



Key Challenges in Thailand's Carbon Credit Market

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KEY SUMMARY

- Thailand's carbon credit market is under the spotlight. While businesses continue to implement efforts to reduce their greenhouse gas emissions, there remain certain sectors that are difficult to abate. Carbon credits are therefore important measures for businesses to achieve their carbon neutrality and net zero targets.
- Amidst the growth of Thailand's voluntary carbon credit market, investors will still encounter market risks around carbon credit trading, including demand, supply, price, and trading channel risks.
- Demand risks focus on uncertainties in the carbon credit market. Given the voluntary nature of carbon credits, they are not the first choice for prospective buyers, whose priority is more focused on implementing carbon reduction initiatives.
- Supply risks derive from the fact that Thailand's carbon credit market is more suited to large-scale, rather than small-scale, investors. There is uncertainty around the regularity of carbon credit trading volumes, and as the market is still developing, carbon trading is based on agreements between buyers and sellers.
- Price risks: As Thailand's carbon credit market is still in development, there are currently no clear regulations or a system to maintain the stability of carbon credit supply and demand. Because of this, there are risks concerning price volatility and price drops.
- Individuals interested in carbon credit trading should carefully examine the information available on the different methods of carbon credit investments, as well as new, progressive technologies that are playing a greater role in reducing greenhouse gas emissions. They should also identify other alternatives to achieve their greenhouse gas reduction and net zero targets in a sustainable way.

The use of carbon credits in offsetting emissions from hard-to-abate activities is an important tool in global efforts to achieve net zero.

Nearly 200 countries were signatories to the 2015 Paris Agreement’s target to keep global warming below 2°C compared to pre-industrial levels. To achieve this target, global greenhouse gas emissions must decrease by 50% from current levels by 2030, and reach net zero by 2050.

However, there are significant costs involved in using current technologies to reduce greenhouse gas emissions. Although such costs could decrease over time, decarbonization remains difficult in some sectors such as industrial cement production, which will typically involve chemical combustion, a major source of carbon emissions in the cement industry.

Purchasing carbon credits is therefore one way for businesses to manage the emissions from their hard-to-abate activities. A carbon credit could serve as a form of certification that demonstrates the removal of one ton of carbon dioxide (CO2) from the atmosphere, or the avoidance of one ton of CO2, where producers of carbon emissions would be able to buy such credits to offset emissions from their production processes and business operations.

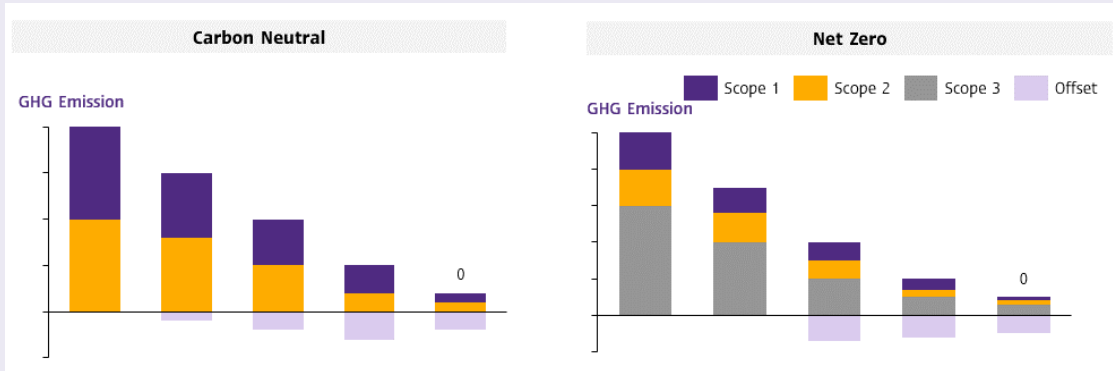
BOX : Net Zero / Carbon neutral?

Carbon neutral refers to the state of neutrality in emissions, which focuses on carbon dioxide (CO2) only, whereas **net zero** refers to emissions reductions across all greenhouse gases, including methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6) and nitrogen trifluoride (NF3). In addition, carbon neutral only refers to Scope 1 and 2 emissions, but net zero refers to all emissions, across Scopes 1, 2, and 3.

Carbon credits are important tools in global efforts to achieve both carbon neutrality and net zero. However, there are different types and standards of carbon credits, which are recognized differently. Net zero, in particular, has stricter requirements around the use of carbon credits.

Scope 1	Scope 2	Scope 3
Direct emission	Indirect (Purchase) emission	All other indirect emission
<p>Direct emissions from an organization’s own operations, such as:</p> <ul style="list-style-type: none"> • Combustion from within areas of operations • Transport • Fugitive emissions due to leakages, such as untreated wastewater leakages into waterways, leakages of coolants from air conditioning systems, and refrigerant leakages. 	<p>Indirect emissions, such as the purchase of energy from external sources for use in an organization’s own operations, such as:</p> <ul style="list-style-type: none"> • Electricity purchases • Heating, cooling, and steam purchases 	<p>All other indirect emissions across a company’s value chain, such as:</p> <ul style="list-style-type: none"> • Business travel • Procurement • Product and service consumption and production, as well as the end of life of products and services.

The difference between carbon neutrality and net zero emissions can be summarized as follows:



Term	Carbon dioxide (CO2)	Other GHGs	Scope	Carbon offset/ Carbon credit	Thailand's target
Carbon neutral	✓		Scope 1, 2	Yes.	2050
Net zero emission/ Climate neutral	✓	✓	Scope 1, 2 และ 3	Can be used by countries that have received authorization, based on carbon reduction standards only.	By 2065, or earlier by 2050, if financing and technology assistance is provided.

BOX: Types of carbon credits

Carbon credits can be categorized into two main types:

1. **Avoidance / Reduction:** Avoiding or reducing the emission of carbon dioxide into the atmosphere. Main examples of projects that are considered to be carbon dioxide avoiding / reducing include:
 - a. Forest conservation and management: Stopping deforestation.
 - b. Renewable energy: Replacing fossil fuel-based energy with renewable energy.
 - c. Fuel switching: Switching to energy sources that emit less carbon dioxide.
 - d. Waste management: Capturing methane emissions from waste disposal activities and landfill, and converting this into fuel for energy to replace the use of fossil fuels in local communities.
2. **Removal / Sequestration:** The removal of carbon dioxide from the atmosphere, where carbon removal and sequestration projects can be implemented in two ways:
 - a. **Carbon capture technology:** Using specialized technology to capture carbon from the atmosphere, such as through direct air capture, which involves capturing carbon directly as it is emitted. This would typically occur, for
 - b. **Nature based solutions:** Enhancing the carbon sequestration potential of forests through reforestation and other related projects such as agriculture.

Today's global carbon markets can be categorized into two types:

1. Compliance market/Mandatory market / Regulated market: A carbon credit and GHG trading market that is legally binding or aligned with international commitments. In this type of market, non-compliance would result in penalties, and compliance to established targets would permit access to various benefits, depending on the enactment of relevant regulations. This type of market therefore involves strict enforcement.

2. Voluntary Carbon Market (VCM): A market that is non-legally binding. In general, it is established on a voluntary basis following agreement by the private sector to manage its climate change impacts. Participants may have their own voluntary greenhouse gas reduction targets that are not legally binding, and carbon credits or GHG emissions allowances are bought or sold to offset emissions. There are many carbon standards in this type of market.

This briefing paper will refer only to voluntary carbon markets. This is because Thailand has established a voluntary carbon market, and the Thailand Greenhouse Gas Management Organization (Public Organization (TGO)) has launched the Thailand Voluntary Emission Reduction (T-VER) verification as a means to standardize the certification of voluntary emissions reduction projects in Thailand.

Although Thailand's carbon credit market has grown rapidly over the past 1-2 years, there are still key risks and uncertainties in various areas of the market, which will be explained below.

Demand risks: There is a lack of clear demand in Thailand's carbon credit market

Demand for carbon credits in Thailand is still based on the nature of a Voluntary Carbon Market (VCM), which relies on other drivers besides regulations to create demand. Examples include trends in environmental concern, or demand from environmentally-conscious customers who are concerned with their supply chain impacts. Indeed, the current key driver of demand is the carbon neutrality / net zero targets that over 28 companies in Thailand have now set, which will create greater demand for carbon credits in the future.

However, voluntary carbon credits are not the first choice for potential buyers. Thai businesses will turn to carbon credits only after they have first made efforts to reduce greenhouse gas emissions from their business operations, such as through energy savings and switching to more environmentally-friendly resources or cleaner energy.

In addition, high carbon-emitting industries will naturally innovate technologies and identify ways of sustainably reducing their carbon emissions rather than purchase carbon credits on an occasional basis. For example, the Thai Cement Manufacturers Association is striving to replace all of its Type I Portland Cement with Hydraulic Cement TIS. 2594, which helps to reduce greenhouse gas emissions, by 2023. This will help to reduce no less than 1 million tCO₂ in emissions, which is equivalent to planting over 122 million trees. Cement producers are therefore preparing to stop the production of their current high-emitting cement in early 2024.

As for other high-emitting industries such as aviation, although there is high demand for carbon offsets, there are currently no regulations surrounding their use in aviation. Some airlines are therefore offering their customers the choice of purchasing carbon credits to reduce their own individual carbon footprints from travel. Given this, it is difficult to determine the demand for carbon credits with certainty.

As for exports and international trade, the European Union's Carbon Border Adjustment Mechanism (CBAM) is the most frequently referred to carbon taxation measure. However, it is unclear to what extent the CBAM is driving the Thai carbon credit market, as credits in the voluntary carbon market cannot be used in place of the CBAM Certificate that importers in the EU must purchase, because they are incompatible standards.¹

¹ For more information, please refer to SCB EIC In focus "CBAM: Preparing Thailand's Businesses for Net Zero" at <https://www.scbeic.com/en/detail/product/cbam-160523>

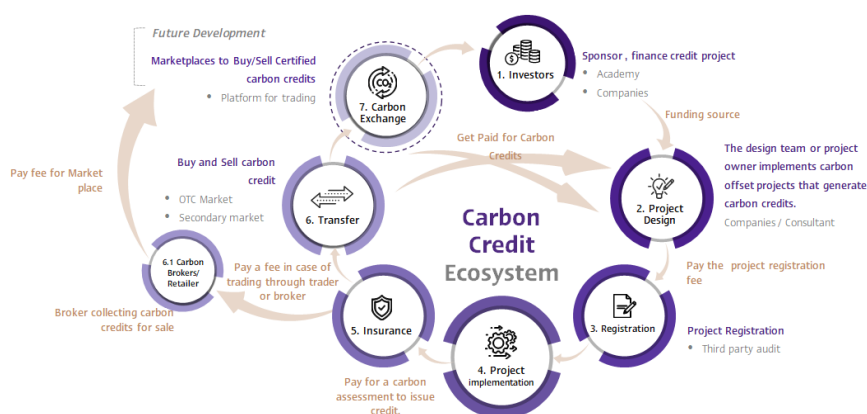
Supply risks: Thailand's carbon credit market is more suited to large-scale, rather than small-scale investors, and faces challenges concerning the uncertainty and instability of trading volumes.

- 1.) Selling carbon credits on the market involves costs for their verification to ensure that the credits are recognized and eligible to be sold. Given this, the supply side is more suited to large-scale investors.

As an example, a reforestation project that has a carbon sequestration potential of around 1.2 – 1.4 tons per rai must have **an area of at least 10 rai to be eligible for T-VER verification**, and to be able to sell carbon credits. Achieving this would require the following costs:

- 1.1 Registration for T-VER: 3,000 baht per project per time.
- 1.2 Costs of tree planting and maintenance: This will differ depending on the type of forest. For example, a terrestrial forest will cost around 4,300 baht/rai (Source: T-VER, rai / year), a coastal forest will cost around 6,390 baht / rai / year (Source: Budget Standards Division, Budget Bureau, January 2018), which means that the minimum total cost will be 43,000 baht for 10 rai.
- 1.3 Costs of carbon measurement: This costs around 1,200 baht per rai, or 1.2 million baht for 1,000 rai, for a 10-year project (based on the period required by T-VER to calculate carbon credits and for project extensions of 10 years at a time), and would not include the costs of tree planting and maintenance. As a result, the minimum cost for measuring carbon credits is 12,000 baht for 10 rai, which is quite high. Measurements will additionally require technologies such as GPS, satellite and drone imagery, etc.
- 1.4 A request to verify the volume of greenhouse gases (carbon credits): 3,000 baht per project per time. Given this, the smallest scale carbon credit project will cost around $43,000 + 12,000 + 3,000 + 3,000 = 61,000$ baht at the minimum, to sequester 14 tons of carbon. The above example of planting a forest of 10 rai for carbon credits is very small-scale compared to real-life industrial emissions, as for example the biggest 5 companies in the Thai cement industry emit around 40 million tons of carbon. Small-scale carbon credit trading in Thailand has the characteristics of an 'Over the Counter' market, in which buyers and sellers agree the terms of trading without an intermediary, making it less flexible. There is also not much market demand. Events and concerts, for example, may only have demand for small-scale carbon credits on specific days and occasions. Carbon credit trading platforms are also still under development, and there are not yet specifications as to how many tons of carbon should constitute the minimum lot size for carbon credit trading. If there is a need to expand the scope of trading to make it more flexible, an investment of at least 1,000 rai would be required, which would bring the total costs to the level of 10 million baht. Alternatively, if there is a need for small-scale trading, an intermediary may be required to consolidate the carbon credits and thus identify buyers more easily.

Figure 1: The current Thai carbon credit ecosystem and future forecasts



Source: SCB EIC analysis

- 2.) Both Thai and international carbon verification standards can be used. However, they differ in their levels of stringency, and there is not currently one internationally agreed carbon standard.

In Thailand, the general standard used is T-VER. This was recently revised as Premium T-VER, to better align with international standards such as Verra and Gold Standard. However, it is not currently possible to trade carbon credits across these different standards.

Figure 2: Comparison between Thai and international carbon verification standards

Voluntary Carbon Assessment Standards of Thai and international standards

Standard	T-ver Standard	Premium T-ver	Verified Carbon Standard (Verra)	Gold Standard
1. Objective	For voluntary carbon market	For voluntary carbon market or Nationally Determined Contribution (NDC)	For voluntary carbon market or Nationally Determined Contribution (NDC)	For voluntary carbon market
2. Calculation of greenhouse gas emissions in baseline	Business as usual	Compare to lower than business as usual	Compare without carbon reduction project with business as usually	Compare without carbon reduction project with business as usually
3. Examination (Additionality)	Large projects with a payback period of more than 3 years	examine strictly	examine strictly	Examine project by project rely on UNFCCC
4. Project auditor	ISO 14065 or CDM	ISO 14065 or CDM	ISO 14065 or CDM	UNFCCC
5. Assess non-performance risk and deduct credit reserves.	Not specified	must evaluate	must evaluate	must evaluate
6. others	no need for projects that have additional environmental or social benefits.	no need for projects that have additional environmental or social benefits.	no need for projects that have additional environmental or social benefits. But need to report for environmental impact assessment	Projects should contribute to at least three of the Sustainable Development Goals set by the United Nations.

Source: SCB EIC analysis based on data from TGO and NEFCO

- 3.) There is a long lag time between investment in the project and carbon credit registration: There will be a gap following the initial investment in a reforestation project of around 3-5 years to allow the trees to grow. Investors must therefore approach this from all angles, because 3-5 years is enough time for alternative emissions reduction technologies to become

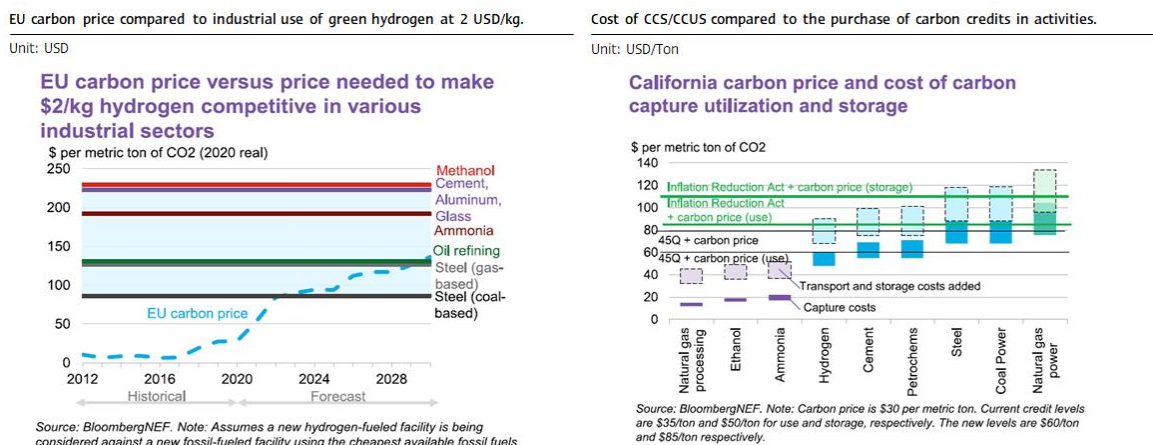
cheaper and therefore more attractive than carbon credits. Moreover, other types of carbon reduction projects that are not reforestation projects, but which are shorter term and can reduce more carbon (although they receive less co-benefits), could enter and compete in the market much faster. Those intending to sell carbon credits must therefore decide between investing in carbon credit projects that have longer lag times between project initiation and credit generation, like reforestation, while accepting the risk that other carbon reduction technologies may emerge over the 3–5-year period, or investing in projects that can generate credits faster, but have less co-benefits compared to reforestation.

Price risks: A carbon credit price that is too high could make carbon reduction technologies that were previously expensive more attractive to investments.

The price of carbon credits in the mandatory market have risen up to the point that other technologies, which were previously expensive, have now been able to compete with carbon credits. In the European Union market, the EU carbon price is now at the breakeven point and is competitive with green hydrogen technology, at 2 USD/kg.

Meanwhile, the cost of investing in Carbon Capture and Storage/Carbon Capture Utilization Storage (CCS/CCUS) in the U.S., determined using the California carbon price of September 2022, is now competitive with the price of carbon credits. As a result, the private sector is now viewing long-term investments in technologies such as CCS or green hydrogen as financially more beneficial and sustainable than occasional carbon credit purchases.

Figure 3: Comparing the value of investing in CCS and carbon credit purchases



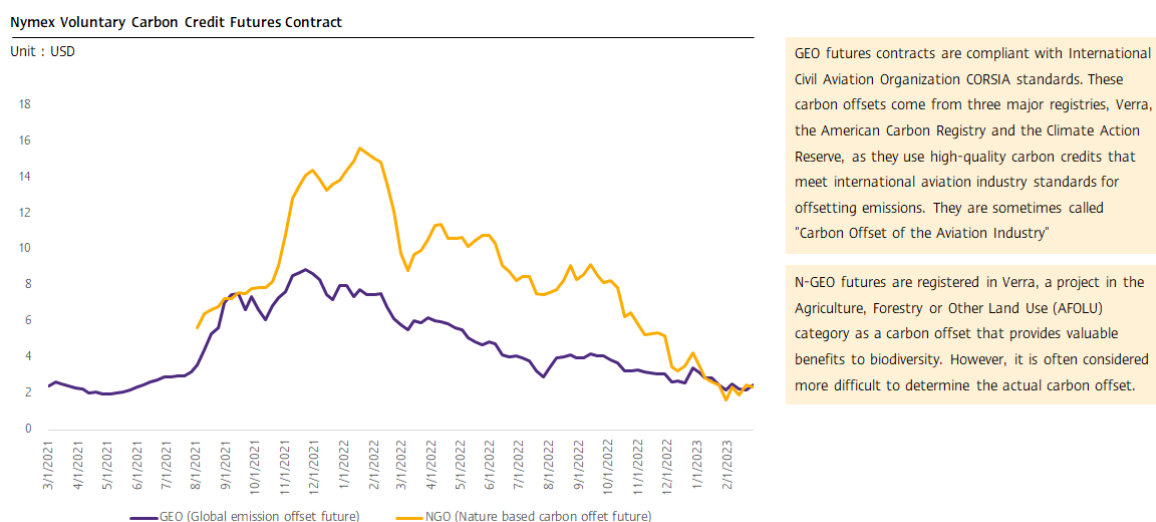
- The current EU carbon price is at the break-even level for green hydrogen at 2 USD/kg.
- Meanwhile investments in US CCS/CCUS carbon storage at the California carbon price as of September 2022 are now competitive.

Source: SCB EIC analysis based on data from Bloomberg

As for the voluntary carbon credit market, there are differences in prices between each market and each standard. On average, the current global carbon price is around 25 USD / ton of carbon. In Asia, the carbon price in South Korea is around 18 USD / ton of carbon, while the latest average price for carbon in Thailand in 2022 was 107 baht, or around 3 USD / ton of carbon, which is very low compared to the price of the global market. Businesses interested in trading on the Thai carbon credit market must therefore consider various factors, in particular that the carbon price could fluctuate greatly as the various carbon standards are not yet fixed, and that the market is not solely determined by demand and supply, but on regulations and new standards as well. For example, the carbon price in the voluntary carbon markets of the International Civil Aviation Organization and in the agriculture sector fluctuate significantly, and could even decrease to around 1 USD.

This decrease is due to the lack of clarity in regulations and how the quality of carbon credits would be determined. Market players had hoped that delegates at COP27 of the UN Framework Convention on Climate Change (UNFCCC) would decide which types of projects would be approved for carbon credits, and provide clear parameters for determining high-quality credits. However, COP27 delegates had decided that more time was needed to consider this decision, so the voluntary carbon market has not yet recovered from this regulatory uncertainty. Recovery in the voluntary carbon market will thus depend on the clarity around what constitutes a high-quality carbon credit, and if and when businesses can enter the voluntary carbon market without the risk of being accused of greenwashing.

Figure 4: Carbon credit price in the voluntary carbon market



Source: SCB EIC analysis based on data from S&P Global and Tradingview

Given this, carbon credit investors must consider the following in terms of carbon price: that there are differences in the stringency of carbon reduction commitments in the mandatory and voluntary carbon markets, as well as in price stability. In Thailand, there is currently no mechanism to maintain price stability as is present in other markets.

In addition, the carbon price ceiling is determined by alternative carbon reduction technologies that are now assuming bigger roles across various industries, and which could become cheaper once they scale.

Environmental risks: Reducing greenhouse gas emissions in a sustainable way should be the priority, rather than carbon credits

The main issue is that Thailand's carbon credit market is an 'Over the Counter' market. That is to say, direct trading between buyers and sellers, which means that only those involved will know exactly where the carbon emissions and reductions are actually occurring. As soon as it becomes a secondary market (an intermediary market), this would make it more difficult to determine the source of the carbon emissions, i.e., which activity is causing the GHG emissions, where, and which communities are being impacted, where such areas would then have been the focus for reducing GHG emissions. However, trading on a secondary market would mean that buyers and sellers will not know where the carbon credit originates, and consumers are becoming increasingly more attentive to and critical of this point, which is linked to 'greenwashing.' Greenwashing refers to an instance where a business claims that they are committed to improving the environmental impacts of their activities, but are actually not enacting any genuine improvements or are only solving problems temporarily. An example is if an organization or individuals are still emitting carbon dioxide, but are trying to offset the pollution that they generate by paying other organizations to offset their excess carbon emissions.

Investments in carbon credits: An opportunity worth pursuing?

Thailand's carbon credit trading market emerged out of the intentions of individuals and organizations to get involved in greenhouse gas reduction efforts. It is a relatively new market, one which has the potential to grow both in terms of price and volume, as there is still a small number of players. However, it is evident that there are still risks involved, in particular the uncertainties around demand and supply, price volatility, and environmental concerns, as outlined above. As a result, investing in the carbon credit market may only be one option, but not the main tool for businesses to achieve their carbon neutral / net zero targets. Businesses must continue to regularly monitor technological advancements that support GHG reductions, as this is what will enable the most sustainable business transition.

The question of whether there is still a chance for the Thai carbon credit market to develop will depend importantly on carbon verification standards and commitments to greenhouse gas reduction targets. Therefore, elevating the Thai carbon standard and ensuring that it is recognized at the international level may be a good starting point for ensuring the success of the Thai carbon credit market in the future.

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