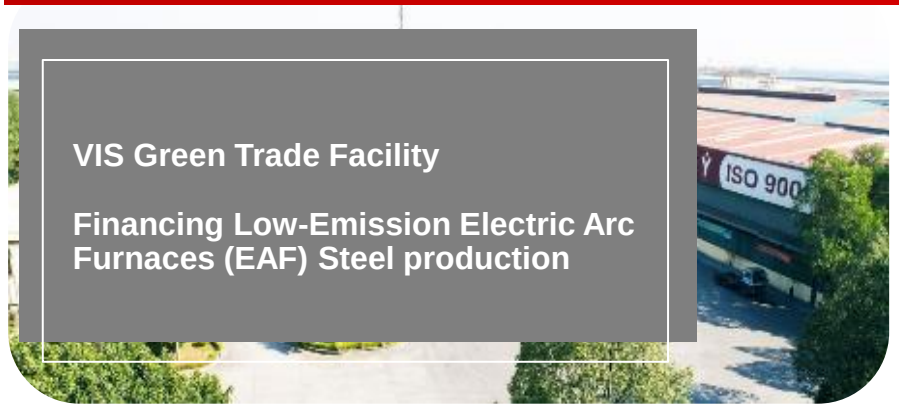
**Deals are sourced from public sources and may not include all bonds and loans that were issued/borrowed during the period under consideration. E.g., Private placements*

Source: MUFG compiled from JSW Steel First Climate Action Report 2024, Climate Bonds, World Economic Forum, H2 Green Steel and various public sources.

Case Study of VIS | Accelerating decarbonisation in the Iron & Steel sector

Leading by example, MUFG closed its first Green Trade Finance Facility and first-ever green financing for the steel sector in Vietnam

Spotlight MUFG



VIS Green Trade Facility

Financing Low-Emission Electric Arc Furnaces (EAF) Steel production

Borrower	Vietnam-Italy Steel Joint Stock Company (VIS)
Facility Size	USD 15 Million Green Trade Facility
Facility Type	Trade Facility
Date	November 2023
Use of Proceeds	▪ Green short-term loan to finance working capital related to steel production using EAF. ▪ Issuance of Green Letter of Credit for procurement of steel scrap and graphite electrode used in EAF production mode for Green Steel

Company Background

- ✓ VIS was established in 2002 with main business of manufacturing and trading of construction steel
- ✓ VIS is an early adopter and leader in manufacturing of steel using Electric Arc Furnace (**EAF**)
- ✓ The company excels in sustainability by employing an eco-friendly method of steel production, utilising raw material sourced from steel scraps and employing EAF production method

Key Highlights of the Green Financing

- ✓ **Greener Steel Production using Steel Scrap**
  - ▪ Steel that has been previously manufactured and used, which has come to its end of life in that form, could be infinitely recycled in the form of steel scrap
  - ▪ Manufacturing a ton of steel with scrap can reduce 1.6 tonnes of GHG emissions and replace the use of 350 kg standard coal
- ✓ **Electric Arc Furnace (EAF) Production**
  - ▪ The EAF generates heat by using high-temperature arcs between graphite electrodes that use electricity as energy source
  - ▪ GHG Emissions are reduced compared to conventional steel production method of Blast Furnace – Basic Oxygen Furnace route which relies on use of coal to produce heat
  - ▪ EAF has potential to be net-zero by sourcing from renewable electricity to power its heating process

Source: MUFG compiled from LinkedIn and internally

CBAM and APAC Iron & Steel Sector I The road towards 2026

CBAM translates the climate impact into financial figures, calling in immediate attention from the corporates to act

Future implications of CBAM

Catalyst for a robust national carbon pricing mechanism

➢ **Targeted regulations**

While hopes are still hanging around G2G negotiation and lobbying efforts between major impacted countries and the EU to delay the CBAM implementation, we expect to see

- More APAC markets issuing industry-specific regulations, e.g. industrial green electricity tariff, conditional ETS (e.g. large-scale emitter only) to address CBAM's impacts on existing exports, rather than implementing a nationwide carbon pricing mechanism that can widely impact a cost structure of the whole domestic economy
- More government fiscal supports for implementation of *specific* low-carbon technologies e.g. hydrogen, amidst a tight decarbonisation budget allocated across multiple priorities

Driver for Corporate Decarbonisation among EU exporters

➢ **Organic expansion rather than accelerated replacement**

- Without a change in CBAM rate & scope, we expect to see a gradual increase of production capacity with a greener technology rather than a rapid replacement of the existing technologies

Spreading the impact

➢ **Expanding scope of EU CBAM**

- By 2025, the EU Commission is expected to expand CBAM to **other sectors** E.g., Polymers, chemicals, mineral oil products, paper and pulp

➢ **Establishing of carbon border measures in other markets**

- More markets are introducing **similar carbon border tax measures** to limit the import emissions and minimise a leakage of carbon revenue to the EU

Australia | 2024

Policy evaluation and feasibility of an Australian CBAM are likely to be finalised by October 2024

United Kingdom | 2027

UK to bring its own CBAM by 2027 for aluminium, cement, ceramics, fertilisers, glass, hydrogen, iron & steel etc.

USA | 2027

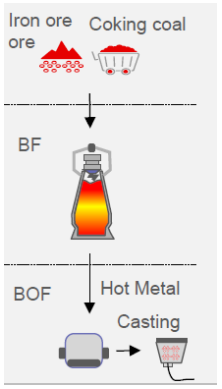
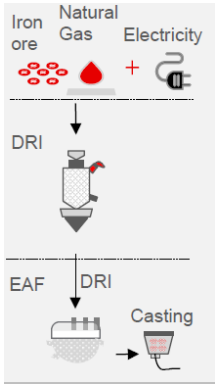
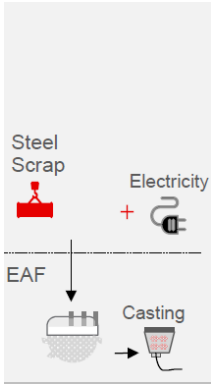
US to bring Foreign Pollution Fee Act by 2027 which aims to tax carbon-intensive imports. E.g., Iron and Steel, cement aluminium etc

Source: MUFG compiled from EY, Carbon chain, Gov.uk, SteelGuru, Economic Times and various public sources

Appendix

Illustration of Steel Production Process | Depiction of main production pathways for APAC

Overview of the Major Steel Production Routes

	Primary Route		Secondary Route
Production route	Blast Furnace and Basic Oxygen Furnace (BF-BOF)	Direct Reduced Iron (DRI-EAF)	Scrap Electric Arc Furnace (Scrap-EAF)
CO_2 (t) emissions/ t-crude steel	2.2	1.4	0.3
Share of global production (%)	73.2	4.8	21.5
Process details			

Source: MUFG Transition Whitepaper (2022)

Source: MUFG compiled from World Economic Forum, MUFG Transition White Paper (2022) and various public sources.

Appendix

Term	Definition
Carbon Pricing	Pricing mechanism to reduce GHG emissions by assigning a cost on emissions, generally through a carbon tax or emission trading system.
Embedded Emissions	Embedded emissions are the GHG emissions released during the production and transportation of a product, encompassing all stages from raw material extraction to delivery.
Emissions Trading Systems (ETS)	Emissions trading systems is a market-based approach to reduce greenhouse gas emissions where companies buy and sell emission allowances to stay within the government set emissions cap.
EU Allowances (EUAs)	Carbon allowances that allows companies covered by the EU ETS to emit a certain amount of CO2e and can be bought and sold on the market.
Decarbonisation	Process to reduce or eliminate CO2 emissions
Electric Arc Furnace (EAF)	Furnace that is used to melt scraps using electricity to create intense heat and energy and is often used in steel production.
Direct Reduced Iron (DRI)	DRI is a low-carbon alternative to produce high quality iron by reducing iron ore without melting it. DRI is generally used in steel production.
GHG Emissions (Scope 1)	Direct emissions from sources that are controlled or owned by an organisation. E.g., Emissions associated with burning coke in blast furnace at a steel plant owned by an organisation.
GHG Emissions (Scope 2)	Indirect emissions from the consumption of purchased electricity, steam, heating and cooling. E.g., Emissions associated with purchased electricity used for lighting or to power machinery.
GHG Emissions (Scope 3)	Indirect emissions occurring from the activities or assets not owned or controlled by the organisation. Scope 3 sources include emissions both upstream and downstream of the organisation's value chain. E.g., For a cement company, Scope 3 emission (upstream), includes emissions from clinker which is key material sourced from external suppliers.

Source: MUFG compiled from EPA, Deloitte, World Economic Forum, DNV and various public sources

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