FINANSIA
FSS INTERNATIONAL INVESTMENT ADVISORY

Thailand ESG report

พ.ร.บ. Climate Change กำลังจะเกิดขึ้นในไทย

- รายงานฉบับนี้ พูดถึงความสำคัญของ พรบ. Climate Change ที่กำลังจะเกิดขึ้นและส่งผลให้เกิดการเปลี่ยนแปลงในเชิงโครงสร้างครั้งใหญ่ของภาคธุรกิจไทย
- การประเมินผลกระทบเบื้องต้นจากภาษีคาร์บอนสำหรับ 6 อุตสาหกรรมที่มีการปล่อยก๊าซเรือนกระจกสูง และความเสี่ยงจาก EU-CBAM และ US-CBAM ต่อภาคส่งออกไทย
- Criterial checklist ที่นักลงทุนควรต้องติดตาม ลำดับแรกสุดคือ รายงานข้อมูลการปล่อยก๊าซเรือนกระจกขององค์กร ถัดมาคือ แนวทางการลดก๊าซเรือกระจก รวมเริ่มมีหลายบริษัทอาศัยเข้าร่วมโครงการซื้อขายคาร์บอนเครดิตแล้ว

พรบ. Climate change กำลังจะถูกบังคับใช้

ประเทศไทยมีเป้าหมายบรรลุความเป็นกลางทางคาร์บอนภายในปี 2050 และบรรลุ net zero ปี 2065 โดยมีการใช้กลไกราคาคาร์บอนแบบสมัครใจตั้งแต่ปี 2014 แต่ยังเห็นผลช้า และไม่เพียงพอต่อการบรรลุเป้าหมายลดโลกร้อน กอปรกับต้องเตรียมความพร้อมรับมือกับมาตรการจัดเก็บภาษีคาร์บอนจากสินค้านำเข้าจากคู่ค้าหลัก (CBAM) ดังนั้นจึงได้เกิดการร่าง พรบ. Climate change สาระสำคัญคือ การรายงานข้อมูลการปล่อย GHG ภาคบังคับ, การจัดเก็บภาษีคาร์บอน ภายใต้หลักการ ผู้ก่อมลพิษเป็นผู้จ่าย (Polluter Pays Principle) และจัดทำระบบซื้อขายสิทธิในการปล่อย GHG (TH-ETS) ถือเป็นกฎหมายบังคับให้ภาคธุรกิจลดการปล่อยก๊าซเรือนกระจกอย่างมีนัยสำคัญ ปัจจุบันอยู่ระหว่างเตรียมเสนอขออนุมัติจาก ครม. คาดว่าอาจเริ่มมีผลบังคับใช้อย่างเร็วในปี 2026

ผลกระทบต่อ 6 กลุ่มอุตสาหกรรมที่การปล่อยก๊าซเรือนกระจกสูง

ปัจจุบันไทยยังไม่มีการประกาศอัตราภาษีคาร์บอนที่ชัดเจน แต่เราอ้างอิงตัวเลขเบื้องต้นที่ภาครัฐกล่าวถึงในช่วงก่อนหน้าในอัตรา 200 บาท/tCO2eq หรือราว USD6/tCO2eq ซึ่งต่ำกว่าราคาคาร์บอนเฉลี่ยทั่วโลกปี 2025 ที่ USD19/tCO2eq เชื่อว่าจะมีการทยอยปรับขึ้นภาษีคาร์บอนในระยะถัดไป เพื่อให้สอดคล้องกับสากลและบรรลุเป้าหมายของไทยได้ ทั้งนี้ FSSIA ประเมินผลกระทบกรณี aggressive สำหรับ 6 อุตสาหกรรมเป้าหมายที่มีปล่อย GHG emissions ในสัดส่วนที่สูง ได้แก่ พลังงานและไฟฟ้า, ปิโตรเคมี, ซีเมนต์, เหล็ก, ขนส่ง และสายการบิน รวม 108 บริษัท โดยใช้สมมติฐานภาษีคาร์บอนในอัตรา 200 บาท/tCO2eq คูณกับปริมาณการปล่อยก๊าซเรือนกระจกที่แต่ละบริษัทได้รายงานในปี 2024 พบว่ากระทบต่อกำไรสุทธิในปี 2024 สูงถึง 49.8% โดยกลุ่มที่มีความเสี่ยงมากสุดคือ เหล็ก และปิโตรเคมี รองมาคือ ซีเมนต์, พลังงานและไฟฟ้า อย่างไรก็ตาม ผลกระทบของภาษีคาร์บอนที่แท้จริงอาจต่ำกว่าที่เราประเมินไว้ เนื่องจากเรายังไม่ได้รวมสิทธิการปล่อยก๊าซเรือนกระจกที่แต่ละบริษัทได้รับ ทั้งนี้ยังต้องรอการประกาศของภาครัฐ ภายหลัง พรบ. Climate change มีผลบังคับใช้ต่อไป

อุปสรรคถัดไปของผู้ส่งออกไทยคือ EU-CBAM และ US-CBAM

ในช่วง 1-2 ปีข้างหน้านี้ ผู้ส่งออกไทยจะต้องเผชิญกับภาษีคาร์บอนสำหรับสินค้านำเข้า (CBAM) ของ US และ EU ซึ่งถือเป็นตลาดส่งออกหลักของไทยสัดส่วนราว 18.3% และ 9.5% ของมูลค่าส่งออกไทยปี 2024 ตามลำดับ แม้เรายังไม่สามารถประเมินผลกระทบเป็นตัวเลขได้ แต่เราได้รวมรวมบริษัทจดทะเบียนที่มีสัดส่วนรายได้ส่งออกไป EU หรือ US รวม 58 บริษัทจาก 10 อุตสาหกรรม โดยเราทำการ screen ข้อมูลเบื้องต้นพบว่า อุตสาหกรรมที่มีการสัดส่วนรายได้ส่งออกสินค้าไป EU แล US สูงคือ เกษตรและอาหาร และชิ้นส่วนอิเล็กทรอนิกส์ ส่วนอุตสาหกรรมที่มีการส่งออกไป US สูงคือ สินค้าอุตสาหกรรมและบรรจุภัณฑ์ หากพิจารณาสัดส่วนของการปล่อยก๊าซเรือนกระจก ต่อรายได้รวม พบว่าอุตสาหกรรมที่มีสัดส่วนนี้สูงได้แก่ เหล็ก, พลังงานและไฟฟ้า และสินค้าอุตสาหกรรมและบรรจุภัณฑ์

คำแนะนำของ FSSIA - นักลงทุนควรติดตามพัฒนาการปล่อยก๊าซเรือนกระจกของบริษัทที่สนใจลงทุน

รายงานฉบับนี้ของ FSSIA ไม่ได้แนะนำ Top Pick หุ้นที่น่าสนใจเข้าลงทุน แต่อยากชี้ให้นักลงทุนติดตามความคืบหน้าของ พรบ. และพัฒนาการของบริษัทเป้าหมายที่นักลงทุนสนใจ โดยเฉพาะการรายงานข้อมูลการปล่อย GHG ที่กำลังจะเป็นภาคบังคับ ซึ่งภายใต้ 166 บริษัทที่ FSSIA ทำการศึกษาในรายฉบับนี้ พบว่ามีจำนวนมากถึง 30 บริษัทที่ยังไม่มีการรายงานข้อมูลการปล่อยก๊าซเรือนกระจกขององค์กรในปี 2024 จากการสอบถามพบว่าส่วนใหญ่อยู่ระหว่างการประเมินและจัดทำรายงานเพื่อเผยแพร่ให้นักลงทุนทราบต่อไป หลังจากนั้นเราต้องติดตามผลกระทบของภาษีคาร์บอน และพัฒนาการของบริษัทจดทะเบียน เพราะหากไม่สามารถปรับตัวได้ทัน อาจนำไปสู่ความเสียหายต่อผลการดำเนินงาน และกระทบต่อมูลค่ากิจการในที่สุด

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บทวิเคราะห์ฉบับนี้แปลมาจากต้นฉบับภาษาอังกฤษ ที่ออกรายงานเมื่อวันที่ 5 พฤศจิกายน 2025

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Global GHG emissions declining more slowly than required

Since the first Conference of the Parties (COP) under the United Nations Framework Convention on Climate Change (UNFCCC) in 1995, the global community has worked together to combat global warming. Most initiatives have been based on voluntary cooperation among the 193 UN member countries (out of 195 countries worldwide). A key example is the Paris Agreement of 2015, which aims to limit the rise in global temperatures to below 2°C, while striving to cap it at 1.5°C. Under this agreement, each country sets its own greenhouse gas (GHG) reduction targets and is required to report progress regularly.

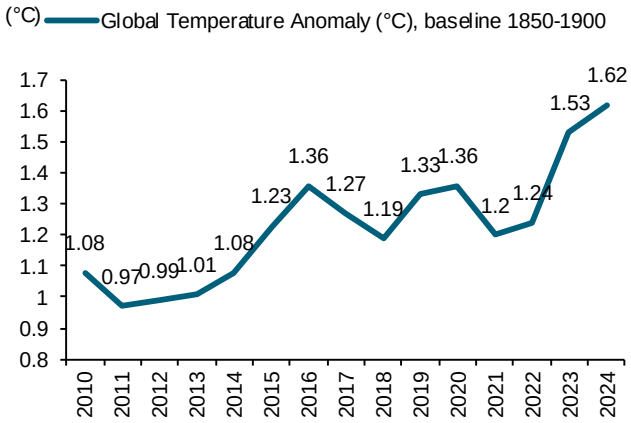
Financial mechanisms were also established to support developing countries in coping with the impacts of climate change. However, because most efforts have relied on voluntary cooperation, the world has reduced GHG emissions at a pace five times slower than necessary, according to the Global Systems Institute at the University of Exeter. In 2024, global GHG emissions reached 53,210 MtCO2eq, up 1.3% y-y — a rate higher than the 10-year average (2015–24) of 0.9% CAGR.

During 2023–24, the average global temperature exceeded 1.5°C for the first time. The World Meteorological Organization (WMO) reported that in 2024, the global temperature rose to 1.55°C, marking the hottest year in 175 years of recorded data. CO2 concentrations in the atmosphere reached their highest level in 800,000 years, sea levels hit record highs since satellite measurements began, and glacier melt rates accelerated to unprecedented levels. Meanwhile, both El Nino and La Nina events have become increasingly intense — El Nino bringing higher temperatures and droughts, and La Nina causing heavier rainfall, floods, and stronger storms.

Voluntary cooperation among member countries may no longer be sufficient. Experts warn that if the situation does not improve, global temperatures are likely to exceed 2°C by 2100.

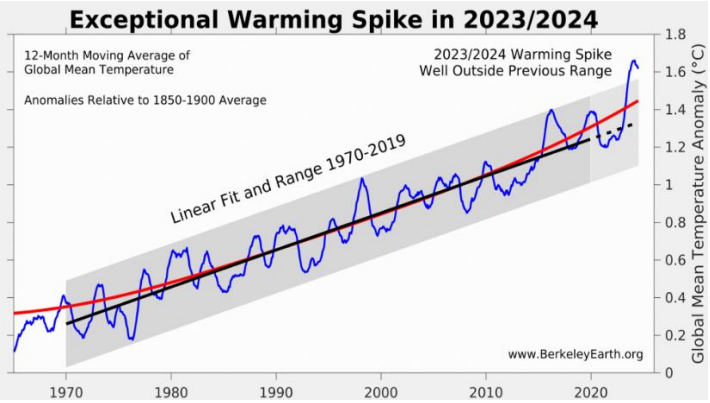
As a result, countries are now taking stricter measures. Rather than relying solely on voluntary commitments, governments have begun implementing carbon-related tax and trade policies. Businesses — both domestic and international — that fail to comply with these measures will face higher trade barriers and increased costs.

Exhibit 1: Global Temperature Anomaly



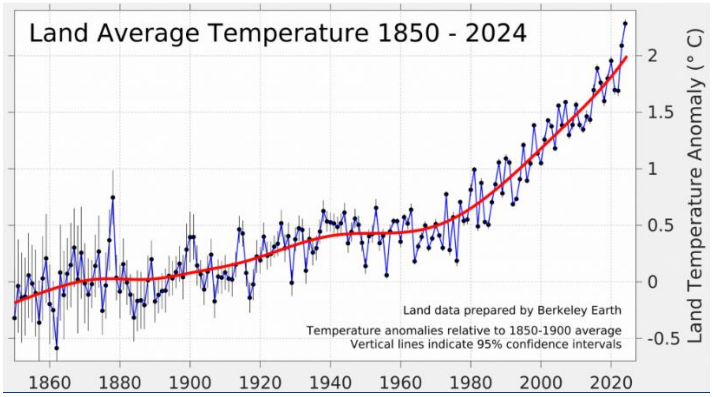
Sources: BerkeleyEarth.org, FSSIA compilation

Exhibit 2: Exceptional Warming Spike in 2023-24



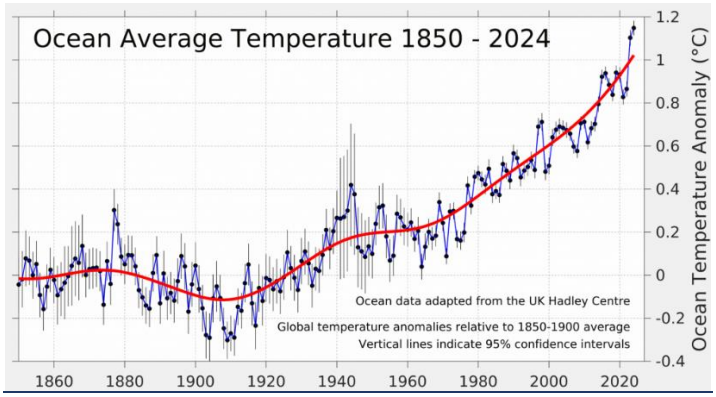
Source: BerkeleyEarth.org

Exhibit 3: Land average temperature in 2024 was warmest at 2.28 °C



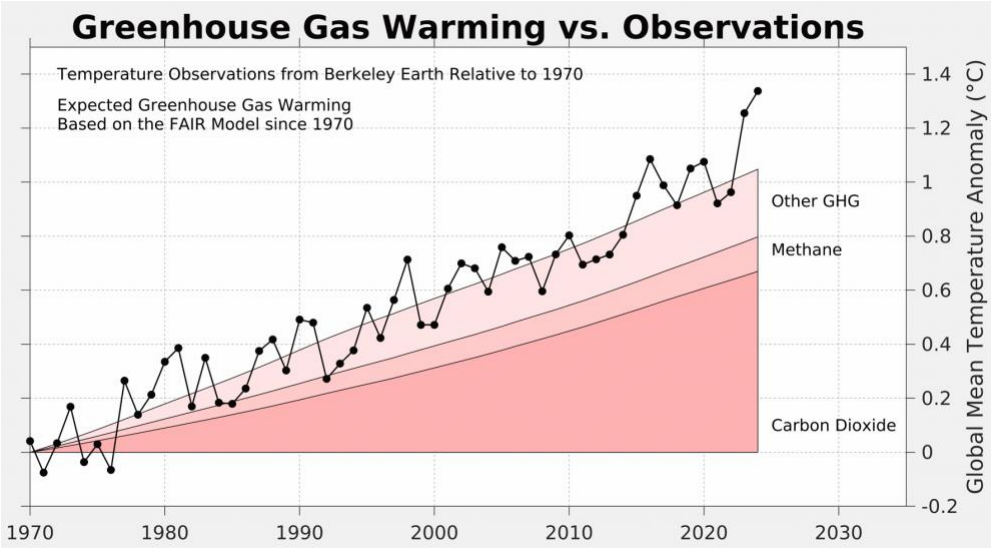
Source: BerkeleyEarth.org

Exhibit 4: Ocean surface average temperature in 2024 was warmest at 1.15 °C



Source: BerkeleyEarth.org

Exhibit 5: Greenhouse Gas Warming vs Temperature Observations



Source: BerkeleyEarth.org

Thailand aims to cut GHG emissions by 30-40% by 2030

At the United Nations COP26 Conference in 2021, Thailand announced its commitment to achieve carbon neutrality by 2050 and net-zero GHG emissions by 2065.

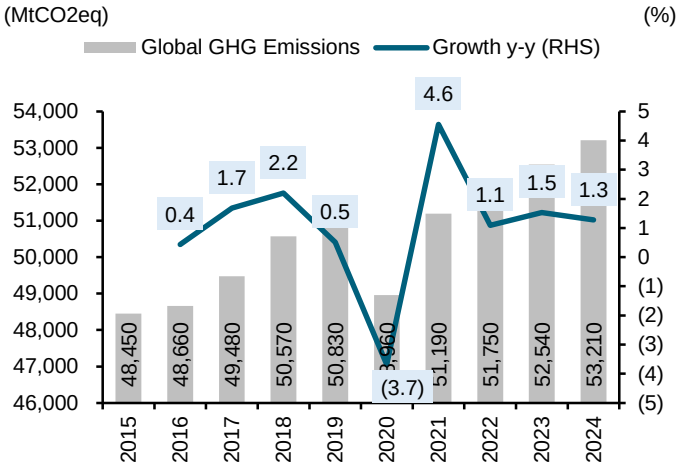
Carbon neutrality refers to balancing the amount of carbon dioxide (CO2) emitted from various economic activities — including manufacturing, industry, energy use, agriculture, and daily human activities — with the amount removed from the atmosphere. Carbon absorption can be achieved through measures such as tree planting, mangrove reforestation, expanding green areas, and purchasing carbon credits to offset emissions that cannot be fully absorbed.

Meanwhile, the goal of achieving net-zero emissions is more ambitious, as it covers not only carbon dioxide but also all seven types of greenhouse gases: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6), and nitrogen trifluoride (NF3). The aim is to achieve a complete balance between emissions and absorption of all seven gases.

In 2024, global GHG emissions totaled 53,210 MtCO2eq. The top five emitters were China (29.2%), the United States (11.1%), India (8.2%), the European Union (5.9%), and Russia (4.8%), together accounting for 59.2% of global GHG emissions. When including the top ten countries, their combined share reached nearly 70% of total global emissions.

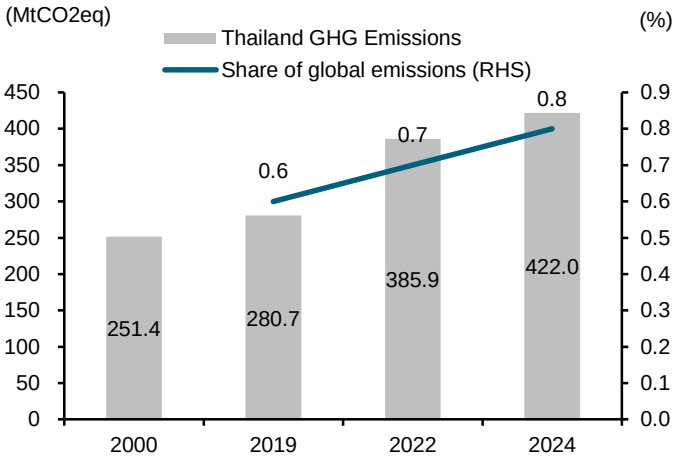
Thailand emitted 422 MtCO2eq in 2024, ranking 21st globally and third in ASEAN, after Indonesia and Vietnam.

Exhibit 6: Global GHG Emissions and growth



Sources: SET, JRC/IEA Report (European Commission), FSSIA's compilation

Exhibit 7: Thailand GHG Emissions and share of global



Sources: SET, Thailand's Fourth Biennial Report, FSSIA's compilation

Exhibit 8: Top 10 countries with the highest GHG emissions in 2024

No.	Countries	GHG emissions (MtCO2eq)	Share of global emissions (%)
1	China	15,536	29.2
2	United States	5,913	11.1
3	India	4,371	8.2
4	EU	3,165	5.9
5	Russia	2,576	4.8
6	Indonesia	1,324	2.5
7	Brazil	1,299	2.4
8	Japan	1,063	2.0
9	Iran	1,055	2.0
10	Saudi Arabia	836	1.6
21	Thailand	422	0.8
	Total	**53,210**	

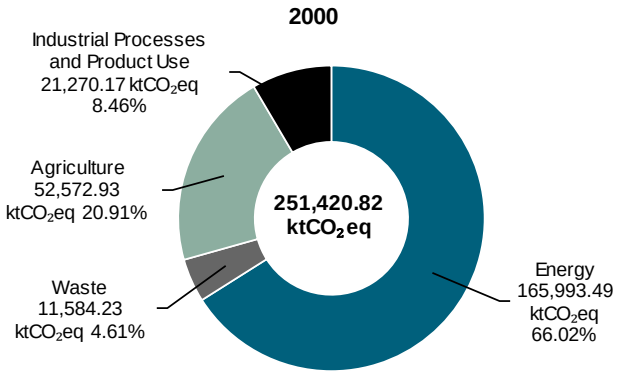
Source: Thailand Greenhouse Gas Management Organization

Thailand's Nationally Determined Contribution (NDC1) targets a 30–40% reduction in GHG emissions by 2030, consistent with commitments made by other UN member countries. On 11 December 2024, the Thai Cabinet approved the National GHG Emission Reduction Action Plan (2021–2030), setting a national reduction target of 222.3 MtCO2eq, or a 40% reduction from the base year by 2030. Of this, 184.8 MtCO2eq will come from domestic actions and 37.5 MtCO2eq from international support.

Domestic reductions (184.8 MtCO2eq) will primarily come from the energy sector (67.4%), followed by transport (24.6%), waste management (9.1%), agriculture (4.1%), and industry (1.4%).

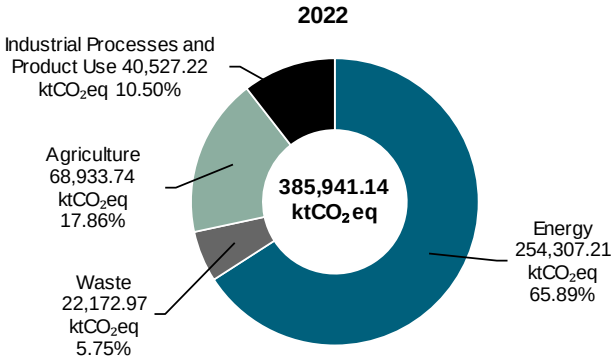
Thailand's GHG emissions are largely composed of carbon dioxide (67.2%), followed by methane (19.2%), fluorocarbons (9.3%), and nitrous oxide (4.3%).

Exhibit 9: Thailand's GHG emissions by sector for 2000



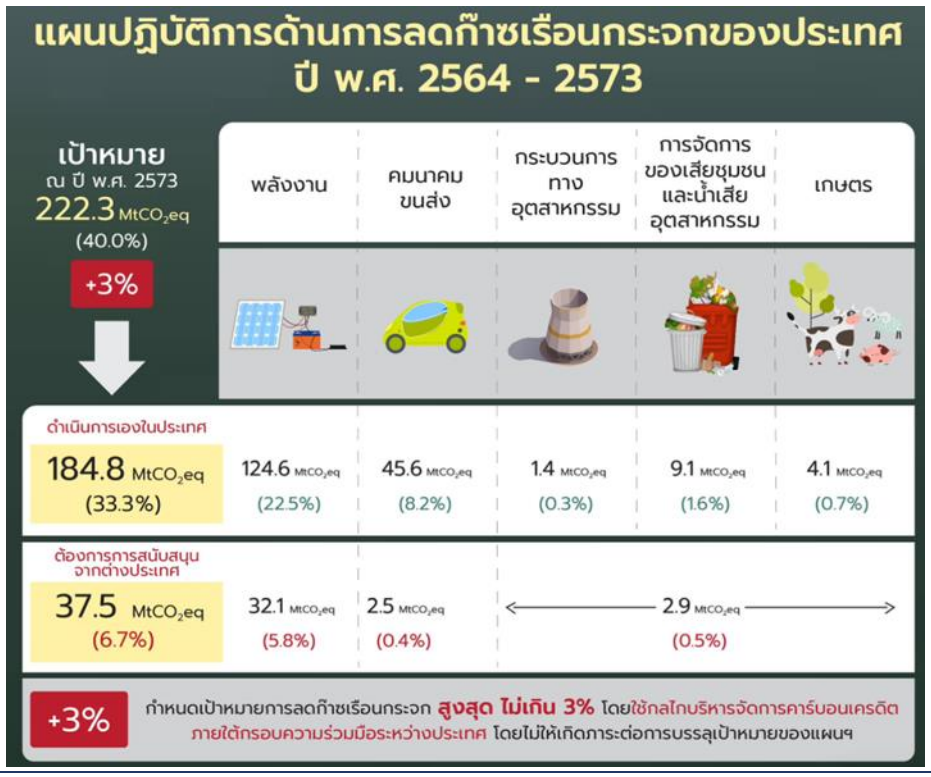
Sources: Thailand's Fourth Biennial Report, FSSIA's compilation

Exhibit 10: Thailand's GHG emissions by sector for 2022



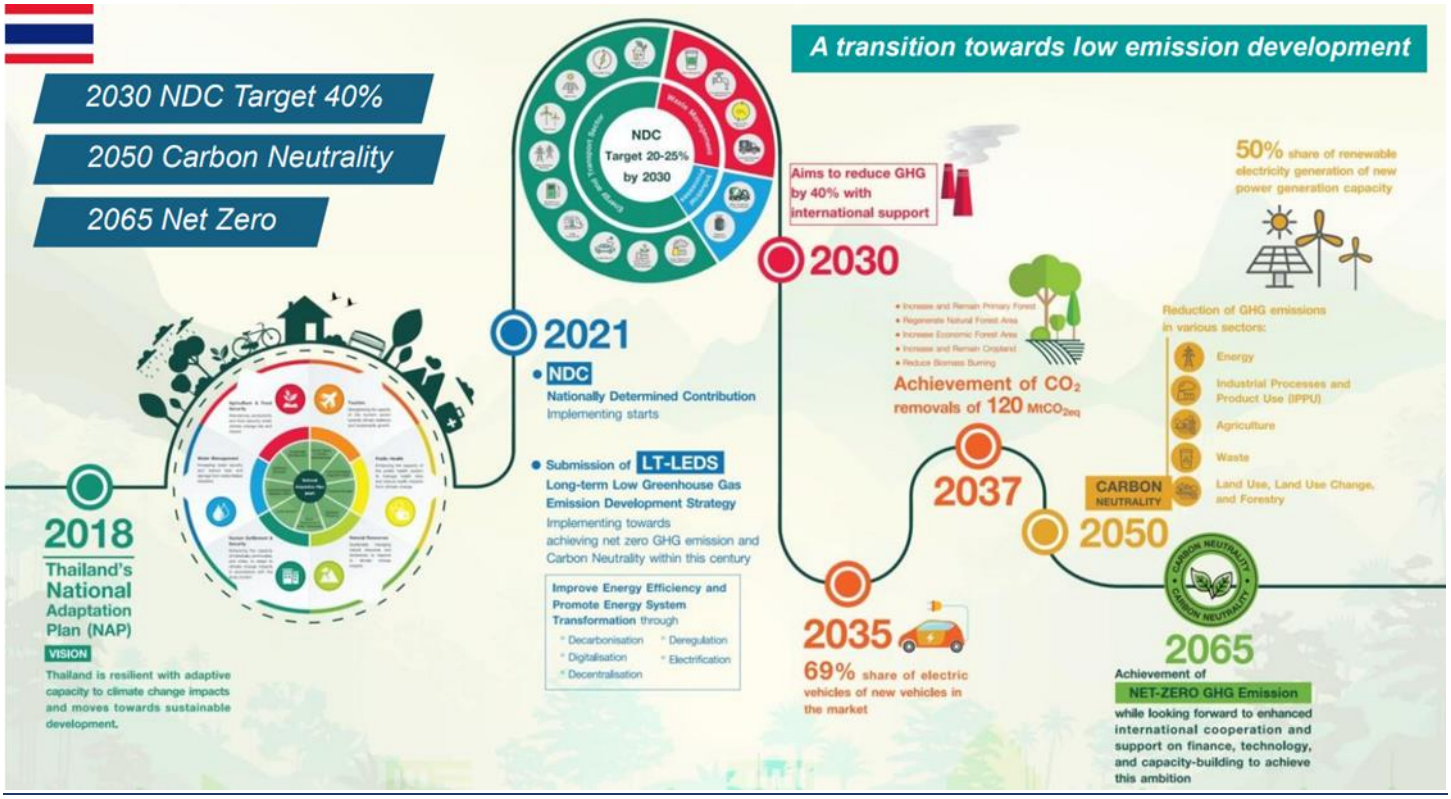
Sources: Thailand's Fourth Biennial Report, FSSIA's compilation

Exhibit 11: Thailand's GHG Emissions Reduction Plan for 2021-2030



Source: Department of Climate Change and Environment (DCCE Thailand)

Exhibit 12: Thailand's Long-term Greenhouse Gas Emission Development Strategy



Sources: Global Compact Network Thailand, FSSIA' compilation

Thailand targets 36% cut in energy intensity by 2037 to curb CO2 emissions

In 2024, Thailand's total energy consumption reached 123,546 kilotonnes of oil equivalent (ktoe), increasing by a 0.4% CAGR over the past five years. The country emitted 245.7 MtCO2eq, up 0.98% y-y, though emissions have declined slightly by 0.4% CAGR over the past five years.

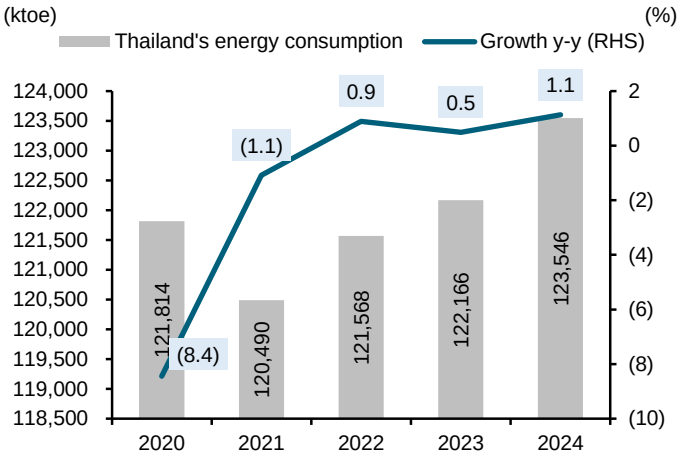
By fuel type, refined oil accounted for the largest share of CO2 emissions at 43%, followed by natural gas (33%) and coal/lignite (24%). Over the past five years, CO2 emissions from refined oil increased at a 1.7% CAGR, reaching 105.3 MtCO2eq in 2024 — the highest level on record since data collection began in 1987 — driven by rising economic activity. CO2 emissions from natural gas rose at a 1.1% CAGR, while emissions from coal and lignite fell by 5.3% CAGR due to reduced coal use in the industrial sector and a shift toward cleaner energy sources.

By economic sector, the power generation sector contributed the most CO2 emissions in 2024, accounting for 38%, followed by transport (33%), industry (23%), and others (5%). Over the past five years, the transport sector recorded the highest increase in CO2 emissions at a 2% CAGR, while the industrial sector achieved a 5.2% CAGR reduction, reflecting progress in industrial adaptation and efficiency.

In 2024, Thailand's CO2 emissions per unit of energy consumption stood at 2.01 tCO2/ktoe, continuing a steady decline over the past 26 years from 2.27 in 1987. The Ministry of Energy expects this to fall further to 1.92 tCO2eq/ktoe by 2025. According to the IEA, Thailand's CO2 emissions per energy use in 2022 were 2.02 tCO2eq/ktoe, lower than the global average of 2.29 and Asia's 2.56, but slightly above Europe's 1.95.

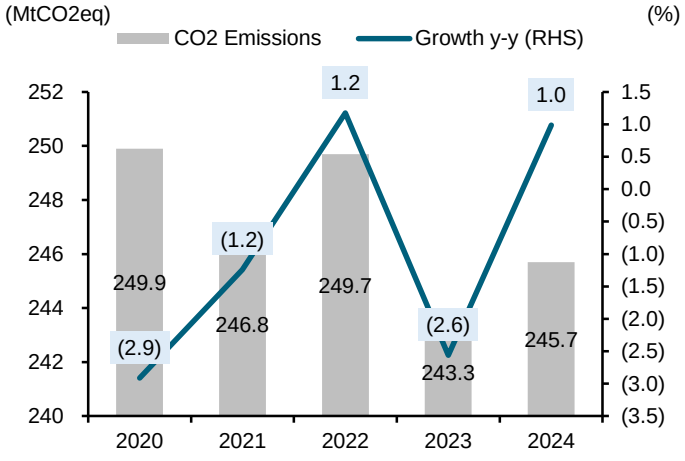
Under the Energy Efficiency Plan (EEP) 2024, the government targets a 36% reduction in energy intensity by 2037, which the Ministry of Energy estimates could save around THB532b in total energy costs. The plan also aims to reduce CO2 emissions by 106 MtCO2eq by 2037, representing 43% of Thailand's total CO2 emissions in 2024.

Exhibit 13: Thailand's energy consumption and growth



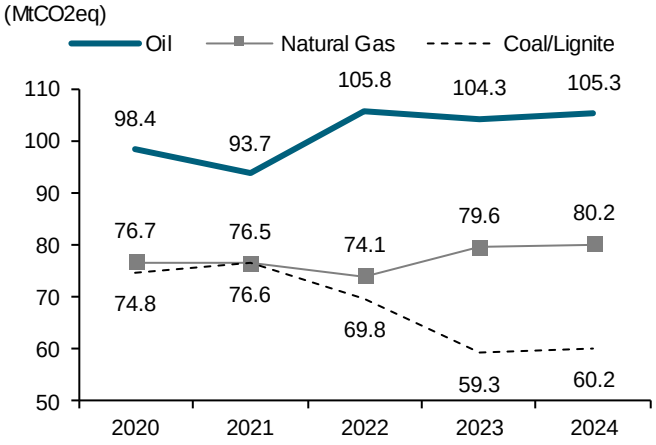
Sources: Energy Policy and Planning Office (EPPO), FSSIA's compilation

Exhibit 14: Thailand's CO2 emissions and growth



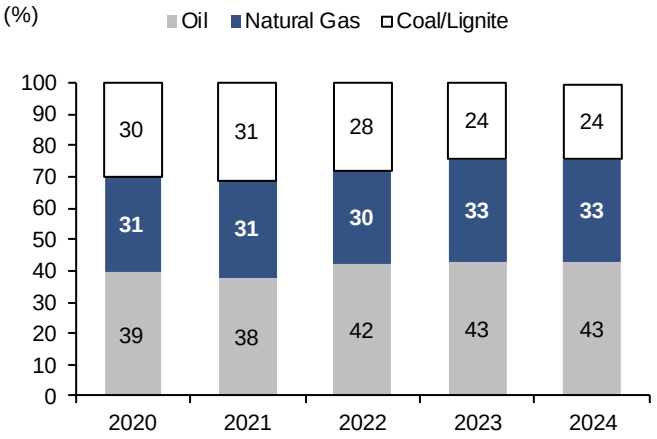
Sources: Energy Policy and Planning Office (EPPO), FSSIA's compilation

Exhibit 15: Thailand's CO2 emissions from energy consumption by fuel type



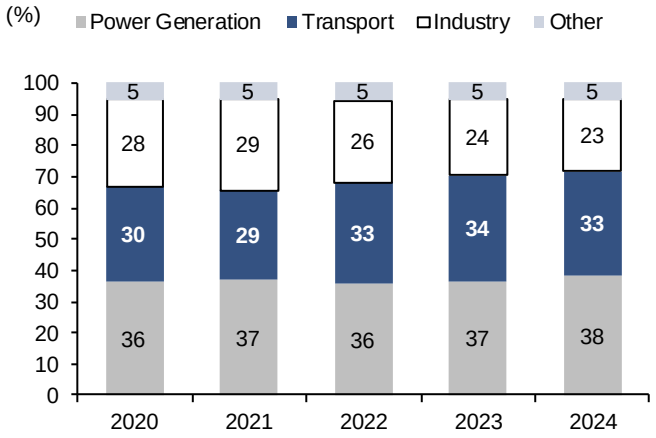
Sources: EPPO, FSSIA's compilation

Exhibit 16: Proportion of CO2 emissions from energy consumption by fuel type



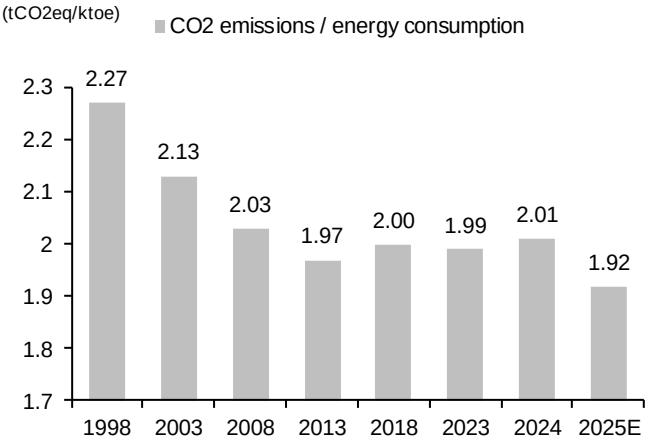
Sources: EPPO, FSSIA's compilation

Exhibit 17: Thailand's CO2 emissions from energy consumption by sector



Sources: EPPO, FSSIA's compilation

Exhibit 18: Thailand's CO2 emissions per energy consumption



Sources: EPPO, FSSIA's compilation

Thailand's Voluntary Carbon Scheme: Promising but Lagging

Thailand has implemented a voluntary carbon pricing mechanism since 2014, reflecting the country's efforts to reduce GHG emissions. This system enables carbon credit trading under the Thailand Voluntary Emission Reduction Program (T-VER), which certifies voluntary emission reduction projects that comply with national standards.

Under the T-VER framework, both corporate entities and individuals can invest in project-based carbon reduction or sequestration initiatives such as clean energy generation, waste management, tree planting, and forest conservation or restoration. These projects can be registered to obtain official certification for the amount of GHG reduced or absorbed—known as carbon credits—which can then be sold to other entities seeking to offset their own emissions.

Despite this progress, Thailand's carbon credit trading market remains relatively small. Since T-VER registration began in 2015, a total of 196 projects (399 registrations) had been approved over an 11-year period, with 23.89 MtCO2eq of certified GHG reductions. However, the accumulated trading volume between 2016 and 2025 amounts to only 4.1 MtCO2eq, valued at approximately THB391m, representing only 1.1% of Thailand's total GHG emissions. While the initiative marks a positive step, it remains insufficient to meet the country's climate mitigation goals.

Globally, the carbon credit trading ecosystem continues to evolve. In the coming years, a global trading platform could emerge to connect national markets, potentially leading to a single global price for carbon credits. According to Research and Markets, the global carbon credit market is projected to grow at a CAGR of 22.7%, reaching USD567m by 2030.

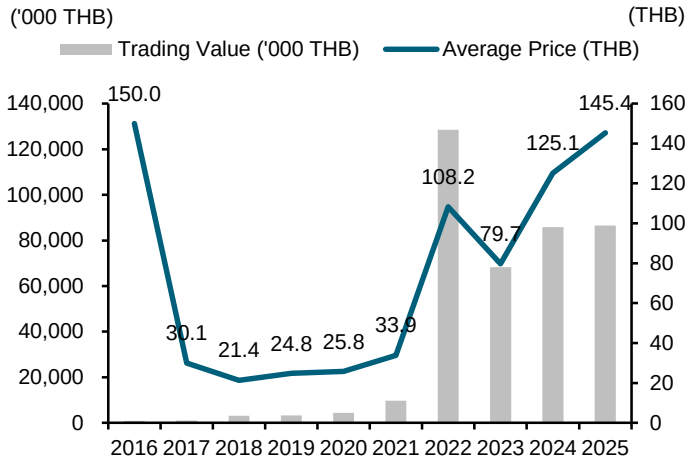
According to data from the Thailand Greenhouse Gas Management Organization (TGO), 76 listed companies (including the SET) have registered for carbon credit certification through various projects. These companies collectively account for 11.75 MtCO2eq, or 49% of Thailand's total certified carbon credits, indicating growing awareness among Thai corporations. Although carbon trading has yet to generate significant incremental revenue, it highlights the private sector's proactive role in climate action and its preparation for increasingly stricter environmental regulations in the future.

Exhibit 19: Certified GHG in T-VER

Year	No. of certified projects	
	No. of certification requests (times)	Certified GHG emissions (tCO2eq)
2015	7	339,537
2016	15	249,612
2017	22	493,207
2018	27	887,523
2019	34	1,262,757
2020	50	2,578,321
2021	52	3,030,038
2022	59	4,673,841
2023	42	3,444,918
2024	41	3,535,918
2025	50	3,396,815
Total	**399**	**23,892,487**

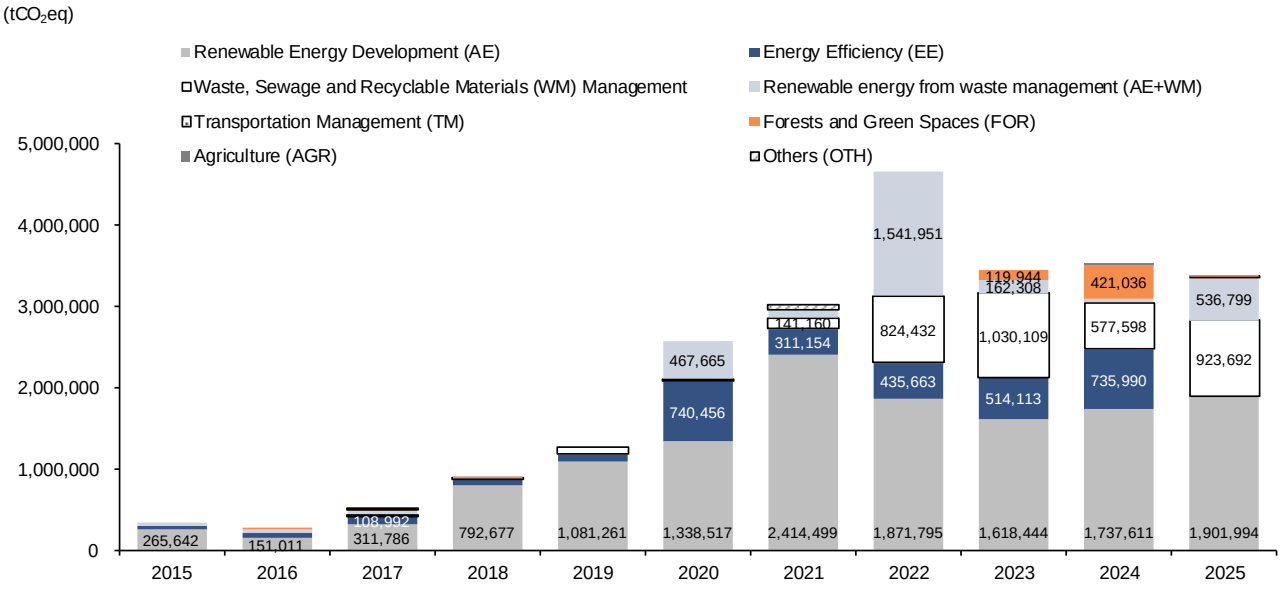
Sources: Thailand Greenhouse Gas Management Organization, FSSIA's compilation

Exhibit 20: Thailand's carbon credit trading value and average selling price



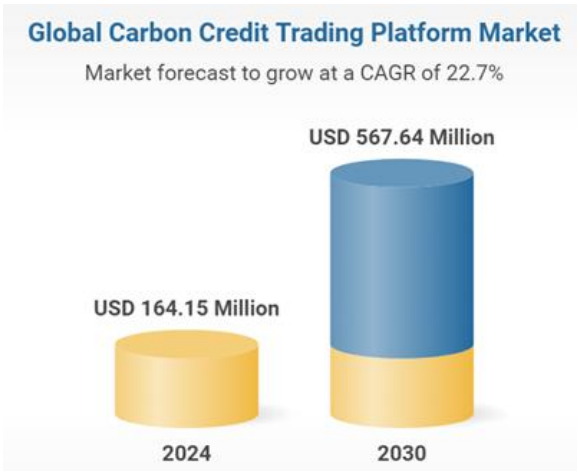
Sources: Thailand Greenhouse Gas Management Organization, FSSIA's compilation

Exhibit 21: Project details of certified GHG in T-VER



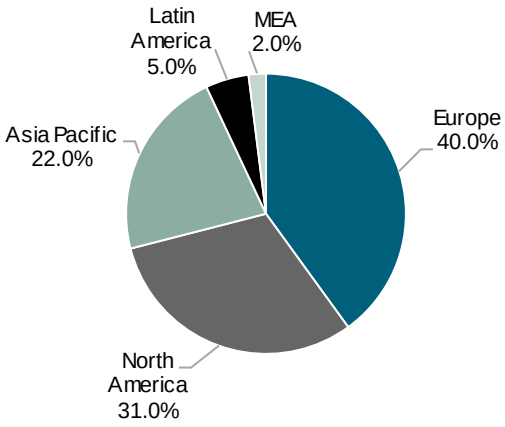
Source: Thailand Greenhouse Gas Management Organization

Exhibit 22: Global Carbon Credit Trading Platform Market



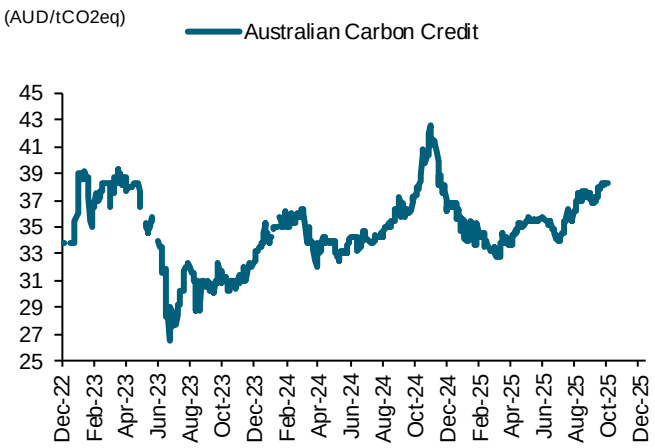
Sources: Researchandmarkets.com

Exhibit 23: Carbon Credit Market Share by region in 2024



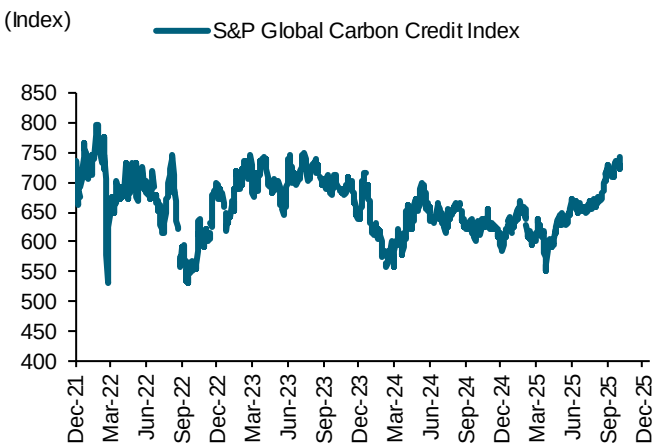
Sources: PrecedenceResearch, FSSIA's compilation

Exhibit 24: Australian Carbon Credit Price



Sources: Bloomberg, FSSIA's compilation

Exhibit 25: S&P Global Carbon Credit Index



Sources: Bloomberg, FSSIA's compilation

Exhibit 26: Listed Companies Registered for Carbon credit (in Alphabetical Order)

Company	Estimated GHG Reduction (tCO2eq/year)	Certified GHG Reduction (tCO2eq)
AIT	1,214	--
AU	229	--
B	3,379	--
BAFS	486	1,045
BANPU	174	--
BCP	8,711	--
BCPG	167,893	734,423
BEM	3,082	--
BGC	7,763	--
BGRIM	252	--
CPALL	3,830	3,622
CPAXT	25,804	4,351
CPF	76,799	744
CPN	11,554	761
CPT	12,536	--
CRANE	276,154	778,155
CSR	161	1,122
DELTA	8,300	10,734
EA	504,629	3,748,118
ETC	144,320	630,398
FE	9,158	25,543
FPT	1,278	--
GLOBAL	23,091	14,805
GPSC	582,370	579,148
GREEN	35,634	--
GULF	3,390,339	234,840
HMPRO	27,863	64,141
ICHI	1,301	4,998
IRC	992	--
IRPC	9,452	--
ITC	9,129	69,631
KBANK	432	--
KBS	156,749	--
KCG	35	--
MEGA	690	--
NER	17,988	--
OGC	677	--
OR	10,469	3,518

Sources: TGO.or.th, FSSIA's compilation

Exhibit 27: Listed Companies Registered for Carbon credit (in Alphabetical Order) *(cont.)*

Company	Estimated GHG Reduction (tCO2eq/year)	Certified GHG Reduction (tCO2eq)
PJW	2,534	--
PM	805	--
PQS	14,473	--
PSTC	7,960	40,889
PTG	27,076	--
PTT	184,152	191,979
PTTEP	16,406	--
RATCH	4,533	4,967
SALEE	430	--
SCC	25,106	3,346
SCGP	7,876	--
SCN	3,921	4,374
SET	914	901
SKN	2,452	2,815
SMT	588	--
SNP	367	--
SOLAR	5,216	--
SSP	3,713	3,865
STA	163.122	15.137
STANLY	2.414	--
STGT	614	--
SUTHA	1,543	--
TCMC	1,033	--
TEGH	56,696	104,842
TFG	16,539	--
TFMAMA	1,552	1,568
TGE	118,561	223,423
TIPCO	923	--
TMI	113,259	141,544
TOP	336,369	1,675,172
TPCH	141,290	107,502
TPIPL	64,790	2,057,275
TU	263	--
TWPC	61,182	260,162
VNG	5,826	--
VNT	8,607	7,205
WHAUP	65,660	--
TRUE	95	--

Sources: TGO.or.th, FSSIA's compilation

Exhibit 28: Listed companies purchasing carbon credit to offset organizational emissions

A total of 36 organization, comprising 34 companies, the SET , and the SEC			
ADD	BTS	NAT	THG
ASW	CPALL	NRF	TRUE
AURA	CPAXT	PRINC	UPF
BAFS	FSX	PSL	VGI
BANPU	HMPRO	PTT	ZEN
BAY	IVF	SCB	
BBL	JAS	SEC	
BCP	KBANK	SET	
BCPG	KKP	SIRI	
BJC	LHFG	THAI	
BJC	NAT	THCOM	

Sources: TGO.or.th, FSSIA's compilation

Exhibit 29: Listed companies have sold carbon credits

A total of 26 organization, comprising 25 companies, and the SET			
BAFS	EA	PSTC	SSP
BCPG	ETC	PTT	TOP
CPALL	GPSC	RATCH	TPIPL
CPAXT	GULF	SCC	TWPC
CPF	HMPRO	SCGD	VNT
CPN	ICHI	SCN	
DELTA	ITC	SET	

Sources: TGO.or.th, FSSIA's compilation

From voluntary to mandatory; Thailand's next step in carbon regulations

Following the slow progress and limited effectiveness of the voluntary carbon pricing system in achieving Thailand's climate mitigation goals, the government is now escalating its environmental policy efforts by introducing a mandatory carbon pricing mechanism. This aims to help the country meet its carbon reduction targets and achieve Net Zero emissions by 2065, while also preparing domestic industries for upcoming carbon border adjustment mechanisms (CBAM) from major trading partners such as the EU, UK, and US.

This marks a major step in Thailand's ESG regulatory landscape, with the Climate Change Act (CCA)—the country's first law directly addressing ESG compliance—currently being prepared for submission to the Cabinet for approval. The Act introduces key policy instruments designed to drive emissions reduction and internalize carbon costs into business operations, including the carbon tax and the Emission Trading Scheme (ETS).

The draft law contains several key measures that will have direct implications for the private sector, summarized as follows:

Exhibit 30: Key highlights of Thailand's Climate Change Act (CCA)

Key Measure	Details and implications
Mandatory GHG Emission Reporting	Businesses falling under the designated criteria will be required to prepare and submit annual GHG emission inventories and reports to the Department of Climate Change and Environment (DCCE). The objective is to establish a centralized national emissions database and monitor Thailand's progress toward emission reduction goals. Non-compliance will result in penalties ranging from THB10,000–100,000, plus a daily fine of up to THB1,000 until compliance is achieved.
Carbon Tax Implementation	Based on the "Polluter Pays Principle," the carbon tax aims to financially incentivize emission reduction by assigning explicit costs to carbon-intensive activities. This is expected to drive significant reductions in business-sector emissions over time.
Thailand Emission Trading Scheme (TH ETS)	The ETS will operate in tandem with the carbon tax, providing a market-based mechanism that rewards companies capable of reducing emissions more efficiently. These firms can monetize excess allowances as tradable assets, creating new revenue streams. Conversely, companies slower to decarbonize may purchase allowances to offset their tax burden, albeit at the expense of higher operational costs.
Carbon Credit Trading	Companies unable to directly reduce emissions can purchase carbon credits domestically to offset their GHG output. Cross-border credit purchases will also be allowed, subject to prior authorization by the relevant authorities.

Source: FSSIA's compilation

Carbon Tax: A key policy mechanism to drive emission reduction

A carbon tax is a policy instrument widely adopted by many countries to reduce GHG emissions, based on the Polluter Pays Principle (PPP). Under this approach, the government sets a tax rate per unit of emissions (per 1 tCO2eq). The primary objectives of carbon taxation are as follows:

- To enforce significant carbon emission reductions within the business sector.
- To prepare for international carbon border measures, such as the EU-CBAM and US-CBAM, which impose import taxes on carbon-intensive products.
- To incentivize consumers to shift toward environmentally friendly products and services.
- To enable the government to use tax revenues to support environmental initiatives and pollution mitigation programs.

Carbon taxation can be structured in two main forms; 1) direct taxation on production activities that generate emissions — such as fossil fuel–based power generation, factory combustion processes, cement and chemical production; and 2) indirect taxation on the consumption of goods or services associated with GHG emissions — such as excise taxes on oil, LPG, coal, and vehicles.

While Thailand has not yet finalized detailed tax rates for specific industries, the Excise Department has proposed using the Excise Tax Act as a pilot mechanism for implementing the carbon tax. The initial focus will be on high-emission products, such as fossil fuels and refined petroleum products, which are expected to be the first group subject to taxation.

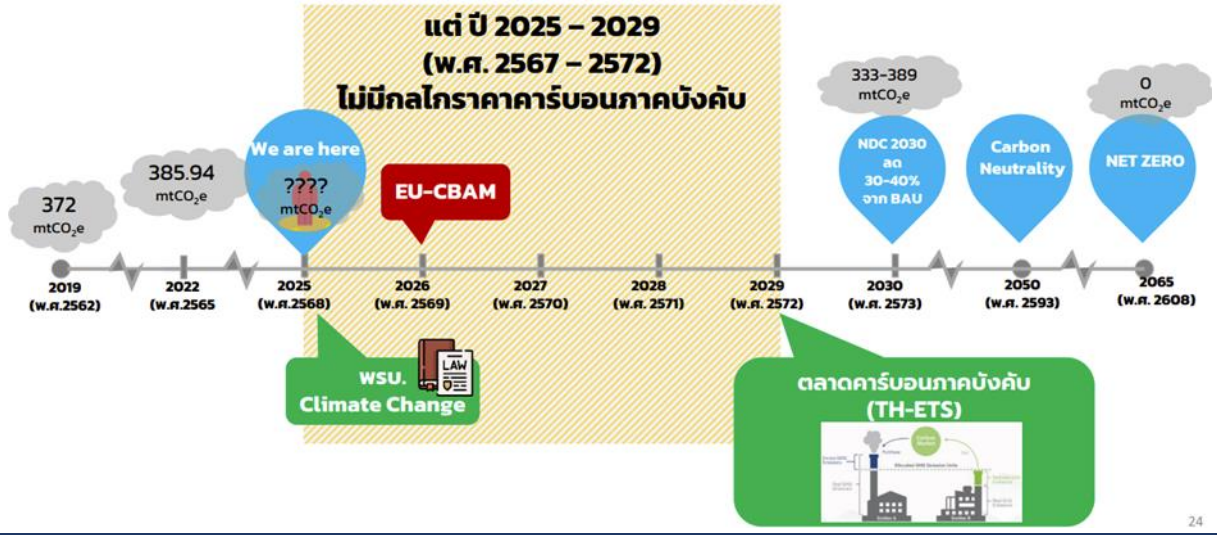
The proposed introductory carbon tax rate is THB200/tCO2eq (approximately USD6/tCO2eq). The government has indicated that this will not affect retail prices in the initial phase. However, it will provide businesses with a tangible cost signal for carbon emissions, encouraging them to accelerate mitigation and adaptation efforts.

Exhibit 31: Thailand's proposed carbon tax implementation roadmap

Phase	Timeline	Details	Estimated value (THB b)
Transition phase	Pilot period	A transition period to allow businesses to adjust and prepare corporate carbon footprint reports. A carbon tax of THB200/tCO2eq will apply initially to fuel and petroleum products. The impact on producers and consumers is expected to be minimal.	--
Phase 1	2026	Covers high GHG-emitting sectors and EU-CBAM target industries, including energy (power plants, refineries), transportation, utilities, and metals.	1,710 (10% of GDP)
Phase 2	2027-2028	Expands to additional EU-CBAM Phase 2 sectors, such as petroleum, petrochemicals, rubber, plastics, and paper.	1,770 (10% of GDP)
Phase 3	2029 onwards	Extends to other high-emission industries, including agriculture (livestock and large-scale crops), food and beverages, and electronics components, among others.	3,020 (17% of GDP

Sources: Kasikorn Research Center, TDRI, FSSIA's compilation

Exhibit 32: The Progress of Carbon Tax in Thailand



Source: Excise Department

According to the World Bank (2025), there are currently 80 jurisdictions worldwide implementing either a carbon tax and/or an Emission Trading Scheme (ETS)—an increase from 70 jurisdictions in 2024.These mechanisms now cover approximately 28% of global GHG emissions, up from 24% in 2024 and 15% in 2020, reflecting the growing effectiveness and adoption of carbon pricing as a global tool for achieving emission reduction targets.

As of 2025, the global average carbon price stands at approximately USD19/tCO2eq, which remains well below the level recommended by the International Monetary Fund (IMF)—estimated at USD40–80/tCO2eq.

According to the IMF, these benchmark price levels represent the minimum effective carbon tax rates required to achieve meaningful global emission reductions:

- Developed economies: should not fall below USD75/tCO2eq
- Emerging markets: should target at least USD50/tCO2eq
- Low-income countries: should aim for around USD25/tCO2eq

The World Bank's "State and Trends of Carbon Pricing" report further outlines more stringent thresholds for effective climate mitigation:

- To keep global temperature rises below 2°C, countries would need carbon prices in the range of USD63–127/tCO2eq.
- To limit warming to 1.5°C, the required range rises sharply to USD226–385/tCO2eq.

Currently, only around 20 countries, primarily in Europe, have achieved carbon prices (including carbon tax and ETS) exceeding USD40/tCO2eq, while just six countries maintain prices above USD100/tCO2eq. Such pricing levels not only drive significant GHG emission reductions, but also generate substantial fiscal revenues that can be reinvested into environmental and sustainability initiatives.

Thailand's initial carbon tax rate, proposed at USD6/tCO2eq, remains substantially lower than international benchmarks. However, this is viewed as an introductory phase, intended to allow businesses and consumers to gradually adapt to the cost of carbon.

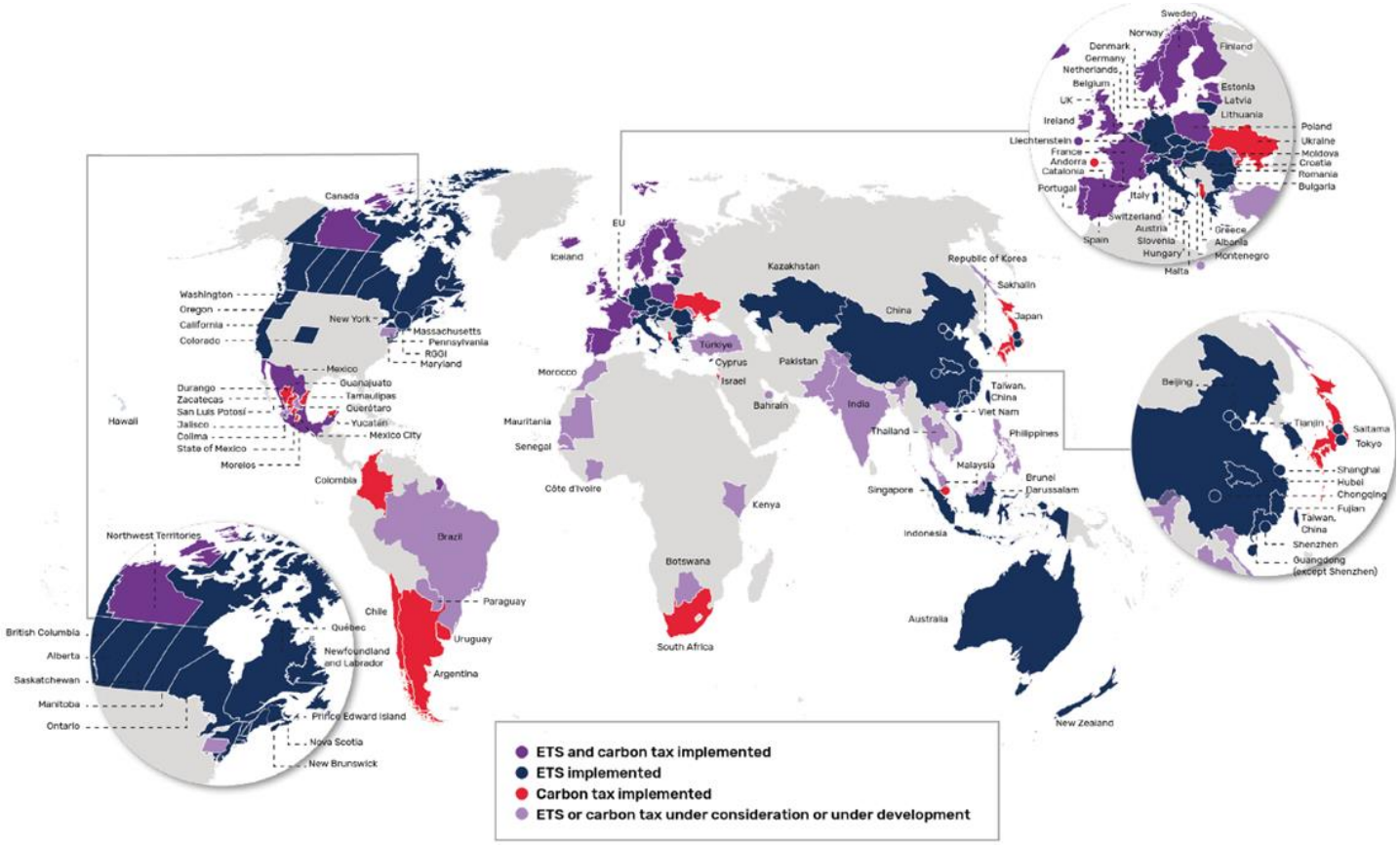
In the medium term, Thailand's carbon price is expected to gradually rise, aligning more closely with global standards as part of its long-term strategy to achieve its Net Zero 2065 target and to enhance competitiveness under international carbon border measures.

Exhibit 33: Carbon prices by country with a carbon tax or ETS system in 2024

Country / Type	Start year year	Carbon price (USD/tCO2eq)	Share of jurisdiction's GHG emissions covered (%)	Government revenue from carbon pricing (2024) (USD m)
Uruguay / Carbon tax	2022	158.8	5	302
Sweden / Carbon tax	1991	144.6	40	2,306
Liechtenstein / Carbon tax	2008	136.0	72	9
Switzerland / Carbon tax	2008	136.0	35	1,426
Norway / Carbon tax	1991	133.9	65	1,605
Denmark / Carbon tax	1992	108.4	64	503
Netherlands / Carbon tax	2021	94.8	45	NA
Portugal / Carbon tax	2015	72.7	40	1,270
EU ETS	2005	70.4	40	41,703
Ireland / Carbon tax	2010	68.5	34	1,111
Finland / Carbon tax	1990	66.9	45	1,375
Canada / ETS	2007	66.2	59	412
Switzerland / ETS	2008	64.7	13	50
Iceland / Carbon tax	2010	60.1	37	54
Luxembourg / Carbon tax	2021	58.5	72	303
UK / ETS	2021	57.2	27	3,250
Washington, US / ETS	2023	50.0	71	811
Austria / ETS	2022	48.5	36	1,264
Germany / ETS	2021	48.5	39	13,933
France Carbon tax	2014	48.1	41	7,844
Hungary / Carbon tax	2023	38.8	32	182
Slovenia / Carbon tax	2023	33.3	46	173
New Zealand / ETS	2008	32.0	44	293
California, US / ETS	2012	29.3	76	4,401
Estonia / Carbon tax	2000	27.0	10	2
Montenegro / ETS	2022	25.9	43	14
UK / Carbon tax	2013	23.2	12	872
Australia / ETS	2023	21.8	26	NA
Singapore / Carbon tax	2019	18.6	71	150
Latvia / Carbon tax	2004	16.2	2	8
Spain / Carbon tax	2014	16.2	2	118
Albania / Carbon tax	2010	13.7	73	NA
South Africa / Carbon tax	2019	12.8	82	92
China national / ETS	2021	11.8	51	NA
Massachusetts, US / ETS	2018	9.3	9	19
Colombia / Carbon tax	2017	6.5	20	133
South Korea / ETS	2015	6.5	79	134
Shenzhen, China / ETS	2013	6.5	37	NA
Argentina / Carbon tax	2018	5.3	38	225
Chile / Carbon tax	2017	5.0	55	140
Mexico / Carbon tax	2014	3.9	29	411
Japan / Carbon tax	2012	1.9	80	1,452
Israel / Carbon tax	2024	1.5	78	NA
Indonesia / ETS	2023	0.7	24	NA
Ukraine / Carbon tax	2011	0.7	32	80

Sources: World Bank; State and Trends of Carbon Pricing 2025

Exhibit 34: Global map of ETS and carbon taxes implemented, under development, or under consideration



Sources: World Bank; State and Trends of Carbon Pricing 2025

The ETS mechanism effectively drives GHG emission reductions

The Emission Trading System (ETS) is a cap-and-trade mechanism that enables entities to buy and sell GHG emission allowances within a regulated framework. Under this system, the government sets an emission cap—the maximum level of GHG emissions permitted nationally or by sector—and allocates emission allowances to organizations.

Companies that emit below their allocated cap can sell surplus allowances in the market to generate additional income, while those that exceed their limits must purchase extra allowances, thereby increasing their operational costs.

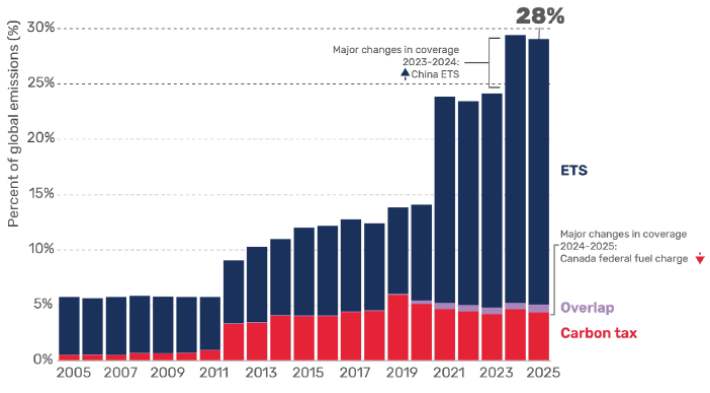
This mechanism allows governments to control total GHG emissions through cap-setting, while the carbon price—determined by supply and demand in the allowance market—creates a financial incentive for companies to reduce emissions. The ETS is therefore often used in conjunction with a carbon tax: the tax stabilizes carbon prices, while the ETS directly limits emission volumes, together achieving cost-efficient decarbonization across the economy.

Exhibit 35: Comparison between Carbon Tax and ETS

	Carbon Tax	ETS
Mechanism	The government sets a tax rate per tonne of CO2 emitted. Producers pay according to their emissions.	The government sets a total emission cap and distributes or auctions emission permits. Companies can buy or sell permits in the market.
Carbon price	The price is fixed price by the government.	The price fluctuates based on market forces of supply and demand for emission allowances.
Emission control	It cannot be controlled as long as producers are willing to pay the taxes imposed by the government.	It can be controlled because a maximum cap on GHG emission has been set.
Implementation Complexity	Simple mechanism based on tax collection.	It is complex, as it requires the establishment of new infrastructure and the development of an ETS system the is transparent and subject to strict supervision.
Flexibility for businesses	Less flexible – producers cannot trade to offset emissions.	More flexible – companies can trade allowances to reduce compliance costs.

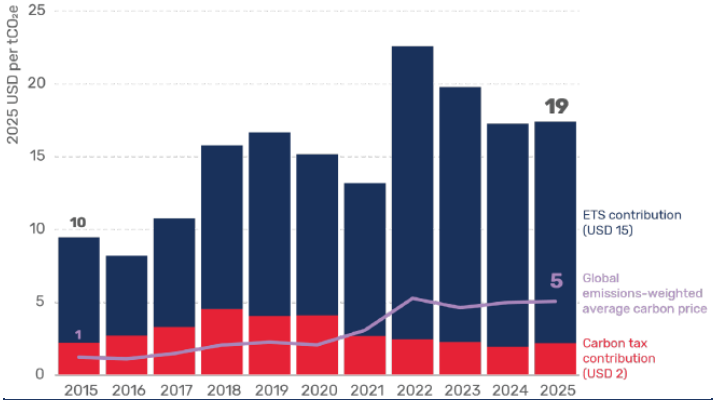
Sources: TGO, TDRI, UN, FSSIA's compilation

Exhibit 36: Share of global GHG emissions covered by an ETS or carbon tax, 2005-2025



Sources: World Bank; State and Trends of Carbon Pricing 2025

Exhibit 37: Emissions-weighted average carbon prices for covered emissions and global emissions, 2015-2025



Sources: World Bank; State and Trends of Carbon Pricing 2025

The European Union Emission Trading System (EU-ETS), launched in 2005, was the world's first and largest carbon trading market, currently covering around 40% of the EU's total GHG emissions. It remains the most revenue-generating carbon market among more than 80 systems worldwide, contributing approximately USD41.7b in government revenues in 2024.

Now in its Phase 4 (2021–2030), the EU-ETS has evolved into a mature and continuously tightening framework that has driven both higher carbon prices and stronger decarbonization compliance across industries.

Thailand is currently developing its own Thailand Emission Trading System (TH-ETS), with implementation targeted for 2029. During this transition period, the government is requiring high-emission industries to compile and report GHG emission data to ensure readiness once the system becomes mandatory.

It is expected that ETS prices will take several years to rise meaningfully, following trends observed in the EU-ETS and China's national carbon market, where carbon prices began to increase notably from the third year of operation or during Phase II, as regulatory coverage expanded and compliance tightened.

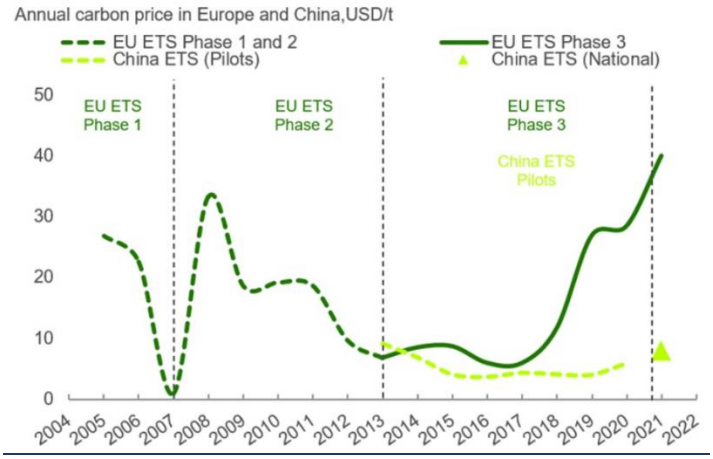
Early movers—companies that proactively reduce emissions and adapt ahead of regulations—are likely to benefit financially from future carbon price appreciation, as they can monetize surplus credits or reduce exposure to rising compliance costs. Conversely, as more firms improve their carbon efficiency and aggregate emissions decline, carbon prices may temporarily stabilize or fall, before potentially rising again if emission reduction progress slows and regulatory stringency increases, through broader sectoral coverage and higher non-compliance penalties.

Exhibit 38: Details of EU ETS phases

Phase	Details	Sectors/products
Phase 1 (2005-2007)	▪ Covered only CO2 emissions from power generators and energy-intensive industries ▪ Almost all allowances were given to business for free ▪ The penalty for non-compliance was EUR40/tCO2eq	Electricity and heat generation Energy-intensive industry sectors, including oil refineries, steel works and the production of iron, aluminum, metals, cement, glass, ceramics, pulp, paper, acids and bulk organic chemicals. Aviation Maritime activities
Phase 2 (2008-2012)	▪ Lower cap on allowances around 6.5% lower compared to 2005 ▪ Inclusion of gases like nitrous oxide ▪ Around 10% of EU allowances are auctioned ▪ The non-compliance penalty increased to EUR100/tCO2eq	
Phase 3 (2013-2020)	▪ A union-wide cap was established, changing from the system of the sum of national caps ▪ Auctioning as the main source of allowance allocation in the primary market ▪ Included more sector and gases ▪ Starting in 2020, credits obtained from the voluntary carbon markets could no longer be used for compliance under the EU ETS	
Phase 4 (2021-2030)	▪ Introduction of CBAM ▪ Phasing out free allowances and accelerating the rate of decline in the emission cap	

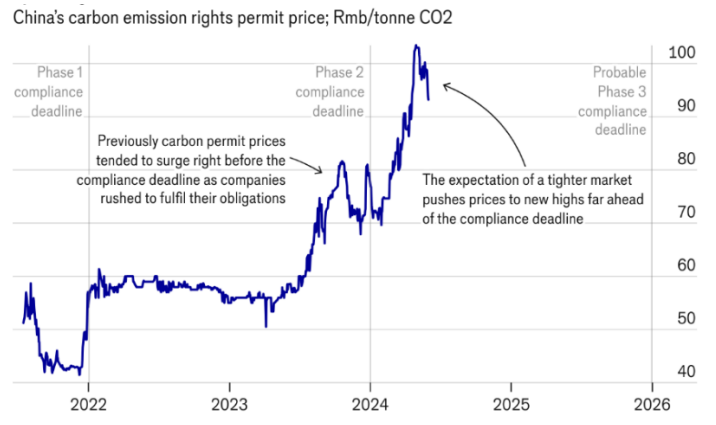
Sources: European Commission, FSSIA's compilation

Exhibit 39: EU carbon price for CO2 more than five times China carbon price



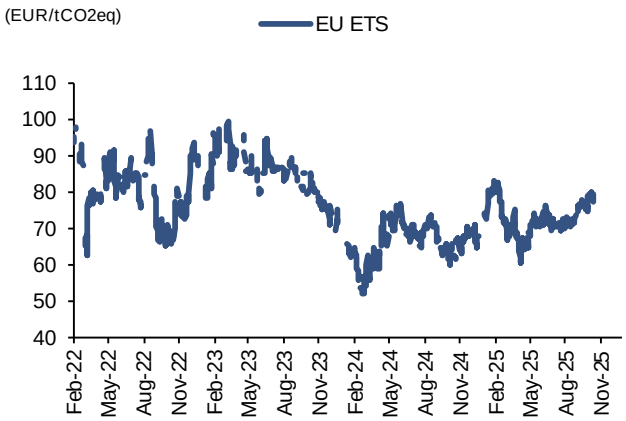
Sources: CRU Group website

Exhibit 40: China's carbon prices set a new record as rules are set to tighten



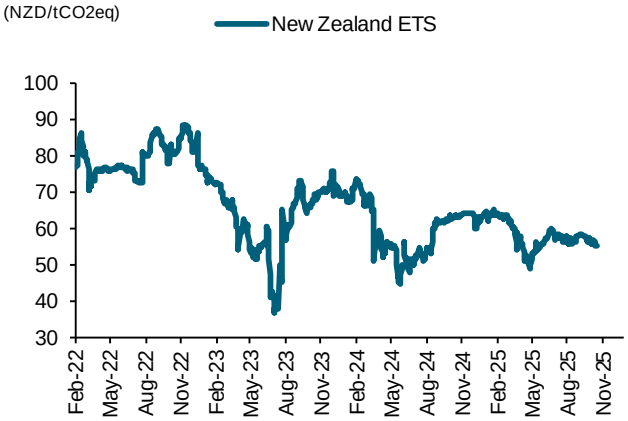
Sources: Economist Intelligence (Shanghai Environment and Energy)

Exhibit 41: EU ETS prices



Sources: Bloomberg, FSSIA's compilation

Exhibit 42: New Zealand ETS Prices



Sources: Bloomberg, FSSIA's compilation

FSSIA provides a rough estimate of the carbon tax impact on six high-GHG-emitting industries

Given the currently limited data, we are unable to precisely assess the potential impact of the carbon tax or ETS on each listed company. However, FSSIA has conducted a preliminary assessment across six industries with high levels of GHG emissions, which are expected to be included in the first phase of carbon tax implementation. These industries include energy and power (56 companies), petrochemicals (12), cement (8), steel (22), transportation (6), and airlines (4) — totaling 108 companies (excluding those under SP, NP, or NC trading suspensions).

Based on FSSIA's sensitivity analysis, assuming a carbon tax rate of THB200/tCO2eq, applied to each company's reported GHG emissions for 2024 while keeping other factors constant, we estimate that the carbon tax burden could reduce 2024 net profit by approximately 49.8%. The details by industry are as follows:

Exhibit 43: Estimated impact of carbon tax on 2024 net profit of six key industries

Sector	Number of companies	Impact on 2024 net profit (%)	Number of companies without GHG disclosure (2022-24)	Details
Energy and Power	56	30.9	8 (14.3%)	Earnings could decline by around 30.9%, with four companies potentially facing carbon tax burdens exceeding their annual profits. Loss-making firms may also be more vulnerable. In addition, eight companies, representing 14.3% of the 56 analyzed, have not disclosed GHG emissions data over the past three years (2022–2024).
Petrochemicals	12	NA	3 (25.0%)	We found that the 2024 earnings of the 12 companies analyzed may not be sufficient to absorb the carbon tax burden. Excluding losses from IVL and PTTGC, the remaining 10 companies would experience an average earnings impact of around 2.4%. However, reported GHG emissions from these firms appear relatively low, while their performance remains volatile, tracking petrochemical price movements.
Cement	8	75.9 (33.6% based on SCC's 2025 earnings)	4 (50.0%)	Based on 2024 earnings, the group's profit impact appears high, mainly due to SCC's weak performance. Using SCC's 2025 net profit forecast of THB24.2bn (FSSIA estimates), the impact on SCC would decrease to 29.8%, reducing the overall impact on the cement industry's earnings to around 33.6%. Among the eight companies analyzed, only four (SCC, TPIPL, SCCC, and Q-CON), or roughly 50%, have consistently reported GHG emissions data over the past three years.
Steel	22	NA	10 (45.5%)	This industry remains a concern, with potentially high exposure to carbon taxation given its volatile performance. Our 2024 sensitivity analysis of 22 companies indicates that 15 reported losses, while only seven were profitable — and just three had earnings sufficient to cover the carbon tax. In addition, around 10 companies, or 45.5%, have not disclosed GHG emissions data over the past three years. Investors should remain cautious and continue to monitor this sector closely.
Transport	6	2.1	0	We analyzed six listed companies, including cargo shipping and electric train operators, all of which disclosed GHG emissions data. The estimated carbon tax would account for only about 2.1% of their combined 2024 net profit.
Airline	4	NA (76.8% based on THAI's 2025 earnings)	0	Earnings are expected to be heavily affected, mainly by AOT and THAI, which posted a loss in 2024. Using THAI's 2025 net profit forecast of THB34bn (FSSIA estimates), the group's overall impact would be about 76.8% of earnings. Excluding AOT, the carbon tax impact on the three airlines would be around 4.1% of profit.

Sources: Company data, SET, FSSIA estimates

Summary

Under our relatively aggressive assessment, assuming a carbon tax rate of THB200/tCO2eq for six high-emission industries, we found that the steel and petrochemical sectors carry the highest risk, followed by cement and energy & electricity. Within the airline sector, AOT appears most exposed to the carbon tax.

In terms of GHG disclosure risk, the steel and cement industries have the highest proportion of companies that have not yet reported their emissions data.

However, the actual carbon tax impact could be lower than our estimates due to several variable factors. Four key factors that could materially affect the carbon tax burden include:

1) **Emission allowance allocation** – Our sensitivity analysis did not include the carbon emission quotas that each company may receive, which will be finalized after the Climate Change Act takes effect.
2) **GHG reduction initiatives** – All 108 companies in our study have begun implementing carbon reduction measures in their operations.
3) **Carbon credit transactions** – 29 of the 108 companies (26.9%) have already participated in carbon credit activities, either generating revenue from selling credits or purchasing them to offset emissions.
4) **Company adaptation** – Improvements in production efficiency, faster-than-expected business growth, or the ability to pass on carbon costs to consumers could all help mitigate the eventual tax impact.

Exhibit 44: Energy and Power – earnings impact under a THB200/tCO2eq carbon tax, based on 2024 data

	GHG Emission			Net profit	Carbon tax burden (excluding emission allowances)	Impact on net profit	Set guidelines for GHG emissions reduction	Applied for carbon credit certification
	2022	2023	2024	2024				
	(tCO2eq)	(tCO2eq)	(tCO2eq)	(THB m)	(THB m)	(%)	(Yes/No)	(Yes/No)
PTG	20,377,468	15,376,312	15,524,991	1,022	3,105	303.9	Yes	Yes
BPP	3,570,856	22,151,602	23,298,677	1,746	4,660	266.8	Yes	No
TAE	148,452	153,080	257,665	22	52	229.5	Yes	No
OR	65,704,660	66,390,923	87,204,188	7,650	17,441	228.0	Yes	Yes
BGRIM	6,492,634	6,426,362	6,952,018	1,557	1,390	89.3	Yes	Yes
GPSC	12,705,766	6,720,415	14,037,281	4,062	2,807	69.1	Yes	Yes
EGCO	6,194,549	17,060,803	15,779,451	5,411	3,156	58.3	Yes	No
BCP	4,058,038	5,379,676	5,596,260	2,184	1,119	51.2	Yes	Yes
BBGI	341,583	334,236	485,787	215	97	45.2	Yes	Yes
ETC		204,367	203,371	93	41	43.6	Yes	No
WHAUP	12,439	2,175,897	2,170,532	1,119	434	38.8	Yes	Yes
EASTW	62,196	86,008	75,246	47	15	32.3	Yes	No
AIE	192,275	371,824	293,675	242	59	24.3	Yes	No
RATCH	11,660,258	6,561,776	7,104,501	6,127	1,421	23.2	Yes	Yes
PTT	80,621,494	83,689,618	82,606,451	90,072	16,521	18.3	Yes	Yes
GULF	8,791,140	14,624,745	17,102,847	21,383	3,421	16.0	Yes	Yes
CKP	840,143	841,368	903,062	1,345	181	13.4	Yes	No
UBE	124,327,584	110,717,199	160,869	253	32	12.7	Yes	No
TPIPP	2,598,274	1,858,850	2,068,071	3,302	414	12.5	Yes	Yes
SPRC	1,320,362	1,195,721	1,293,665	2,235	259	11.6	Yes	No
TOP	3,264,005	3,384,406	3,478,038	9,959	696	7.0	Yes	Yes
SUPER	156,562	190,066	187,609	1,363	38	2.8	Yes	No
PTTEP	5,743,401	6,813,154	6,669,308	78,824	1,334	1.7	Yes	Yes
LANNA	82,074	84,944	112,511	1,664	23	1.4	Yes	No
BAFS	5,194	6,326	6,777	103	1	1.3	Yes	Yes
SEAOIL		37,017	14,326	357	3	0.8	Yes	No
TTW	83,064	92,785	101,602	2,791	20	0.7	Yes	No
WP	1,740	1,928	4,416	144	1	0.6	Yes	No
SGP (CF)	33,699	31,564	29,187	1,319	6	0.4	Yes	No
AI			7,221	385	1	0.4	Yes	No
SUSCO	1,520	8,590	5,298	292	1	0.4	Yes	No
GUNKUL	5,445	13,634	28,741	1,661	6	0.3	Yes	No
SSP	377	6,559	6,925	754	1	0.2	Yes	Yes
BCPG	1,825	1,770	2,697	1,819	1	NA	Yes	Yes
SCN	1,987	2,783	2,973	(217)	1	NA	Yes	Yes
EA	314,698	198,101	144,612	(4,630)	29	NA	Yes	Yes
IRPC	3,689,000	3,600,000	3,725,383	(5,193)	745	NA	Yes	Yes
SCG	673,739	839,557	454,122	(242)	91	NA	Yes	No
BSRC	1,066,499	969,500	26,138,310	(1,689)	5,228	NA	Yes	No
BANPU	60,583,180	56,611,785	45,357,675	(682)	9,072	NA	Yes	Yes
NOVA	6		20	247	NA	NA	Yes	No
ACC				(85)	NA	NA	Yes	No
ACE				839	NA	NA	Yes	No
AE (CB)				(162)	NA	NA	Yes	No
AGE		5,472		(221)	NA	NA	Yes	No
BIOTEC				(82)	NA	NA	Yes	No
EP				(825)	NA	NA	Yes	No
GREEN				6	NA	NA	Yes	Yes
MDX		7,059		230	NA	NA	Yes	No
PRIME	221	461		(190)	NA	NA	Yes	No
RPC		857,843		(72)	NA	NA	Yes	No
SKE				(39)	NA	NA	Yes	No
SPCG		919		683	NA	NA	Yes	Yes
TCC				16	NA	NA	Yes	No
TSE			265	(501)	NA	NA	Yes	No
Total	**425,751,325**	**436,139,663**	**369,648,333**	**238,965**	**73,930**	**30.9**		

Sources: Company data, SET, TGO, FSSIA estimates

Exhibit 45: Petrochemical and Cement – earnings impact under a THB200/tCO2eq carbon tax, based on 2024 data

	GHG Emission			Net profit	Carbon tax burden (excluding emission allowances)	Impact on net profit	Set guidelines for GHG emissions reduction	Applied for carbon credit certification
	2022	2023	2024	2024				
	(tCO2eq)	(tCO2eq)	(tCO2eq)	(THB m)	(THB m)	(%)	(Yes/No)	(Yes/No)
Petrochemical								
SUTHA	434,678	350,590	377,136	62	75.4	121.6	Yes	Yes
PATO	10,797	12,467	11,658	86	2.3	2.7	Yes	No
UAC		76,506	9,685	169	1.9	1.6	Yes	No
UP	403	436	623	50	0.1	0.3	Yes	No
GC		1,792	1,939	191	0.4	0.2	Yes	No
GGC	633,933	672,610	96,257	(265)	19.2	NA	Yes	No
IVL	42,588,484	39,105,035	9,812,611	(19,262)	1,962.5	NA	Yes	No
PTTGC	43,537,780	49,442,635	49,570,000	(29,811)	9,914.0	NA	Yes	No
TPA	4,605	50,329	NA	(23)	NA	NA	Yes	No
BCT				3,547	NA	NA	Yes	No
CMAN				252	NA	NA	Yes	No
PMTA				151	NA	NA	Yes	No
Total	**87,210,680**	**89,712,400**	**59,879,909**	**(44,854)**	**11,975.9**	**NA**		
Total (excl. IVL, PTTCG)	**1,084,416**	**1,164,730**	**497,298**	**4,219**	**99.5**	**2.4**		
Cement								
SCC (2024)	40,131,192	37,690,119	36,174,815	6,342	7,234.9	114.1	Yes	Yes
TPIPL	9,522,849	8,638,405	7,420,182	1,442	1,484.0	102.9	Yes	Yes
SCCC	11,166,527	10,218,017	10,275,119	5,388	2,055.0	38.1	Yes	No
Q-CON	272,297	283,222	201,370	504	40.3	8.0	Yes	No
CCP	4,227			87	NA	NA	Yes	No
DCON				59	NA	NA	Yes	No
SCP				304	NA	NA	Yes	No
STECH				117	NA	NA	Yes	No
Total	**61,097,092**	**56,829,762**	**54,071,486**	**14,243**	**10,814.3**	**75.9**		
SCC (2025E)	40,131,192	37,690,119	36,174,815	24,237	7,234.9	29.8	Yes	Yes
Total	**61,097,092**	**56,829,762**	**54,071,486**	**32,138**	**10,814.3**	**33.6**		

Sources: Company data, SET, TGO, FSSIA estimates

Exhibit 46: Steel – earnings impact under a THB200/tCO2eq carbon tax, based on 2024 data

	GHG Emission			Net profit	Carbon tax burden (excluding emission allowances)	Impact on net profit	Set guidelines for GHG emissions reduction	Applied for carbon credit certification
	2022 (tCO2eq)	2023 (tCO2eq)	2024 (tCO2eq)	2024 (THB m)	(THB m)	(%)	(Yes/No)	(Yes/No)
Steel								
INOX	29,191,012	22,847,783	25,936,606	351	5,187.3	1,478.6	Yes	No
AMC	282,515	3,910	488,960	71	97.8	137.3	Yes	No
2S		4,594	4,510	24	0.9	3.8	Yes	No
SSSC	2,677	2,617	2,552	204	0.5	0.3	Yes	No
LHK	840	728	1,140	103	0.2	0.2	Yes	No
BSBM		8,068	5,695	(146)	1.1	NA	Yes	No
PAP	12,619	13,098	11,797	(204)	2.3	NA	Yes	No
TYCN	592,750	419,061	282,013	(283)	56.4	NA	Yes	No
TWP		112,519	131,648	(75)	26.3	NA	Yes	No
TMT	1,046,140	1,210,594	1,030,865	(42)	206.2	NA	Yes	No
MILL (CB CS)	253,457	155,180		(6,027)	NA	NA	Yes	No
CEN				(22)	NA	NA	Yes	No
CITY (CB)				(27)	NA	NA	Yes	No
CSP				(107)	NA	NA	Yes	No
GJS (CB)				(1,019)	NA	NA	Yes	No
MCS				679	NA	NA	Yes	No
PERM (CB)				(311)	NA	NA	Yes	No
SAM (CS)				(110)	NA	NA	Yes	No
SMIT				146	NA	NA	Yes	No
TGPRO				(161)	NA	NA	Yes	No
THE				(81)	NA	NA	Yes	No
Total	**32,074,916**	**25,434,890**	**28,559,238**	**(6,659)**	**5,711.8**	**NA**		

Sources: Company data, SET, TGO, FSSIA estimates

Exhibit 47: Transport and Airline – earnings impact under a THB200/tCO2eq carbon tax, based on 2024 data

	GHG Emission			Net profit	Carbon tax burden (excluding emission allowances)	Impact on net profit	Set guidelines for GHG emissions reduction	Applied for carbon credit certification
	2022 (tCO2eq)	2023 (tCO2eq)	2024 (tCO2eq)	2024 (THB m)	(THB m)	(%)	(Yes/No)	(Yes/No)
Airlines								
AOT	227,289	287,779	226,744,921	19,964	45,349	227.2	Yes	No
AAV	806,643	1,742,409	2,146,704	3,478	429	12.3	Yes	No
BA	187,537	293,222	362,814	3,788	73	1.9	Yes	Yes
THAI (2024)	2,825,220	4,651,791	5,949,492	(26,934)	1,190	NA	Yes	No
Total	**4,046,688**	**6,975,201**	**235,203,931**	**296**	**47,041**	**NA**		
THAI (2025E)	2,825,220	4,651,791	5,949,492	34,255	1,190	3.5	Yes	No
Total	**4,046,688**	**6,975,201**	**235,203,931**	**61,484**	**47,041**	**76.5**		
Transport								
PSL	502,349	537,684	492,514	1,468	99	6.7	Yes	Yes
PRM	162,269	207,958	264,841	2,120	53	2.5	Yes	No
RCL	987,322	972,699	938,613	9,171	188	2.0	Yes	No
TTA	34,954	35,822	123,776	1,323	25	1.9	Yes	No
BTS	135,229	153,249	111,107	2,240	22	1.0	Yes	Yes
BEM	107,080	143,834	141,552	3,768	28	0.8	Yes	Yes
Total	**1,929,203**	**2,051,246**	**2,072,403**	**20,090**	**414**	**2.1**		

Sources: Company data, SET, TGO, FSSIA estimates

CBAM is a new trade challenge for Thai exporters

Europe has long been at the forefront of climate regulation and environmental policy development, and is recognized as the first region in the world to implement comprehensive legislation aimed at mitigating global warming. In recent years, the region has made notable progress in reducing GHG emissions, with several countries already achieving their interim reduction targets.

The cornerstone of this progress is the European Green Deal, launched in 2019, which set an ambitious goal to cut CO2 emissions by 55% by 2030 and achieve Net Zero by 2050. To support these objectives, the EU has introduced a series of policy frameworks and legislative measures, including:

1. Enhancing the Emission Trading System (ETS) – to strengthen the cap-and-trade mechanism for CO2 emissions.
2. Promoting green transportation across land, sea, and air sectors.
3. Implementing environmentally aligned taxation to encourage sustainable business practices.
4. Setting renewable energy targets to increase the share of clean energy in total consumption.
5. Establishing GHG absorption and carbon sink targets, particularly through forestry and land-use initiatives.
6. Launching CBAM to prevent carbon leakage from imports.

CBAM is a transformative policy within the EU's climate framework and will have a direct impact on non-EU exporters, including those from Thailand.

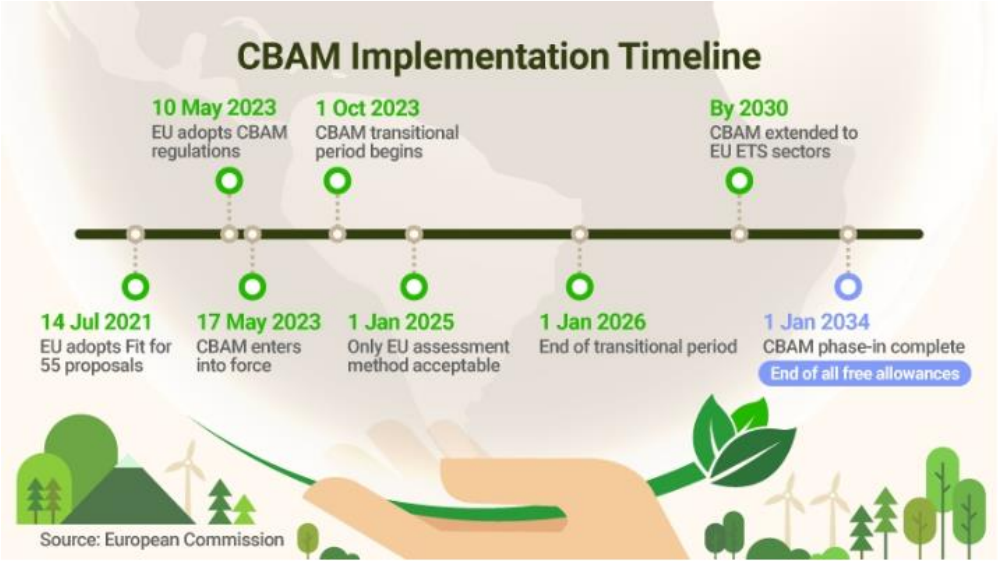
CBAM implementation is divided into two key phases:

1. Transitional Phase (1 October 2023 – 31 December 2025) - During this period, EU importers are required to report the GHG emissions embedded in the products they import. This reporting obligation extends upstream, requiring exporters—such as Thai manufacturers—to provide verified emissions data for their goods. The goal of this phase is to prepare both EU importers and foreign exporters for full compliance once the mechanism is fully enforced.
2. Full Implementation Phase (from 2026 onward) - Beginning in 2026, EU importers will be required not only to submit verified GHG emission reports for each product but also to purchase and surrender CBAM Certificates to cover the associated carbon costs.

The CBAM levy will not be a fixed rate; instead, it will be calculated dynamically according to the following formula; (Weight of goods) × (Embedded emissions) × (Weekly EU ETS carbon price).

Thai exporters that already pay domestic carbon taxes or participate in carbon pricing schemes in Thailand—under criteria recognized by the EU—will be eligible for deductions against their CBAM liabilities, helping to avoid double taxation.

Exhibit 48: EU's CBAM Implementation Timeline



Source: European Commission

Next in line: The U.S. plans to launch its CBAM

Similar to Europe, the United States has set ambitious climate goals—to reduce GHG emissions by 50–52% by 2030 and achieve net zero emissions by 2050. To support these objectives, the U.S. has proposed the Clean Competition Act (CCA), which establishes a domestic carbon pricing mechanism and a carbon border adjustment framework (US-CBAM) applicable to both domestically produced goods and imports.

The CCA covers 12 key industrial sectors, including fossil fuels, petroleum, petrochemicals, fertilizers, hydrogen, adipic acid, cement, iron and steel, aluminum, glass, paper, and ethanol.

Beginning in 2024, U.S. manufacturers in the designated industries whose GHG emissions exceed the industry average will be required to pay a carbon tax on the excess emissions at a rate of USD55/tCO2eq. This rate will subsequently increase each year based on the Consumer Price Index (CPI) plus an additional 5%.

For imported goods, the U.S. is expected to begin enforcing the US-CBAM between 2026 and 2027. The measure will apply to two main product categories:

1. Target industrial products – imports from the 12 specified sectors will be subject to the same carbon tax rate applied to equivalent domestic products.
2. Finished products containing target materials – manufactured goods that incorporate covered materials exceeding a certain weight threshold.

Between 2026 and 2027, the threshold is set at 500 pounds of target materials per product. From 2028 onward, the threshold will be tightened to 100 pounds.

Countries classified as Least Developed Countries (LDCs) under United Nations criteria will be exempted from the US-CBAM tax.

Exhibit 49: Comparison between the EU-CBAM and the US-CBAM

	EU-CBAM	US-CBAM
Transition phase	2023-25	NA
Year of Implementation	2026	2026 (expected)
Year of Full Enforcement	2034	NA
Product Category	Aluminum, Cement, Fertilizers, Iron and steel, Hydrogen, and Electricity. Currently, considering expansion into other product categories.	Fossil fuels, Petroleum, Petrochemicals, Fertilizers, Hydrogen, Adipic acid, Cement, Iron and steel, Aluminum, Glass, Paper, and Ethanol
Exemption	▪ Imported goods weigh no more than 50 tonnes ▪ Product used for military purpose ▪ Products covered under the EU ETS	▪ A weight limit of 500 pounds is specified for 2026-27 ▪ A weight limit adjusts to 100 pounds from 2028 onward ▪ Imported goods from countries that have an International Partnership Agreement or participates in Climate Clubs ▪ Imported goods from countries with FTA with the U.S., whose carbon intensity is less than 50% higher than the U.S. industry average ▪ Countries classified as Least Developed Countries (LDCs)
The calculation method	(Weight of goods) x (Embedded Emissions) x (Weekly EU ETS price)	(Carbon intensity of product-carbon intensity benchmark) x (Weight of goods) x (Carbon price)
Suggests Rate	No fixed rate; depends on the Weekly EU ETS price (As of October 2025, the price was EUR77-78)	USD55/tCO2eq
Annual adjustment		Tax rate would likely increase based on CPI plus the rate of 5%

Sources: Climate Change Institute, The Federation of Thai Industries. FSSIA's compilation

Thai exporters begin their carbon footprint journey

Over the next one to two years, the two key carbon border adjustment mechanisms (CBAMs) that Thai exporters should monitor closely are the EU-CBAM and US-CBAM, given their significance as Thailand's major export destinations.

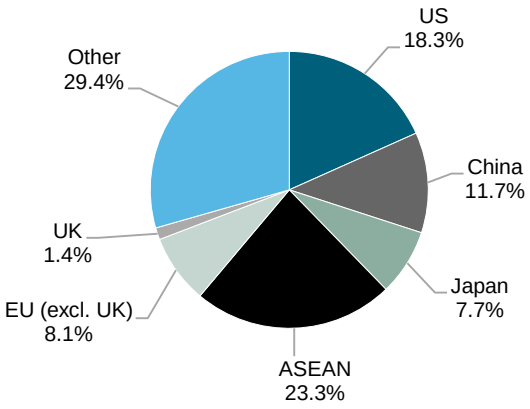
In 2024, Thailand's exports to the United States and the European Union were valued at USD54.95b and USD28.40b, respectively—accounting for 18.3% and 9.5% of Thailand's total exports. These markets represent Thailand's first and third-largest export destinations, with China ranking second.

By product category, Thailand's key exports to the U.S. and EU include computers and components, jewelry and accessories, rubber products, electronic parts, automobiles and automotive components, air conditioners and parts, processed food, pet food, and textiles. Most of these products fall within carbon-intensive sectors, which are expected to be among the first groups subject to carbon border taxation.

According to estimates by the Kasikorn Research Center, if Thailand fails to accelerate its GHG emission reduction efforts, the country could face an export cost impact of approximately THB28b by 2030 as a result of the EU-CBAM. This estimate includes the initial six target industries and an additional eight sectors expected to be added under the expanded coverage. The combined impact would represent about 3–4% of Thailand's total exports to the EU.

Moreover, Thai exporters whose GHG emission intensity exceeds EU benchmarks could face penalties of up to 50% of their export value, significantly increasing compliance and operational costs for affected industries.

Exhibit 50: Thailand's export value breakdown by country in 2024



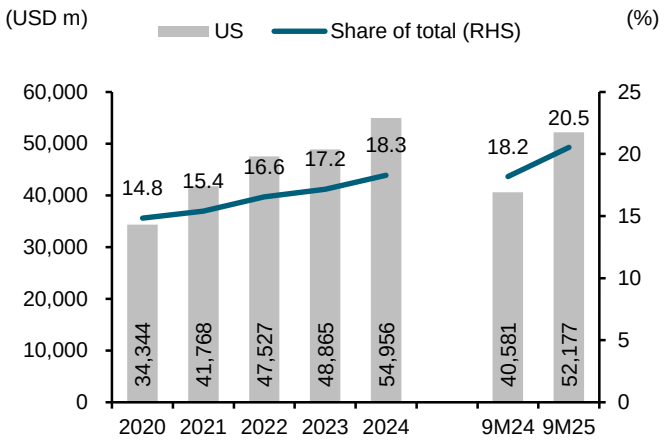
Sources: Tradereport.moc.go.th, FSSIA's compilation

Exhibit 51: Thailand's top 20 export products in 2024

Export products	Value (USD m)	Share of total (%)
1.Automobiles, equipment, and parts	31,041	10.3
2.Computers, equipment, and parts	24,610	8.2
3.Gems and jewelry	18,425	6.1
4.Rubber products	14,239	4.7
5.Machinery and parts	10,316	3.4
6.Refined petroleum	9,195	3.1
7.Plastic pellets	8,794	2.9
8.Electronic integrated circuits	8,687	2.9
9.Chemicals	8,422	2.8
10.Telephones, fax machines, and parts	7,962	2.6
11.Air conditioners and parts	6,888	2.3
12.Iron, steel, and products thereof	6,635	2.2
13.Fresh, chilled, frozen, and dried fruits	6,510	2.2
14.Rice	6,433	2.1
15.Electrical appliances and other parts	5,506	1.8
16.Natural rubber	4,992	1.7
17.Electric transformers and parts	4,851	1.6
18.Plastic products	4,506	1.5
19.Copper and copper products	3,870	1.3
20.Canned and processed seafood	3,845	1.3

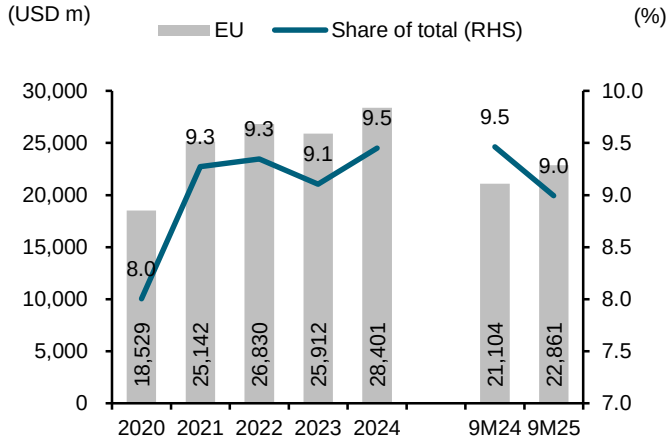
Sources: Tradereport.moc.go.th, FSSIA's compilation

Exhibit 52: Thailand's export value to the U.S. market



Sources: Tradereport.moc.go.th, FSSIA's compilation

Exhibit 53: Thailand's export value to the EU market



Sources: Tradereport.moc.go.th, FSSIA's compilation

Exhibit 54: Thailand's top 20 export products to the U.S. market in 2024

Export products	Value (USD m)	Share of total (%)
1.Computers, equipment, and parts	10,567	19.2
2.Telephones, fax machines, and parts	4,657	8.5
3.Rubber products	4,501	8.2
4.Semiconductors, transistors, and diodes	2,483	4.5
5.Electric transformers and parts	2,096	3.8
6.Machinery and parts	2,043	3.7
7.Gems and jewelry	1,974	3.6
8.Automobiles, equipment, and parts	1,893	3.4
9.Electrical appliances and other parts	1,777	3.2
10.Air conditioners and parts	1,282	2.3
11.Iron, steel, and products thereof	1,207	2.2
12.Plastic products	1,071	1.9
13.Switch panel and electrical control panel	912	1.7
14.Canned and processed seafood	911	1.7
15.Other industrial products	900	1.6
16.Radio and television receivers and parts	895	1.6
17.Pet foods	873	1.6
18.Apparel	848	1.5
19.Rice	801	1.5
20.Refrigerators, freezers, and parts	745	1.4

Sources: Tradereport.moc.go.th, FSSIA's compilation

Exhibit 55: Thailand's top 20 export products to the EU market in 2024

Export products	Value (USD m)	Share of total (%)
1.Computers, equipment, and parts	31,041	10.3
2.Gems and jewelry	24,610	8.2
3.Automobiles, equipment, and parts	18,425	6.1
4.Air conditioners and parts	14,239	4.7
5.Rubber products	10,316	3.4
6.Machinery and parts	9,195	3.1
7.Processed chicken	8,794	2.9
8.Electric transformers and parts	8,687	2.9
9.Motorcycles and parts	8,422	2.8
10.Electronics PCB	7,962	2.6
11.Telephones, fax machines, and parts	6,888	2.3
12.Other industrial products	6,635	2.2
13.Electrical appliances and other parts	6,510	2.2
14.Natural rubber	6,433	2.1
15.Lenses	5,506	1.8
16.Iron, steel, and products thereof	4,992	1.7
17.Switch panel and electrical control panel	4,851	1.6
18.Pet foods	4,506	1.5
19.Radio and television receivers and parts	3,870	1.3
20.Apparel	3,845	1.3

Sources: Tradereport.moc.go.th, FSSIA's compilation

To avoid trade barriers with major markets, Thai exporters should ensure that their emissions data and disclosures align with internationally recognized standards accepted by the EU and the US. Products manufactured through high GHG-emission processes in countries with low or no carbon pricing mechanisms will face higher import costs under CBAM rules. As a result, EU and US importers may shift their sourcing toward countries with more robust carbon pricing systems, which could ultimately lead Thai exporters to lose market share in these regions.

FSSIA conducted an analysis of 58 listed companies with revenue exposure or export operations to the EU and US, covering 10 key industries: agriculture and food, electronic components, automotive, hotels, energy and petrochemicals, industrial products, packaging, steel, jewelry, and apparel.
The objective of this study is to provide a preliminary screening tool for investors, focusing on whether these companies have disclosed their GHG emissions across all three scopes (1, 2, and 3)—a critical step in preparing for the upcoming EU-CBAM and US-CBAM regulations.

Data for this analysis were collected from One Reports, ESG Structured Data Reports, the SET website (SET.or.th), company websites, and direct communication with investor relations departments.

The findings show that, as of 2024, only five companies (8.6% of the total sample) had not yet disclosed their GHG emissions data. Most of these firms reported that they are in the process of assessment and report preparation, with completion expected by 2025–2026. In addition, four companies have already disclosed Scope 1–2 emissions and are currently assessing Scope 3 data for future inclusion.

Industries with the highest proportion of export revenue to the EU and US are agriculture and food, and electronic components, while industrial products and packaging have the highest exposure to the US. These four key sectors could be the most affected by EU and US CBAM measures. Meanwhile, some companies in the energy and power sector, such as BANPU, BPP, and IVL, also have significant revenue exposure to the US, primarily from domestic operations that must comply with local environmental regulations.

When considering GHG emissions intensity (emissions relative to total revenue), the steel, energy and power, and industrial products and packaging sectors have the highest ratios.

In summary, listed companies with export exposure to the EU and US have become increasingly aware of the potential impact of EU-CBAM and US-CBAM, as reflected by their greater efforts to disclose GHG emissions data and implement emission reduction initiatives. Once Thailand's carbon tax framework is finalized, it will allow for a clearer comparison of carbon tax differentials between Thailand and the EU or US, which will be essential for evaluating the potential impact of these CBAM mechanisms. Shareholders and investors should continue to monitor policy developments and the progress of GHG reduction initiatives among their target companies.

Exhibit 56: Listed companies with export revenue exposure to the EU and the U.S. and their GHG emissions assessment

	Revenue share 2024		GHG Emission			GHG Emission/Total revenue (THB1,000)			Note
	EU (%)	US (%)	2022 (tCO2eq)	2023 (tCO2eq)	2024 (tCO2eq)	2022 (tCO2eq)	2023 (tCO2eq)	2024 (tCO2eq)	
Agro - Food									
AAI	21.6	54.8	55,564	47,911	79,517	0.0077	0.0087	0.0114	
APURE	-	14.0	-	-	-	-	-	-	In progress
ASIAN	24.5	49.9	93,811	110,408	122,510	0.0083	0.0114	0.0112	
BTG	6.8	-	447,588	420,244	416,931	0.0040	0.0039	0.0036	No scope 3
CBG	0.9	-	197,878	416,058	118,861	0.0102	0.0218	0.0561	
CPF	13.5	5.4	5,897,114	12,931,539	1,521,299	0.0095	0.0219	0.0026	
COCOCO	14.3	23.7	-	-	-	-	-	-	In progress
FM	21.7	-	26,896	31,114	38,884	0.0046	0.0054	0.0053	No scope 3
GFPT	10.5	-	410,292	432,418	440,094	0.0221	0.0224	0.0224	
ITC	15.5	50.4	67,202	52,227	53,752	0.0030	0.0032	0.0029	
MALEE	NA	NA	17,447	56,877	24,176	0.0027	0.0072	0.0029	
STA	9.9	14.8	168,972	150,522	504,015	0.0015	0.0018	0.0044	
SAPPE	18.6	3.5	59,260	70,307	63,114	0.0121	0.0113	0.0090	
SUN	8.9	-	10,678	13,110	10,393	0.0036	0.0035	0.0029	No scope 3
TFG	8.4	-	1,691,922	1,691,922	NA	0.0321	0.0300	NA	
TKN	1.0	10.0	7,774	70,575	45,943	0.0018	0.0132	0.0080	
TU	30.0	38.0	4,031,433	4,599,711	3,157,796	0.0258	0.0334	0.0029	
TWPC	7.5	4.7	165,974	166,311	171,725	0.0159	0.0162	0.0169	
XO	78.8	4.7	3,293	4,187	7,426	0.0022	0.0017	0.0030	
Electronics									
DELTA	25.0	30.0	251,907	221,163	171,760	0.0021	0.0015	0.0010	
HANA	12.0	25.6	23,773	22,522	21,946	0.0009	0.0008	0.0009	
KCE	52.6	21.4	126,470	117,018	409,942	0.0067	0.0007	0.0270	
SVI	67.0	9.9	12,345	11,437	12,663	0.0004	0.0005	0.0006	
Automotive									
AH	18.0	<1	36,762	248,469	185,771	0.0013	0.0082	0.0069	
HFT	29.6	10.5	-	46,722	61,529	-	0.0175	0.0200	
SAT	-	<5	110,545	99,197	83,296	0.0122	0.0108	0.0110	
STANLY	<1	0.0	63,818	61,448	52,897	0.0043	0.0042	0.0042	
Hotel									
MINT	53.1	-	1,247,416	2,288,256	2,230,869	0.0100	0.0150	0.0135	
SHR	36.0	-	41,417	26,326	42,021	0.0047	0.0026	0.0040	
Energy & Petrochemical									
BANPU	NA	21.3	60,583,180	56,611,785	45,357,675	0.2201	0.3075	0.2438	
BCP	6.1	2.0	4,058,038	5,379,676	5,596,260	0.0129	0.0136	0.0094	
BPP	-	76.3	3,570,856	22,151,602	23,298,677	0.1405	0.7111	0.8719	
IVL	NA	30.6	42,588,484	39,105,035	9,812,611	0.0640	0.0714	0.0179	
PTTGC	5.0	4.0	43,537,780	49,442,635	49,570,000	0.0633	0.0782	0.0806	
SCC	<5	<5	40,131,192	37,690,119	36,174,815	0.0689	0.0713	0.0687	
UBE	NA	8.2	124,327,584	110,717,199	160,869	NA	NA	0.0246	
Industrial & Packaging									
AJ	NA	NA	-	599,999	520,276	-	0.0779	0.0653	
EPG	5.0	20.0	131,481	153,738	154,944	0.0108	0.0117	0.0112	
HTECH	-	20.7	2,692	2,650	2,942	0.0022	0.0025	0.0024	
PTL	22.0	39.0	86,250	86,006	86,500	0.0040	0.0032	0.0041	
SCGP	6.0	4.0	5,816,613	6,075,529	6,917,486	0.0395	0.0466	0.0517	
SPMC	8.0	48.0	19,893	19,111	24,057	0.0036	0.0048	0.0050	No scope 3
SNC	5.2	43.4	87,858	NA	15,664	0.0046	NA	0.0018	
STGT	17.6	20.2	1,037,278	1,328,600	601,792	0.0445	0.0676	0.0241	
TPBI	7.8	28.6	294,139	153,290	133,860	0.0430	0.0291	0.0236	
VARO	4.2	2.0	36,245	33,008	145,397	0.0096	0.0131	0.0480	
Steel									
INOX	3.9	5.1	29,191,012	22,847,783	25,936,606	1.2401	1.6205	1.7947	
TGPRO	2.9	13.8	-	-	-	-	-	-	In progress
TSTH	NA	NA	692,906	656,738	663,452	0.0225	0.0262	0.0262	
TYCN	26.7	NA	592,750	419,061	282,013	0.0629	0.0743	0.0660	
Jewelry									
PDJ	15.2	31.3	5,050	4,899	8,334	0.0014	0.0014	0.0021	
SAWANG	10.8	-	-	-	-	-	-	-	In progress
Apparel									
AFC	-	33.0	-	21,931	NA	0.0000	0.0287	NA	
CPH	31.2	66.1	-	5,551	NA	0.0000	0.0044	NA	
PG	-	31.6	1,008	1,155	NA	0.0014	0.0015	NA	
SABINA	5.0	<1	12,923	13,409	15,174	0.0041	0.0039	0.0042	
SUC	0.3	2.5	15,371	10,556	10,557	0.0015	0.0012	0.0010	
TTT	0.4	0.4	-	-	-	-	-	-	In progress

Sources: SET, company data (One Report, ESG Structured Data Report), FSSIA's compilation and interviews

FSSIA recommends investors monitor GHG emission of their target companies

Under the enforcement of Thailand's first Climate Change Act, significant structural changes are expected that should enhance the overall sustainability standards of Thai businesses. However, companies that fail to adapt in time could face substantial negative impacts. For investors, it is therefore important to closely monitor their target companies (both existing holdings and potential investments) using the following checklist:

Exhibit 57: Key checklists for investors to track target companies

	Checklists for investors
1	Has the company assessed its carbon footprint (Scope 1–3)?
2	Which industry does the company operate in, and how exposed is it to carbon taxation relative to other sectors?
3	Has the company set concrete, measurable GHG reduction targets, along with clear strategies to achieve them?
4	Track how much carbon emission allowance the company receives versus its current emissions level. 4.1) If emissions exceed the allowance, the company will incur carbon tax expenses or need to purchase additional credits to offset the excess. 4.2) If emissions are below the allowance, the company can generate income by selling surplus credits in the ETS market.
5	Assess opportunities to generate additional revenue from the carbon credit market, especially if the company implements government-certified environmental projects that help absorb or offset carbon emissions.
6	For companies with export exposure, particularly to the EU and US, which have begun implementing CBAM (Carbon Border Adjustment Mechanism) import taxes, evaluate which phase of CBAM they fall under and how significant the potential impact could be.

Source: FSSIA's compilation

From our study of six high-emission industries—energy and power, petrochemical, cement, steel, transport, and airlines—covering 108 companies, we found that the steel and petrochemical sectors carry the highest carbon tax risk if they cannot adapt quickly.

In assessing the potential impact of EU-CBAM and US-CBAM on 58 export-oriented companies across 10 industries, while a quantitative estimate cannot yet be made, our preliminary screening identified that only about five companies (8.6%) had not disclosed GHG emissions data in 2024. Most of these firms indicated they are currently preparing such reports for investor disclosure.

Combining both studies, covering a total of 166 companies, we found that 30 firms (18.1%) have not disclosed GHG emissions data during 2022–2024. This remains a key concern for investors, as once the Climate Change Act takes effect, GHG data disclosure will be essential for assessing potential carbon tax exposure, emission allowances, and opportunities for competitive advantage under the new regulatory framework.

Companies that adapt early—particularly those with complete carbon footprint assessments—could gain an edge, potentially enhancing business value and share price performance. Conversely, firms that are slow to adapt, especially those yet to assess their carbon footprint or with emissions exceeding allowances, may face earnings pressure, higher operating costs, and increased risk, particularly if they have export exposure to Europe or the US under CBAM regulations.

Disclaimer for ESG scoring

ESG score	Methodology	Rating
The Dow Jones Sustainability Indices (DJSI) By S&P Global	The DJSI World applies a transparent, rules-based component selection process based on the companies' Total Sustainability Scores resulting from the annual S&P Global Corporate Sustainability Assessment (CSA). Only the top-ranked companies within each industry are selected for inclusion.	Be a member and invited to the annual S&P Global Corporate Sustainability Assessment (CSA) for DJSI. Companies with an S&P Global ESG Score of less than 45% of the S&P Global ESG Score of the highest scoring company are disqualified. The constituents of the DJSI indices are selected from the Eligible Universe.
SET ESG Ratings List (SETESG) by The Stock Exchange of Thailand (SET)	SET ESG quantifies responsibility in Environmental and Social issues by managing business with transparency in Governance, updated annually. Candidates must pass the preemptive criteria, with two crucial conditions: 1) no irregular trading of the board members and executives; and 2) free float of >150 shareholders, and combined holding must be >15% of paid-up capital. Some key disqualifying criteria include: 1) CG score of below 70%; 2) independent directors and free float violation; 3) executives' wrongdoing related to CG, social & environmental impacts; 4) equity in negative territory; and 5) earnings in red for > 3 years in the last 5 years.	To be eligible for **SETESG inclusion**, verified data must be scored at a minimum of 50% for each indicator, unless the company is a part of DJSI during the assessment year. The scoring will be fairly weighted against the nature of the relevant industry and materiality. **SETESG Index** is extended from the SET ESG Ratings companies whose 1) market capitalization > THB5b (~USD150b); 2) free float >20%; and 3) liquidity >0.5% of paid-up capital for at least 9 out of 12 months. The SETTHSI Index is a market capitalisation-weighted index, cap 5% quarterly weight at maximum, and no cap for number of stocks.
CG Score by Thai Institute of Directors Association (Thai IOD)	An indicator of CG strength in sustainable development, measured annually by the Thai IOD, with support from the Stock Exchange of Thailand (SET). The results are from the perspective of a third party, not an evaluation of operations.	Scores are rated in six categories: 5 for Excellent (90-100), 4 for Very Good (80-89), 3 for Good (70-79), 2 for Fair (60-69), 1 for Pass (60-69), and not rated for scores below 50. Weightings include: 1) the rights; 2) and equitable treatment of shareholders (weight 25% combined); 3) the role of stakeholders (25%); 4) disclosure & transparency (15%); and 5) board responsibilities (35%).
AGM level By Thai Investors Association (TIA) with support from the SEC	It quantifies the extent to which shareholders' rights and equitable treatment are incorporated into business operations and information is transparent and sufficiently disclosed. All form important elements of two out of five the CG components to be evaluated annually. The assessment criteria cover AGM procedures before the meeting (45%), at the meeting date (45%), and after the meeting (10%). (*The first assesses 1) advance circulation of sufficient information for voting; and 2) facilitating how voting rights can be exercised. The second assesses 1) the ease of attending meetings; 2) transparency and verifiability; and 3) openness for Q&A. The third involves the meeting minutes that should contain discussion issues, resolutions and voting results.)*	The scores are classified into four categories: 5 for Excellent (100), 4 for Very Good (90-99), 3 for Fair (80-89), and not rated for scores below 79.
Thai CAC By Thai Private Sector Collective Action Against Corruption (CAC)	The core elements of the Checklist include corruption risk assessment, establishment of key controls, and the monitoring and developing of policies. The Certification is good for three years. *(Companies deciding to become a CAC certified member start by submitting a Declaration of Intent to kick off an 18-month deadline to submit the CAC Checklist for Certification, including risk assessment, in place of policy and control, training of managers and employees, establishment of whistleblowing channels, and communication of policies to all stakeholders.)*	The document will be reviewed by a committee of nine professionals. A passed Checklist will move for granting certification by the CAC Council approvals whose members are twelve highly respected individuals in professionalism and ethical achievements.
Morningstar Sustainalytics	The Sustainalytics' ESG risk rating provides an overall company score based on an assessment of how much of a company's exposure to ESG risk is unmanaged. *Sources to be reviewed include corporate publications and regulatory filings, news and other media, NGO reports/websites, multi-sector information, company feedback, ESG controversies, issuer feedback on draft ESG reports, and quality & peer reviews.*	A company's ESG risk rating score is the sum of unmanaged risk. The more risk is unmanaged, the higher ESG risk is scored. NEGL: 0-10 / Low: 10-20 / Medium: 20-30 / High: 30-40 / Severe: 40+
ESG Book	The ESG score identifies sustainable companies that are better positioned to outperform over the long term. The methodology considers the principle of financial materiality including information that significantly helps explain future risk-adjusted performance. Materiality is applied by over-weighting features with higher materiality and rebalancing these weights on a rolling quarterly basis.	The total ESG score is calculated as a weighted sum of the features scores using materiality-based weights. The score is scaled between 0 and 100 with higher scores indicating better performance.
MSCI	MSCI ESG ratings aim to measure a company's management of financially relevant ESG risks and opportunities. It uses a rules-based methodology to identify industry leaders and laggards according to their exposure to ESG risks and how well they manage those risks relative to peers. AAA 8.571-10.000 AA 7.143-8.570 A 5.714-7.142 BBB 4.286-5.713 BB 2.857-4.285 B 1.429-2.856 CCC 0.000-1.428	**Leader:** leading its industry in managing the most significant ESG risks and opportunities **Average:** a mixed or unexceptional track record of managing the most significant ESG risks and opportunities relative to industry peers **Laggard:** lagging its industry based on its high exposure and failure to manage significant ESG risks
Moody's ESG solutions	Moody's assesses the degree to which companies take into account ESG objectives in the definition and implementation of their strategy policies. It believes that a company integrating ESG factors into its business model and relatively outperforming its peers is better positioned to mitigate risks and create sustainable value for shareholders over the medium to long term.	
Refinitiv ESG rating	Designed to transparently and objectively measure a company's relative ESG performance, commitment and effectiveness across 10 main themes, based on publicly available and auditable data. The score ranges from 0 to 100 on relative ESG performance and insufficient degree of transparency in reporting material ESG data publicly. *(Score ratings are 0 to 25 = poor; >25 to 50 = satisfactory; >50 to 75 = good; and >75 to 100 = excellent.)*	
S&P Global	The S&P Global ESG Score is a relative score measuring a company's performance on and management of ESG risks, opportunities, and impacts compared to its peers within the same industry classification. The score ranges from 0 to 100.	
Bloomberg	ESG Score	Bloomberg score evaluating the company's aggregated Environmental, Social and Governance (ESG) performance. The score is based on Bloomberg's view of ESG financial materiality. The score is a weighted generalized mean (power mean) of Pillar Scores, where the weights are determined by the pillar priority ranking. Values range from 0 to 10; 10 is the best.
Bloomberg	ESG Disclosure Score	Disclosure of a company's ESG used for Bloomberg ESG score. The score ranges from 0 for none to 100 for disclosure of every data point, measuring the amount of ESG data reported publicly, and not the performance on any data point.

Rating regarding the sustainable development of Thai listed companies, both on the SET and MAI, are publicly available on the website of the Securities and Exchange Commission of Thailand (SEC). Currently, ratings available are 1) "**CG Score**"; 2) "**AGM Level**"; 3) "**Thai CAC**"; and 4) ""**SETESG**" The ratings are updated on an annual basis. FSSIA does not confirm nor certify the accuracy of such ratings.

Source: FSSIA's compilation

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 Investment in securities has risks. Investors are advised to consider carefully before making investment decisions.

Additional Disclosures

Target price history, stock price charts, valuation and risk details, and equity rating histories applicable to each company rated in this report is available in our most recently published reports. You can contact the analyst named on the front of this note or your representative at Finansia Syrus Securities Public Company Limited.

All share prices are as at market close on, unless otherwise stated.

RECOMMENDATION STRUCTURE

Stock ratings

Stock ratings are based on absolute upside or downside, which we define as (target price* - current price) / current price.

BUY (B). The upside is 10% or more.
HOLD (H). The upside or downside is less than 10%.
REDUCE (R). The downside is 10% or more.
Unless otherwise specified, these recommendations are set with a 12-month horizon. Thus, it is possible that future price volatility may cause a temporary mismatch between upside/downside for a stock based on market price and the formal recommendation.

* In most cases, the target price will equal the analyst's assessment of the current fair value of the stock. However, if the analyst doesn't think the market will reassess the stock over the specified time horizon due to a lack of events or catalysts, then the target price may differ from fair value. In most cases, therefore, our recommendation is an assessment of the mismatch between current market price and our assessment of current fair value.

Industry Recommendations

Overweight. The analyst expects the fundamental conditions of the sector to be positive over the next 12 months.
Neutral. The analyst expects the fundamental conditions of the sector to be maintained over the next 12 months.
Underweight. The analyst expects the fundamental conditions of the sector to be negative over the next 12 months.

Country (Strategy) Recommendations

Overweight (O). Over the next 12 months, the analyst expects the market to score positively on two or more of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.

Neutral (N). Over the next 12 months, the analyst expects the market to score positively on one of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.

Underweight (U). Over the next 12 months, the analyst does not expect the market to score positively on any of the criteria used to determine market recommendations: index returns relative to the regional benchmark, index sharpe ratio relative to the regional benchmark and index returns relative to the market cost of equity.