



**ASIA School
of Business**

in collaboration with
MIT Sloan Management

ASB Working Paper Series 09/2023

Malaysia's New Voluntary Carbon Market: Origins, Ecosystem and Prospects

Pieter E. Stek
Thessa Vasudhevan
Renato Lima-de-Oliveira

September 2023



[ABSTRACT / EXECUTIVE SUMMARY]

Middle-income economies such as Malaysia, which are integrated into global value chains, have both significant domestic carbon emissions as well as sizeable opportunities for nature-based carbon offsets. While they face pressures to reduce carbon emissions from their international trade and investment partners, these countries are also ineligible for official development aid, and they therefore need to mobilize domestic funds to finance reductions in carbon emissions. Malaysia launched a domestic Voluntary Carbon Market (VCM) in December 2022 as part of the government's climate change policies. The VCM appears to have been implemented relatively quickly, having only been announced in September 2021. This paper traces the origins of the VCM and analyzes the economic and regulatory context of the market in terms of the domestic supply and demand for carbon credits in Malaysia. The analysis reveals that Malaysia, as a middle-income economy that has significant potential for nature-based carbon offsets, faces a number of unique domestic political-economic challenges involving carbon trading, which are not faced by high-income economies nor by low-income economies. These domestic challenges explain the difficulties countries like Malaysia face in formulating policies on carbon pricing and the reason for its rapid introduction of a VCM without a supportive carbon credit ecosystem or clear plans for a carbon tax.

Introduction to the research center

The Center of Technology, Strategy and Sustainability (CTSS), endowed by Sapura Energy aims to be a leading center of excellence and research on business strategies and technology in emerging markets and their socio-political environment. The CTSS is a part of the Asia School of Business.



ASB-WP CTSS 002 | 29 September 2023

Malaysia's New Voluntary Carbon Market: Origins, Ecosystem and Prospects

The views and opinions expressed are those of the authors and do not represent those of the Center of Technology, Strategy and Sustainability (CTSS), the Asia School of Business (ASB) or its affiliates. All errors remain the authors' own.

Attribution – Please cite the work as follows: Stek, Pieter, Vasudhevan, Thessa and Lima-de-Oliveira, Renato. 2023. Malaysia's New Voluntary Carbon Market: Origins, Ecosystem and Prospects. *ASB Center of Technology, Strategy and Sustainability Working Paper Series 09/2023*, Kuala Lumpur: Asia School of Business. Creative Commons Attribution CC BY 3.0

Please visit <https://asb.edu.my/faculty-research/working-papers-database> for further information on the ASB Center of Technology, Strategy and Sustainability Working Paper Series (CTSS).



Malaysia's New Voluntary Carbon Market: Origins, Ecosystem and Prospects

Pieter E. Stek, Thessa Vasudhevan and Renato Lima-de-Oliveira

Center for Technology, Strategy and Sustainability (CTSS)

Asia School of Business

11 Jalan Dato' Onn

50480 Kuala Lumpur

Malaysia

Middle-income economies such as Malaysia, which are integrated into global value chains, have both significant domestic carbon emissions as well as sizeable opportunities for nature-based carbon offsets. While they face pressures to reduce carbon emissions from their international trade and investment partners, these countries are also ineligible for official development aid, and they therefore need to mobilize domestic funds to finance reductions in carbon emissions. Malaysia launched a domestic Voluntary Carbon Market (VCM) in December 2022 as part of the government's climate change policies. The VCM appears to have been implemented relatively quickly, having only been announced in September 2021. This paper traces the origins of the VCM and analyzes the economic and regulatory context of the market in terms of the domestic supply and demand for carbon credits in Malaysia. The analysis reveals that Malaysia, as a middle-income economy that has significant potential for nature-based carbon offsets, faces a number of unique domestic political-economic challenges involving carbon trading, which are not faced by high-income economies nor by low-income economies. These domestic challenges explain the difficulties countries like Malaysia face in formulating policies on carbon pricing and the reason for its rapid introduction of a VCM without a supportive carbon credit ecosystem or clear plans for a carbon tax.

Key words: carbon market; greenhouse gas emissions; Malaysia;



1. INTRODUCTION

Carbon markets are seen as one of the key tools to reduce global warming. It is grounded in the idea of exploiting the efficiency gains from trade to promote carbon emission reductions at the lowest cost. High emitters, such as today's rich nations and leading multinational corporations, can offset their emissions at a lower cost by buying credits from sellers who can reduce or capture carbon emissions at a lower relative cost. In concrete terms, a U.S. company like Microsoft can fund reforestation projects in countries like Brazil and make a claim (to consumers, shareholders, regulators, etc.) to be sequestering their carbon emissions from energy-intensive activities like datacenters (Microsoft 2023).

Wealthy nations and their corporations are the main likely buyers for credits while land-abundant (and capital poor) nations are well positioned to be in the selling side, exporting carbon credits. As Figure 1 below shows, there is a generally negative relationship between investible carbon and emissions. Some emerging economies, like Malaysia, Thailand, Mexico, and India, which are plugged into global value chains (GVCs) and exposed to climate regulations like the European Union's Carbon Border Adjustment Mechanism (CBAM), may have both local supply and demand opportunities.

Designing and implementing a carbon market in these nations is a crucial first step to unlock gains from trade between sectors and countries, but it has proved to be far from straightforward. Unlike the standard markets for goods, carbon markets are a political creation which requires solving issues which may include competing domestic jurisdictions on land use, credibility of enforcement agencies, and varying interest from potential buyers and sellers. Given the expected importance of carbon markets to the sustainable development agenda, it is important to understand how carbon markets are designed, implemented, and which challenges they face. Shedding light on these questions is key to assess how effective carbon trading will be as a mechanism to promote global decarbonization.

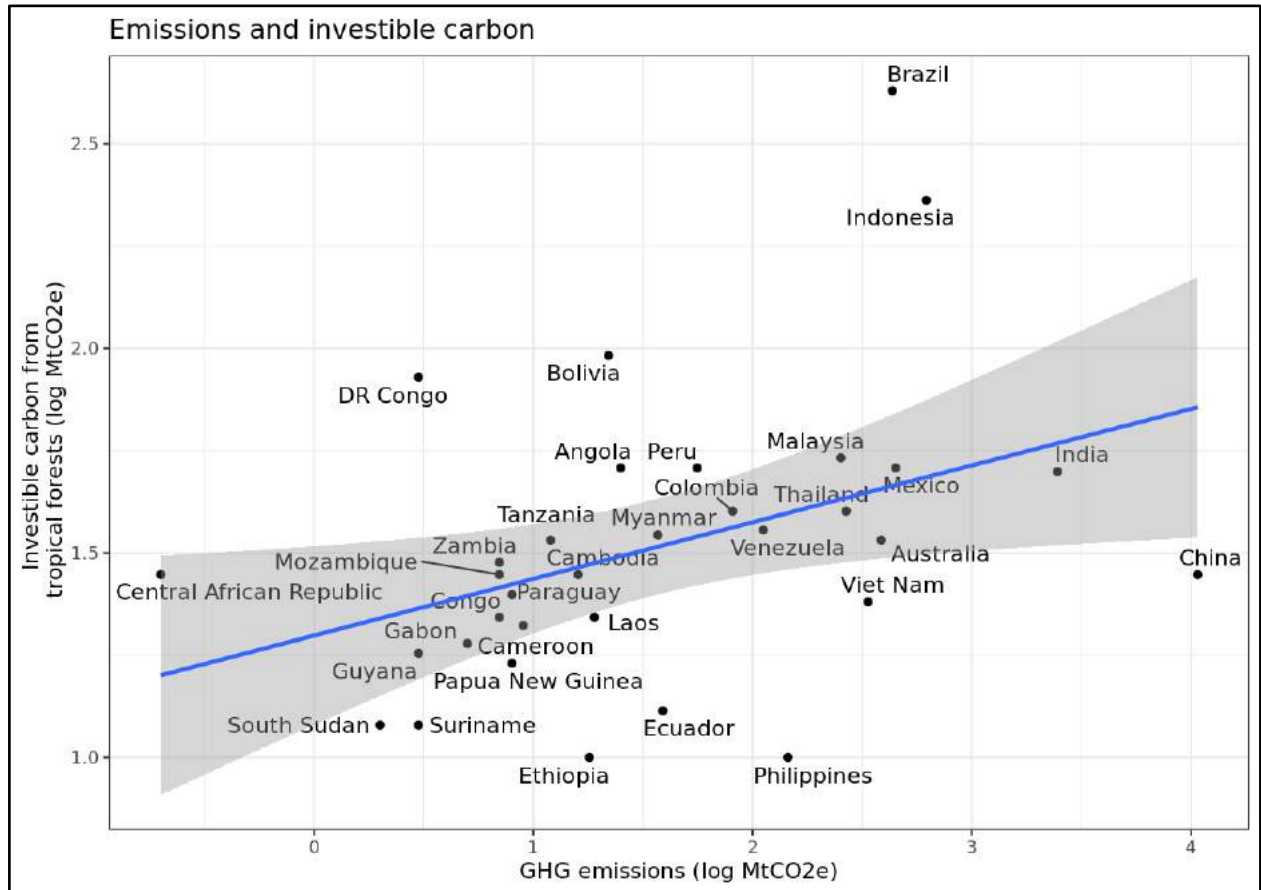


Figure 1: Greenhouse gas emissions (World Resources Institute 2023) and investible carbon (Koh et al. 2021).

In this paper, we focus on the carbon market of Malaysia, an upper middle-income economy of Southeast Asia. Malaysia saw the first auction on its domestic Voluntary Carbon Market (VCM) take place on 17 March 2023, an event which the auction’s organizer, financial markets operator Bursa Malaysia, described as “a proven market mechanism which provides price discovery” and “a significant step towards unlocking Malaysia’s potential as a supplier of high-quality carbon credits” (Bursa Malaysia 2023).

At the same time, critics noted that the VCM did not see the auction of any domestically-originated carbon credits, that credits sold at the minimum reserve price, and that Bursa Malaysia likely acted as the buyer of last resort to ensure the completion for one of the auctioned credits (Stek 2023).

The piecemeal development of the Malaysian VCM offers a case study of how an economically open middle-income economy responds to the economic challenges of climate change. Malaysia’s response appears to be markedly different from the state-led approaches of China (Engels 2018) and Vietnam (Gverdtiteli 2023) and the Official Development Aid (ODA)-influenced approaches of many lower income economies (Michaelowa and Michaelowa 2007;

Baniya, Giurco, and Kelly 2021; Wang, Guo, and Dong 2021). Malaysia also has a more issue-focused environmental movement, a fact that can be attributed to its (until recently) more authoritarian style of government (Yew and Zhu 2019), and more broadly, to the observation that in many developing economies, environmentalism is more strongly related to local concerns than to global problems such as climate change (White and Hunter 2009; Nguyen, Virdis, and Vu 2023).

At the same time, Malaysia is highly integrated into global trade and investment flows, with international trade accounting for 74% of GDP (World Bank 2022). As a result, climate issues are also influenced by foreign investment and trade partners, many of whom are now imposing sustainability criteria on their supply chains (Taghikhah, Voinov, and Shukla 2019), and as a condition for providing finance (Zhang et al. 2021; Chan, Merdekawati, and Suryadi 2022).

Perhaps as a result of these circumstances, Malaysian policy makers have tended to frame their climate change-related policies within a “green growth” narrative (Jacobs 2013; Stegemann and Ossewaarde 2018), emphasizing energy exports, attracting foreign direct investment and new business opportunities (Aman 2023; Sallehuddin 2023). At the same time they have avoided making politically more difficult decisions in areas such as carbon taxes and regulated emissions trading, which are being implemented in other low- and middle-income Asian economies such as China and Indonesia.

The development of the VCM can also be framed within the historical context of Malaysia’s success in developing local financial markets related to the country’s core commodity exports. In 1980 the country started the trade of crude palm oil futures in the local currency, the ringgit, which are now seen as the global pricing benchmark for this commodity (Jeong et al. 2023; Ahmad 2015). However, in 1980 Malaysia was the world’s largest exporter of crude palm oil, whereas its creation of carbon credits is still in a nascent stage, and the VCM is presented by Bursa Malaysia as a mechanism to stimulate the development of the local carbon credit business ecosystem.

Within this broad context, this paper has three main aims. First, to trace the path that led to the first domestic VCM auction on 17 March 2023 (section 3). Second, to explore the scale, actors and regulatory challenges related to the development of a carbon credit business ecosystem in Malaysia that can support a vibrant VCM (section 4). Third, to discuss the prospects of the VCM, given Malaysia’s domestic social, economic and political priorities, and its exposure to international trade and investment flows (section 5).

The paper begins with a brief discussion of the theoretical frameworks and relevant literature about VCMs and their role in achieving sustainable economic development while mitigating



the effects of climate change (section 2). The paper concludes with a brief discussion of its main findings and how the Malaysian experience adds to the existing literature on VCMs (section 6).

2. HISTORY, ROLE AND DRIVERS OF VOLUNTARY CARBON MARKETS

The voluntary offsetting of carbon emissions can be traced back as far back as 1989, when an American electricity company agreed to pay farmers in Guatemala to plant 50 million pine and eucalyptus trees on their land (Hawn 2005). However, the concept gained mainstream acceptance as a legitimate business practice during the late 1990s.

The Kyoto Protocol, which was adopted in 1997, provided clear inter-governmental support for the concept of cross-border carbon emission offsets in its article 12 through the Clean Development Mechanism (CDM). The CDM ignited a boom in carbon offsetting projects in emerging economies during the 2000s, but lacked coherent standards, leading to negative social and environmental side-effects for certain projects (Kollmuss, Zink, and Polycarp 2008). Additions and modifications to the CDM have since occurred, notably the development of the Reducing Emissions from Deforestation and Degradation (REDD) and REDD+ frameworks, which are also part of the UNFCCC, and were specifically aimed at preserving forest ecosystems (Bhullar 2013).

Since then a number of other international carbon emission offsetting standards have emerged, including the Gold Standard (since 2003), Verified Carbon Standard (Verra, since 2007) and CORSIA (specifically for the aviation industry, since 2016) which have supported in the creation of international voluntary carbon markets by enabling the trading of standardized carbon credits which are based on a transparent and credible verification of greenhouse gas emission reductions (Streck, Dyck, and Trouwloon 2022).

A number of governments have also introduced, or supported the introduction of, national or state carbon credit standards, such as in California, Colombia, Thailand and the United Kingdom (Streck, Dyck, and Trouwloon 2022).

Although voluntary carbon markets are *voluntary*, they have often been perceived as stepping stones towards a compliance market, which is created by the introduction of greenhouse gas emission taxes or emission quotas. Guigon (2010, 19:8) notes that “the emergence of the voluntary market can also lay the basis for building national capacity in carbon markets in countries whose climate policies may have yet to establish carbon market schemes.” Further elaborating: “voluntary markets can provide an early pre-compliance arena in which to test and develop systems needed to transition to a compliance market.”

The creation of voluntary carbon markets can help drive climate ambitions of the corporate sector and put pressure on governments to implement a compliance market (Streck 2021). In fact, corporate interest in voluntary carbon markets has increased as an increasing number of companies commit themselves to voluntary emission reductions and net-zero emission goals even if the legislative requirements for doing so are not yet in place (Streck 2021). The volume of credits traded on voluntary carbon markets almost tripled between 2018-2020, and it is a trend that has resisted economic disruptions from COVID-19, policy shifts in key countries such as the United States, where President Trump pulled the country out of the Paris Agreement, and the recent Russian-Ukraine conflict. The strong and growing corporate demand for emission reductions is seen as a very significant driver of carbon emission offset projects, especially in developing countries, which supply the majority of voluntary carbon credits (Sankar 2020; Streck 2021).

An important influence on voluntary carbon markets are the compliance carbon markets in other parts of the world. Since the adoption of article 6 of the Paris Agreement, the international trade in carbon offset credits needs to be accounted for in the respective countries' Nationally Determined Contributions (NDCs). This means that selling countries see a reduction in their offsets, while buying countries record an increase. However, the regulatory architecture for such transactions is still under development (Kreibich and Hermwille 2021; Müller and Michaelowa 2019).

For developing countries, a purely national perspective on carbon credits would lead to the underpricing of carbon value, given that their domestic supply of carbon offsets is relatively large compared to their emissions. Therefore, the export of such carbon credits is potentially lucrative for emerging economies, especially if they can obtain the much higher prices in compliance markets, as compared to the low prices for voluntary carbon credits (Rosales et al. 2021).

A second channel through which compliance-based carbon markets influence voluntary markets is the imposition of carbon import taxes, notably the creation of the Carbon Border Adjustment Mechanism (CBAM) by the European Union. Although it has been condemned as a protectionist trade measure (Lim et al. 2021), CBAM imposes charges on imported goods based on their carbon emissions footprint. Although the offsetting of such carbon emissions is allowed in the exporting country, importers are still required to pay the difference between the EU and the exporting country's carbon credit cost. In this way, the imposition of CBAM provides an incentive to raise domestic carbon credit prices, even if they are traded on a voluntary market.

While there is great interest in voluntary carbon markets, their launch does not automatically guarantee their success or sustainability. As an example, China's voluntary carbon market,

the China Certified Emission Reductions (CCER) program launched in 2012 was suspended in 2017 due to a lack of carbon credits traded and concerns over standards. The market is due to relaunch in 2023 following an upgrade of standards and a rule that would allow energy producers to offset up to 5% of their carbon emissions using voluntary carbon credits (Hou 2022). China's national VCM is especially complex because although domestically focused, it exists alongside a national compliance carbon market and several provincial and city-level schemes, notably in Beijing, Guangdong, Hubei and Shenzhen (Sun et al. 2016; Zhou and Li 2019; Cui et al. 2021).

3. THE JOURNEY TO MALAYSIA'S FIRST VOLUNTARY CARBON MARKET AUCTION

Malaysia's participation in VCMs is not a new phenomenon. There have been several schemes, (and some outright scams) involving carbon credits since the launch of the CDM under the Kyoto Protocol. As a reference point, Malaysia's first credit under the Verified Carbon Standard (Verra) was issued in 2013.

Recently, media highlighted the Sabah Nature Conservation Agreement (NCA), which was signed secretly in October 2021 between the Sabah chief minister and a Singapore-based carbon credit developer without consultation of local stakeholders, nor the national government. The Sabah state attorney general has since called the agreement "legally impotent" (V. Tan 2022).

Despite this history of participation in carbon offset schemes, the idea of creating a national voluntary carbon market appears to be relatively recent. The first mention of such an initiative was reported by local media in September 2021, ahead of the COP26 conference in Glasgow, Scotland (Hazim 2021). The announcement came from the Malaysian Ministry of Environment and Water (KASA) following a cabinet meeting and the secretary general of KASA also led the Malaysian delegation to the COP26 conference in Glasgow in November 2021 (Z. Y. Tan 2021).

As details of the VCM were announced in parliament in December 2021, the KASA minister announced that the market would be created by Bursa Malaysia, which also operates the country's stock, options and futures exchanges, and that the VCM would be compliant with the principles of Islamic financial law (*Shariah*) (Zahiid 2021).

Occurring alongside the discussion about the Malaysian VCM was also the introduction of a carbon tax, which was incorporated into the 12th Malaysia Plan 2021-2025 (12MP), an important medium-term policy document, and in the Finance Minister's 2022 budget speech to parliament (Manaf 2022). The carbon tax was again announced in the first 2023 budget (Abdul Aziz 2022), but it was not included in the re-tabled 2023 "Madani" budget, following

a general election in November 2022. Local stakeholders do not appear to expect a carbon tax in the near future (Chung 2023).

This course of events led Bursa Malaysia to announce the launch of the VCM in December 2022 (Bursa Malaysia 2022), and the first auction on the “Bursa Carbon Exchange” took place in March 2023. During the auction all carbon credits on offer sold at the minimum reserve price, and Bursa Malaysia itself appears to have acted as the buyer of last resort in accordance with the auction rules (Stek 2023).

From a regulatory perspective, the VCM faced relatively few restrictions. KASA has issued a 9-page guidance document (KASA 2021), while the Securities Commission has reportedly issued a Letter of No Objection to the creation of the VCM by Bursa Malaysia (Securities Commission Malaysia 2022).

Bursa Malaysia has stated that it will only accept the Verra standard of carbon emissions reductions on its VCM, and has signed a Memorandum of Understanding with Verra to “boost” Malaysia’s VCM ecosystem. Currently there is no Malaysian organization that can certify Verra credits, although SIRIM QAS, a company wholly-owned by the Ministry of Trade and Industry, held such a certification authorization in the past.

Note that Bursa Malaysia’s four largest shareholders are also government-linked agencies, holding approximately 40% of the exchange’s share capital. In this sense, both the VCM and the main verification provider (SIRIM QAS) are effectively state-controlled entities.

4. VOLUNTARY CARBON MARKET ECOSYSTEM IN MALAYSIA

The creation of Bursa Malaysia’s VCM aims “to facilitate the development of a vibrant VCM ecosystem” in Malaysia (Bursa Malaysia 2023), and to that end, the Malaysian government has also announced a MYR10 million (~USD2.2 million) seed fund for the creation of Malaysian carbon credits (Bernama 2023b). In this section the current status of Malaysia’s VCM business and regulatory ecosystem is discussed from the perspective of the domestic supply of carbon credits (subsection 4.1), the domestic demand for carbon credits (subsection 4.2), and a brief stakeholder mapping exercise based on a carbon credit project that is under discussion in the Malaysian state of Selangor (subsection 4.3).

In analyzing domestic supply and domestic demand, an attempt is made to quantify current and potential future supply and demand, to identify major potential market participants, and to discuss the regulatory factors that are likely to influence the market.

4.1 Domestic Supply



Malaysia is seen as one of the countries in Asia with the greatest potential for generating nature-based carbon credits, just behind Indonesia, and ahead of Thailand and India (Koh et al. 2021). While nature-based carbon credits are seen as a key source of carbon credit creation, methane capture from palm oil milling effluent is an example of a technical solution where carbon credits could also be generated (Loh et al. 2020), alongside other opportunities for carbon capture, storage and utilization (CCUS).

In this section the volume of potential domestic carbon credit supply is explored, along with the likely suppliers and relevant regulations.

Quantifying Domestic Supply

Malaysia's net emission removals from Land Use, Land-Use Change and Forestry (LULUCF) in 2016 were estimated at 241 MtCO_{2e} (Malaysia 2020). In addition to this amount of existing carbon sequestration, Malaysia is seen as being able to generate approximately 40 MtCO_{2e} of relatively inexpensive carbon credits (Agarwal et al. 2022), with the total investable carbon credit supply being estimated at around 53.6 ±21.3 MtCO_{2e} according to Koh et al. (2021).

McKinsey Nature Analytics, a consultancy firm, sees a potential of 26 MtCO_{2e} coming from forest conservation, 11 MtCO_{2e} from peatland restoration, and the balance 3 MtCO_{2e} coming from improved forest management and reforestation (Agarwal et al. 2022).

Forests as well as peatlands (and mangroves) are primarily located in forest and coastal reserves, which are typically managed by state governments. The states with the largest areas of forest cover are Sarawak and Sabah in East Malaysia, and Pahang in West Malaysia (see table 1).

State	Forested area (million ha)	Investible carbon (ktCO _{2e} /year)
Sarawak	7.7	196
Sabah	4.8	208
Pahang	2.1	53
Perak	1.1	<i>(missing data)</i>
Kelantan	1.0	<i>(missing data)</i>
Terengganu	0.81	18
Johor	0.45	14

Table 1: Forested area by state (Statistics Malaysia 2018) and investible carbon by state (Koh et al. (2021) quoted by Joshi et al. (2023)) for selected states.

Identifying Major Domestic Suppliers

For the purposes of issuing carbon emission offset credits, land ownership and management are a critical factor, as ownership of the land is an important criterion for issuing a credit. State governments are the main owners and managers of forested land, and they are therefore likely to become the main suppliers of nature-based carbon credits. However, there are a number of governance challenges surrounding land ownership that may complicate the supply of carbon credits.

Within the Malaysian context, most forested land is managed by the Forestry Departments of their respective states, although not all forested lands are necessarily owned by the state, and private owners, tribal people (through customary land rights) and the Malay rulers of certain states are also major owners of forested land. Forested land can be gazetted as a permanent forest reserve by the federal government (West Malaysia only) and by state governments. The East Malaysian states of Sabah and Sarawak, which contain most of Malaysia's forested land area, have separate forestry legislation and policy which is relatively autonomous from that of the federal government (Ministry of Energy and Natural Resources 2021).

Although the government's gazetting of forest reserves is described as "permanent" in the 1984 National Forestry Act, there are occasional instances of forest reserve degazettement, including in Johor (Law 2022), Pahang (Donald 2021) and Selangor (Jun 2021), which have attracted media attention. As land sales are a major revenue source for state governments, there is always a risk of forest reserve degazettement. However, this economic concern also means that state governments have a strong interest in developing carbon credits as an important source of potential revenue (The Borneo Post 2023). The Malaysian state governments can therefore be seen as large and eager sellers of nature-based carbon credits.

Regulatory Issues Influencing Supply

Especially in Sabah and Sarawak, but also in the interior of Peninsula Malaysia, the protection of forests is connected to the issue of indigenous land rights. The inclusion of tribal populations in forestry conservation is both important from the perspective of conservation – as they maintain and protect the forest – but also from the perspective of legal ownership (Fa et al. 2020). To illustrate the importance of this, the recent Sabah NCA agreement (already mentioned earlier), did not include any participation from the indigenous groups living there, and this has since become a major liability for the project, both from a legal and reputational standpoint (V. Tan 2022).

Malaysian courts have affirmed customary ownership and land rights for indigenous peoples in the past, however native people face many obstacles in asserting their customary land rights (Cooke, Toh, and Vaz 2011).

Viewed from the perspective of carbon credits, the native ownership claims to forested land mean that these land ownership issues need to be resolved, or the native populations must be involved in the conservation of forested lands, before any carbon credits can be issued. Even if their legal claims are delayed or difficult, the exclusion of native communities may create negative publicity for the carbon credit buyers, making these carbon credits less attractive or unsellable on international markets.

As Malaysia is also a signatory to the Paris Agreement, it can consider participating in the international trade of carbon credits under article 6. While certain state governments, notably Sarawak, have indicated their interest in selling carbon credits to international buyers, the federal government (and not the Sarawak state government) is party to the Paris Agreement. Therefore any exports of carbon credits must be reflected in an adjustment of Malaysia's nationally defined contribution (NDC), which requires the approval of the federal government in Putrajaya.

As Sarawak and Sabah have large forest cover and a low population density, they are naturally interested in the sale of nature-based carbon credits at high prices on international markets. However, Peninsula Malaysia, which has a much higher population density, a well developed manufacturing sector, and a significant number of coal-fired power plants, would aim to keep the carbon credit market closed to international buyers in order to avoid buyer competition and higher prices. This divide is likely to cause some tension between the federal government and the East Malaysian state governments in Malaysia's carbon market policies moving forward.

4.2 Domestic Demand

The domestic demand for carbon emission offsets is linked to Malaysia's pledge to reduce the intensity of its carbon emissions by 45% from 2005 to 2030 and its pledge to reach net-zero carbon emissions by 2050.

To this end, the government has announced its intention to impose a carbon tax under the 12th Malaysia Plan. Furthermore, a number of large greenhouse gas emitting corporations, notably state oil company Petronas and state electricity company Tenaga Nasional (TNB), have pledged to become net-zero emitters by 2050. Electricity generation and fugitive emissions from oil and gas account for 31% and 8% of Malaysian greenhouse gas emissions, respectively (Joshi et al. 2023), thus making these pledges a very significant influence on the demand for carbon credits if they are actually carried out.

In this section an attempt is made to estimate the domestic demand for carbon offsets based on the government's greenhouse gas emission targets, including net-zero emissions by 2050. Major domestic buyers and regulatory issues influencing demand for carbon offsets are also discussed.

Quantifying Domestic Demand

The Malaysian government has declared that it intends to reduce greenhouse gas (GHG) emissions by 45% in 2030 per unit of GDP. This means that Malaysia can still increase GHG emissions until this time, provided that the increase is slower than GDP growth, which has been the long-term trend in recent years. Malaysia is projected to reach its 2030 target without having to impose any additional measures to reduce GHG emissions, assuming current trends are maintained; in fact, the country can double its GHG emissions under the pledge, assuming it maintains strong economic growth (CEO Action Network and Climate Governance Malaysia 2022; Suskind et al. 2020).

Only by 2050 should Malaysia reach net-zero emissions, and to achieve this goal measures would need to be taken as compared to a business-as-usual scenario. Based on Malaysia's Third Biennial Update Report (BUR3) (Malaysia 2020) and under the assumptions of moderate increases in emissions (0.3% annually 2017-2030 and 0.15% annually 2031-2050) and economic growth (4.7% annually 2017-2030 and 2.7% annually 2031-2050), the gap between Malaysia's emissions and the net-zero target would be approximately 100 MtCO_{2e}, or a gap of around 30% of emissions (see Figure 2 and calculations in the appendix).

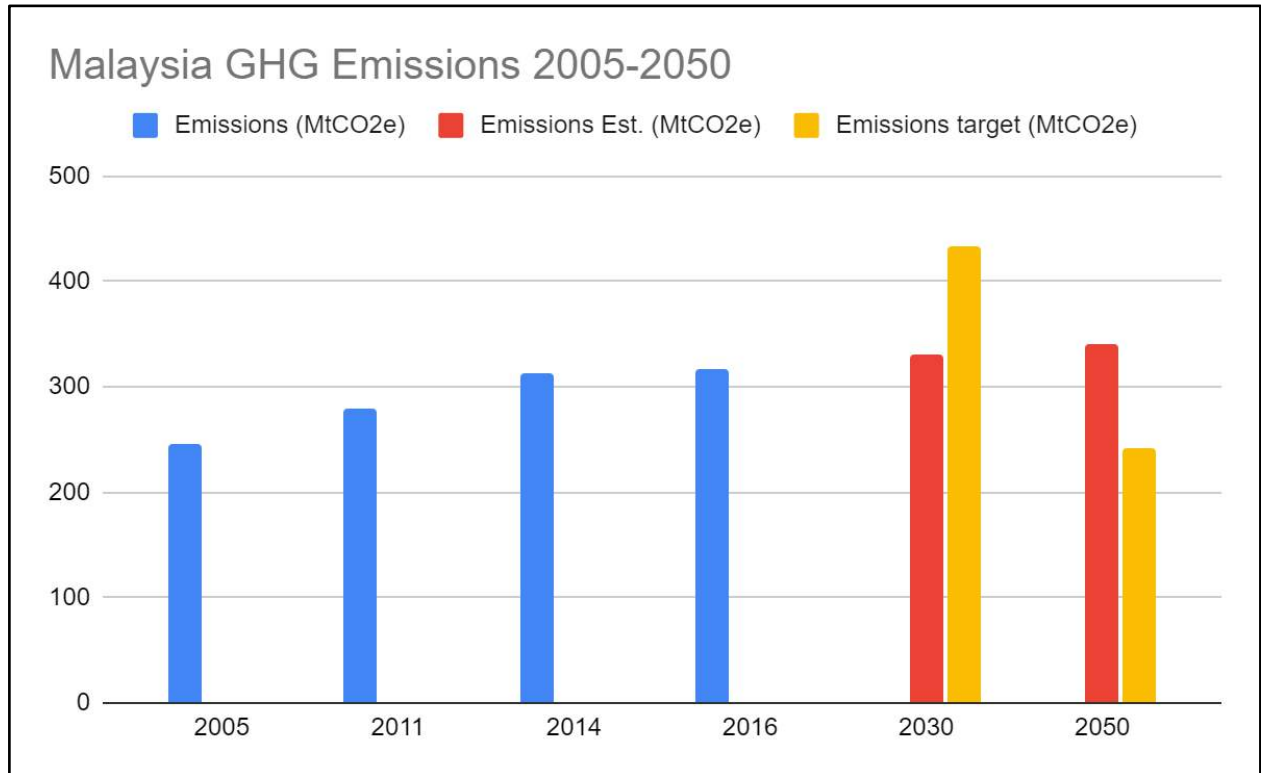


Figure 2: Malaysia projected and target greenhouse gas emissions (source: Government of Malaysia and author calculations)

While a 100 MtCO₂e reduction in carbon emissions is large, it seems within reach if one considers some of the main sources of emissions for Malaysia. Aside from increasing offsets by developing nature-based solutions, Malaysia can also reduce emissions through specific policy measures. For example, a move towards the phasing out of coal in favor of renewable and/or nuclear energy can be a major source of reduced emissions. Currently, 71.5% of Malaysian electricity emissions are from coal (Joshi et al. 2023), equivalent to 76.6 MtCO₂e, or approximately 77% of the projected 2050 emissions gap. Aside from coal, emerging technologies related to CCUS, energy efficiency and expanded public transportation are also likely to contribute to significantly lower emissions by 2050.

From a demand perspective, this suggests that the 40 MtCO₂e in carbon offsets that Malaysia might provide will not be enough to completely offset its excess emissions under a business-as-usual scenario. However, the removal or dramatic reduction of major emissions sources such as coal would significantly decrease the domestic demand for carbon offsets and could lead to excess supply.

Identifying Major Domestic Buyers

Identifying domestic buyers can be done on the basis of emissions from major sectors, and by observing the first buyers at the first auction of the Malaysian VCM.

In 2016 electricity and heat production were the largest source of emissions in Malaysia (31%), followed by transport (19%), various kinds of manufacturing (13%), oil and gas production and refining (11%), agriculture and land use change (9%), other energy production (6%) and water treatment and waste disposal (3%) (KASA as cited in Joshi 2023). Therefore energy companies, high GHG emission manufacturing (such as metals and cement production) and the oil and gas sector are likely major buyers of carbon credits, along with intermediaries from the financial sector. Looking at the buyers during the first auction of the VCM, these expectations appear to be largely met (see table 2).

A large number of first auction buyers are also government-linked companies, which is generally reflective of the Malaysian economy, where many sectors of the economy are controlled by government-linked companies (Menon and Ng 2013). In table 2, government-linked buyers are starred. Out of 12 buyers, six are government-linked. Among the different buyer types, financial intermediaries, oil and gas companies and metals producers all have two or more buyers.

Buyer Type	Buyers
Financial Intermediaries	AmBank (M) Berhad, AmBank Islamic Berhad and AmInvestment Bank Berhad CIMB Bank Berhad* Malayan Banking Berhad* MIDF Amanah Investment Bank Berhad* Permodalan Nasional Berhad*
Oil and gas	AU Synergy Sdn. Bhd. Petroleum Nasional Berhad (PETRONAS)* Yinson Holdings Berhad
Metals	Malaysia Steel Works (KL) Berhad (Masteel) Press Metal Aluminium Holdings Berhad
Manufacturing	Pet Far Eastern (M) Sdn. Bhd.
Telecommunications	Telekom Malaysia Berhad*

Table 2: Confirmed buyers grouped by sector at Bursa Carbon Exchange’s first auction in March 2023; government-linked buyers are marked with a * (Bursa Malaysia 2023).

Missing from the list of buyers at the first auction appears to be the electricity sector, including firms like Tenaga Nasional Berhad (government-owned), Malakoff Corporation Berhad and YTL Power International Berhad (both privately owned coal power-plant

operators), as well as airlines. As noted earlier, Tenaga Nasional has pledged to achieve net-zero emissions by 2050.

While this does not mean that companies in these sectors are not interested in offsetting their greenhouse gas emissions, they may have simply chosen not to participate in the first auction on the Malaysian VCM and may be following a different strategy to reach their net-zero goals.

Regulatory Issues Influencing Demand

Aside from the implementation of a carbon tax, which Malaysia has pledged to do sometime before 2026 under the 12MP, a number of international regulatory changes are also occurring.

The most controversial of these is the EU's implementation of a carbon import tax, the Carbon Border Adjustment Mechanism (CBAM). Under CBAM exporters from countries with a low (or no) carbon tax need to "top up" when their goods are imported into the EU to reflect the carbon prices of the EU's own Emissions Trading System (ETS). With prices currently (as of May 2023) ETS carbon as high as 90 euro per ton, this can make Malaysian exports targeted under CBAM uncompetitive, essentially closing the EU market to these products.

While the EU recognizes domestic carbon credit offsets purchased in exporting countries, the price difference between the exporting country's carbon credit and the EU carbon ETS price still needs to be paid when importing into the EU. For Malaysian manufacturers this becomes a strong incentive to reduce carbon emissions and to agree to buying of local carbon offsets at a relatively high price. While CBAM currently targets only a small share of ASEAN exports, its scope will likely expand in the future, and CBAM-like regulations could be adopted by other major trading partners of Malaysia as carbon prices rise (Huda 2022).

The imposition of CBAM and other climate change-related trade policies by the EU, notably against the import of palm oil, are often framed within the context of being "neoimperialist" or "neocolonial" interference within the local Malaysian political discourse, although Malaysia, often in collaboration with Indonesia, appear to be unable to affect any serious changes to these policies (Beattie 2023).

The other emerging international regulatory framework concerns the international trade of carbon credits under article 6 of the Paris Agreement. While the regulatory framework for this trade is still being developed, Malaysia's relatively large supply of nature-based carbon offsets suggests that there will be pressure from state governments, and especially Sarawak and Sabah, to allow some international transactions in carbon credits at relatively higher international prices as compared to the domestic VCM.

4.3 Carbon Credit Development Stakeholder Mapping: Mangroves in Selangor

As noted earlier, no Malaysian carbon credits have as yet been traded on Malaysia's VCM, despite the country's large potential for producing nature-based emission offset credits. To understand the challenges in developing credits, a brief stakeholder analysis of a mangrove carbon credit project in the Malaysian state of Selangor is analyzed. The stakeholder mapping is based on the unpublished work of an industry consulting project carried out by MBA students with a Malaysia-based carbon credit developer (Pathak, Rahim, and Vadivalu 2022).

Project Background

The project involves the rehabilitation and sustainable development of approximately 90,000 acres of mangrove forest (so-called "blue carbon"). The project is carried out by a private company that is fully owned by the Selangor state government through a state investment company. The project developer had engaged a local carbon credit developer to support the carbon credit creation process.

For the purposes of creating carbon credits, a special task force was created with stakeholders from the state government (forestry, irrigation and drainage, economic planning, investment division) and local councils. Because the issuing of carbon credits is relatively new, the carbon credit project developer struggled to identify the key decision makers in the project.

Although not directly involved, NGOs are seen to exert some influence on the state government to develop environmentally friendly projects (Yew and Zhu 2019). In another mangrove conservation project in Selangor, the Malaysian Nature Society (MNS) is involved in its management and a private company is supporting the project as part of their carbon offset efforts (Lye 2022).

Carbon Credit Ecosystem

Aside from the carbon credit developer, technical expertise for the project is to be provided by the consulting division of a local public university and validation by a local Verra-accredited carbon credit certifier owned by the Ministry of Trade and Industry. The main role of the carbon credit developer is to bring the partners together to create the credit, and to then find a suitable buyer for the carbon credit. This could be through the new VCM, or alternatively, through a directly negotiated arrangement with a partner in Malaysia or outside the country. Recently, national energy company PETRONAS entered into an MoU with the (also government-owned) Malaysia Forest Fund to develop carbon offset projects (Petronas 2023).

An overview of the different stakeholders and their power and interest positioning is shown in figure 3.



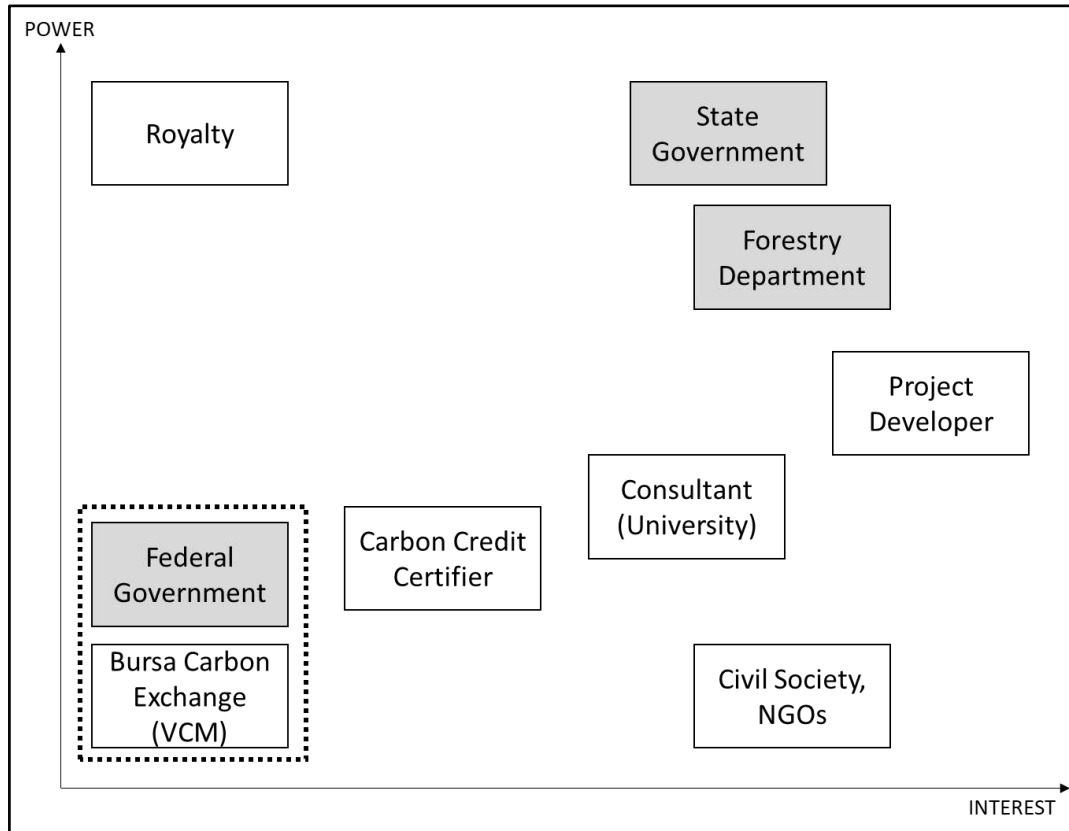


Figure 3: Power interest matrix of stakeholders in Malaysia’s carbon credit ecosystem based on a case study of a mangrove carbon credit project in Selangor (adapted from Pathak et al. (2022)). Government actors marked in gray.

Understanding Stakeholder Motivations

A key challenge in implementing the carbon credit project was the identification of the motivations of powerful decision-makers. While the project is operated by a subsidiary of the investment arm of the state government, the state government itself has an interest in the project as part of its broader environmental policy and not just as a financial investment. Furthermore, the state forestry department is responsible for the management and management plan of the mangroves, which is a key part of the issuing of the carbon credit. The forestry department’s involvement is therefore a critical part, alongside the actual project developer.

The carbon credit developers and consultants have a lower power and interest position, as they serve as facilitators and not as drivers of the carbon credit, collecting fees rather than owning the project. For the project in question, civil society and NGOs played a relatively minor role, but they may have stronger interest in specific projects.

The role of the Selangor royalty in the project should also be noted. While not directly involved, the Selangor Sultan has regularly made public statements supporting environmental

protection and forest conservation (Bernama 2023a). Given the cultural and political status of Malaysian royalty within their own states, such statements carry considerable weight. The project is carried out within a broader national context, notably policy announcements from the federal government and the creation of the Bursa VCM.

A final note about stakeholder motivations concerns the extent of government ownership: in this specific case, the project developer, consultant and carbon credit certifiers are all fully government owned. In this sense, the carbon credit creation ecosystem seems to mainly function as a platform to coordinate the activities of different government agencies, and it is plausible that policy, rather than market forces, are the main influences within this process.

5. PROSPECTS OF MALAYSIA'S VOLUNTARY CARBON MARKET

In its current form, Malaysia's VCM faces a number of obstacles, but it also presents large opportunities, especially for the East Malaysian state governments of Sabah and Sarawak. The market appears to be a precursor to a compliance market and to the international trade of carbon credits due to the adoption of the widely used international Verra standard.

Developing a Domestic Carbon Market Ecosystem

Malaysia faces a number of challenges to developing a vibrant carbon credit ecosystem. Most important is perhaps a lack of local capacity to certify carbon credits, and therefore a need to rely on international certifiers, a limitation that raises costs and the time needed to produce credits.

While the decision to follow the international Verra standard has advantages as it allows credits to be sold more easily to foreign buyers, and it is "ready made", allowing it to be implemented immediately, it also carries disadvantages. The focus on the Verra standards may preclude the creation of a local Malaysian standard, which could be less expensive and more flexible to implement. By comparison, Thailand, China and Indonesia have all created a national registry system for carbon offsets, although they have also faced occasional concerns over the quality of the system.

A further concern is the connection between the carbon market, the energy market and the unclear role of the private sector. Currently, it appears that many of the key stakeholders in the carbon market, including the certifier (SIRIM QAS), technical consultants (public universities), market platform provider (Bursa Malaysia) and main sellers (state governments) are all effectively state-controlled entities. Furthermore, Malaysia has a highly regulated energy sector which is controlled by government-owned monopoly companies such as Tenaga Nasional and Petroliam Nasional (PETRONAS) who would be major buyers of credits. Given that the VCM is currently domestic in focus, there is a high risk that crowding-out by government-linked companies will occur.

Thus the lack of a local Malaysian carbon credit standard and the need to rely on foreign certifiers, together with a lack of private sector participation, suggests that the VCM in its current form will be of limited value in stimulating private sector-led innovation.

Furthermore, because of the borderless nature of VCMs, Malaysian carbon market participants may also choose to bypass the Malaysian VCM and sell their credits directly to international buyers via VCM platforms based in other countries. While this may not necessarily harm the local ecosystem, it could harm the local BCX.

Opportunities for East Malaysia

Due to the distribution of carbon offsets mainly in East Malaysia and carbon emissions mainly in West Malaysia, the creation of a strong carbon market with high carbon credit prices could lead to significant revenue transfers from West Malaysia, and companies owned by the federal government, to the state governments of East Malaysia, who are selling carbon offsets.

This situation has important domestic political implications, as East Malaysian states have often complained about how the federal government shares revenue from oil and gas production with state governments. A low domestic carbon price can thus be seen as depriving East Malaysian states of revenue. The lack of federal funds has often been cited by the East Malaysian states as a reason to allow deforestation and land conversions.

In the past the East Malaysian states have exported energy to foreign countries and not to West Malaysia. LNG from Sarawak is mainly exported to Japan and South Korea, while West Malaysia imports inexpensive coal from Indonesia and elsewhere to meet its energy needs. It is possible that the East Malaysian states will again seek to orient their export of carbon credits to foreign buyers, while the federal government imposes some kind of export tax to support the decarbonization of West Malaysia.

Precursor to a Compliance Market

In the case of Malaysia the focus on capacity building in launching the VCM and commitments under 12MP to impose a carbon tax suggest that the VCM is seen as an intermediate step towards an eventual compliance market. By imposing a credible Verra standard on carbon offsets, Malaysia may be trying to avoid carbon credit scandals faced in China and Indonesia while allowing some form of crossover between the compliance and voluntary markets. For example, China allows 5% of power plants' emissions to be offset using voluntary credits.

Because they have a concentrated source of emissions, the Malaysian carbon tax will likely first be applied to power plants, as is the case in China and Indonesia. Once this taxation and

related emissions trading system is well-established, Malaysia may move to expand the scope of carbon taxes. This gradual expansion of the scope of carbon taxes has also been followed in Europe (Brandi 2021; Barnes 2021) and may well lead to the coexistence of a voluntary and a compliance carbon market for some time.

An important difference between the Malaysian and the Indonesian or Chinese carbon markets is size: Malaysia is a small country compared to China and Indonesia, and currently energy production and large carbon emissions are concentrated in a small number of government-linked companies.

Towards an ASEAN energy and carbon market?

One solution to create a more dynamic carbon market in the Malaysian context may be to attempt a degree of market integration with other ASEAN countries. The ASEAN grid and the related ASEAN energy market are rapidly developing, with 8 of 16 cross-border energy connections having become operational as of December 2020, although only Laos is a significant electricity exporter in ASEAN (Do and Burke 2023). Malaysia also recently lifted a ban on the export of renewable energy, which will likely attract significant investment into the sector, especially due to the prospect of exporting energy to neighboring Singapore, which has much higher energy prices.

The internationalization of energy and carbon markets would have to go hand in hand with a strategy to address the monopolistic or oligopolistic structure of the Malaysian carbon and energy markets and the large involvement of government-linked companies. As is typical of ASEAN projects, a gradual approach will likely be followed.

6. CONTRIBUTIONS AND CONCLUSION

This preceding discussion of Malaysia's VCM has highlighted the interrelated challenges faced by middle-income economies when formulating economic policies that address climate change. Carbon trading is one of the key areas where economic and environmental policies intersect and the VCM highlights the difficult choices that policy makers face, and which they may also try to avoid or delay.

Aside from striking a balance between economic growth and reducing greenhouse gas emissions, a middle-income economy like Malaysia also faces choices regarding:

- the adoption of carbon credit standards and how to develop the capacity to certify them – should Malaysia pursue a home-grown standard or adopt an international standard?
- the implementation of a carbon tax and its redistributive impact on different stakeholders and regions within the country – should Malaysia raise the cost of

emissions and deliver nature-based carbon offset providers a windfall at the expense of large domestic emitters?

- the internationalization of the carbon market – should Malaysia enable the export of carbon credits under article 6 as a way to generate export revenue and foreign investment even if this leads to higher domestic emission offset costs?
- control over carbon markets – should private or foreign entities be allowed to play a significant role and Malaysia be part of a wider ASEAN framework, or should the ecosystem be domestically focused and controlled by government-linked corporations?

In contrast to emerging and middle-income economies, high-income economies are more likely to play a role in international standard-setting and certification, and as likely buyers of carbon credits, their standards influence those of carbon-credit selling countries.

There is also no question of the potential domestic redistributive effects of a carbon tax in many high-income economies. Most high-income economies tend to have high emissions and are located outside of the tropical and subtropical climate zones which have more abundant nature-based carbon offset opportunities (Seddon et al. 2020). Therefore the domestic transfer of income from emitters to nature-based solutions providers is a moot point.

For low-income economies the export of nature-based carbon credits is attractive due to their low domestic emissions. However, middle-income economies such as Malaysia have substantial domestic emissions and this creates an incentive to only sell to domestic buyers and to not internationalize the market.

Finally, the question of control over carbon markets is relevant in Malaysia due to the monopolistic nature of its energy market and the large influence of government-linked corporations. A national electricity monopoly exists in some other middle-income economies, such as South Africa (Eskom), while China has liberalized its wholesale electricity market (Favras et al. 2022) and is using its carbon market mainly to reduce power generation by less efficient power plants (Roldao 2022).

In summary, middle-income economies with significant potential for nature-based carbon credit offsets face a number of difficult policy choices that are not faced by low-income or high-income economies in the setting up of carbon markets and implementation of carbon taxes. This more complex political-economic landscape could cause a delay in climate change policy making. Within the Malaysian context, the creation of the VCM can be seen as a compromise to deliver some policy results while delaying difficult political choices about the future of a compliance carbon market.

REFERENCES

- Abdul Aziz, Zafrul. 2022. "Budget Speech 2023." Putrajaya: Treasury, Ministry of Finance Malaysia.
- Agarwal, Vishal, Juan Carlos Arredondo, Li-Kai Chen, Vaibhav Dua, Stuart Evans, and Rohan Jain. 2022. "Scaling Carbon Markets in Malaysia | McKinsey." McKinsey. September 19, 2022. <https://www.mckinsey.com/capabilities/sustainability/our-insights/how-carbon-markets-can-help-malaysia-achieve-its-climate-targets>.
- Ahmad, Noryati. 2015. "Analysing the Price Discovery Function of Crude Palm Oil Futures (FCPO) Before and After Shari'ah-Compliance." *Asian Academy of Management Journal* 20 (2): 147–61.
- Aman, Azanis Shahila. 2023. "MITI to Launch National Industry ESG Framework by September." *New Straits Times*, June 27, 2023, sec. business. <https://www.nst.com.my/business/2023/06/924686/miti-launch-national-industry-esg-framework-september>.
- Baniya, Bishal, Damien Giurco, and Scott Kelly. 2021. "Changing Policy Paradigms: How Are the Climate Change Mitigation-Oriented Policies Evolving in Nepal and Bangladesh?" *Environmental Science & Policy* 124 (October): 423–32. <https://doi.org/10.1016/j.envsci.2021.06.025>.
- Barnes, Alex. 2021. *The Challenges and Prospects for Carbon Pricing in Europe*. Oxford Institute for Energy Studies.
- Beattie, Alan. 2023. "Rich Nations Are Not Looking Good in the Palm-Oil Dispute." *Financial Times*, March 16, 2023.
- Bernama. 2023a. "Selangor Sultan Wants State Govt to Continue Preserving Forest Reserve." *Malay Mail*, March 17, 2023. <https://www.malaymail.com/news/malaysia/2023/03/17/selangor-sultan-wants-state-govt-to-continue-preserving-forest-reserve/60220>.
- . 2023b. "RM10 MLN SEED FUND FOR MALAYSIAN-GENERATED CARBON CREDIT TO KICKSTART MARKET - PM ANWAR." *BERNAMA*, August 3, 2023, sec. news. <https://www.bernama.com/en/business/news.php?id=2171079>.
- Bhullar, Lovleen. 2013. "REDD+ and the Clean Development Mechanism: A Comparative Perspective." *International Journal of Regional, Rural and Remote Law and Policy*, no. 1: 1–8.
- Brandi, Clara. 2021. "Priorities for a Development-Friendly EU Carbon Border Adjustment (CBAM)." Briefing Paper.
- Bursa Malaysia, dir. 2022. *Launch of Malaysia's Voluntary Carbon Market Exchange (Facebook Live Recording)*. https://www.facebook.com/watch/live/?ref=watch_permalink&v=703934427663080.
- . 2023. "BURSA CARBON EXCHANGE SUCCESSFULLY COMPLETES MALAYSIA'S INAUGURAL CARBON AUCTION." Media Release. Kuala Lumpur: Bursa Malaysia. https://www.bursamalaysia.com/sites/5bb54be15f36ca0af339077a/content_entry5c11a9db758f8d31544574c6/6413da6f5b711a45ca10d6ad/files/17Mar_2023_Bursa_Carbon_Exchange_Successfully_Completes_Malaysia_s_Inaugural_Carbon_Action_.pdf.
- CEO Action Network, CAN, and CGN Climate Governance Malaysia. 2022. "Towards a Low Carbon Emissions Pathway: Industry Leadership for Climate Action - Report of

- Proceedings.” Kuala Lumpur: Bank Negara Malaysia. https://www.bnm.gov.my/documents/20124/3770663/jc3_can_cgm_report_2022.pdf.
- Chan, Hoy-Yen, Monika Merdekawati, and Beni Suryadi. 2022. “Bank Climate Actions and Their Implications for the Coal Power Sector.” *Energy Strategy Reviews* 39 (January): 100799. <https://doi.org/10.1016/j.esr.2021.100799>.
- Chung, Hailey. 2023. “Malaysia Not Ready for Carbon Tax but on Its Way, Experts Say.” *The Edge Malaysia*, June 9, 2023. <https://theedgemalaysia.com/article/malaysia-not-ready-carbon-tax-its-way-experts-say/>.
- Cooke, Fadzilah Majid, Sumei Toh, and Justine Vaz. 2011. “Malaysian Borneo: Land, People and Development.” *Community-Investor Business Models: International Institute for Environment and Development*. <https://www.jstor.org/stable/resrep16524.8>.
- Cui, Jingbo, Chunhua Wang, Junjie Zhang, and Yang Zheng. 2021. “The Effectiveness of China’s Regional Carbon Market Pilots in Reducing Firm Emissions.” *Proceedings of the National Academy of Sciences* 118 (52): e2109912118. <https://doi.org/10.1073/pnas.2109912118>.
- Do, Thang Nam, and Paul J. Burke. 2023. “Is ASEAN Ready to Move to Multilateral Cross-Border Electricity Trade?” *Asia Pacific Viewpoint* 64 (1): 110–25. <https://doi.org/10.1111/apv.12343>.
- Donald, Rachel. 2021. “Tiger Habitat Threatened by Malaysian Royals’ Mining Plans.” *Mongabay*, July 7, 2021. <https://news.mongabay.com/2021/07/tiger-habitat-threatened-by-malaysian-royals-mining-plans/>.
- Engels, Anita. 2018. “Understanding How China Is Championing Climate Change Mitigation.” *Palgrave Communications* 4 (1): 1–6. <https://doi.org/10.1057/s41599-018-0150-4>.
- Fa, Julia E, James Em Watson, Ian Leiper, Peter Potapov, Tom D Evans, Neil D Burgess, Zsolt Molnár, et al. 2020. “Importance of Indigenous Peoples’ Lands for the Conservation of Intact Forest Landscapes.” *Frontiers in Ecology and the Environment* 18 (3): 135–40. <https://doi.org/10.1002/fee.2148>.
- Fatras, Nicolas, Zheng Ma, Hongbo Duan, and Bo Nørregaard Jørgensen. 2022. “A Systematic Review of Electricity Market Liberalisation and Its Alignment with Industrial Consumer Participation: A Comparison between the Nordics and China.” *Renewable and Sustainable Energy Reviews* 167 (October): 112793. <https://doi.org/10.1016/j.rser.2022.112793>.
- Guigon, Pierre. 2010. “Voluntary Carbon Markets: How Can They Serve Climate Policies?” *OECD Environment Working Papers* 19. Vol. 19. *OECD Environment Working Papers*. <https://doi.org/10.1787/5km975th0z6h-en>.
- Gverdtiteli, Gvantsa. 2023. “Authoritarian Environmentalism in Vietnam: The Construction of Climate Change as a Security Threat.” *Environmental Science & Policy* 140 (February): 163–70. <https://doi.org/10.1016/j.envsci.2022.12.004>.
- Hawn, A. 2005. “Horses for Courses: Voluntary vs CDM Projects in Mexico, Ed.” *R. Bayon. San Francisco: Ecosystem Marketplace. Available Online: Http://Ecosystemmarketplace.Com/Pages/Article.News.Php*.
- Hazim, Anis. 2021. “Govt Agrees for Voluntary Carbon Markets Development.” *The Malaysian Reserve*, September 20, 2021, sec. News. <https://themalaysianreserve.com/2021/09/20/govt-agrees-for-voluntary-carbon-markets-development/>.

- Hou, Liqiang. 2022. "Nation Set to Relaunch Carbon Cut Program." *China Daily*. June 14, 2022. <https://www.chinadaily.com.cn/a/202206/14/WS62a7c524a310fd2b29e62750.html>.
- Huda, Mirza Sadaqat. 2022. "The Implications of EU's CBAM for Southeast Asia." *FULCRUM* (blog). August 19, 2022. <https://fulcrum.sg/the-implications-of-eus-cbam-for-southeast-asia/>.
- Jacobs, Michael. 2013. "Green Growth: Economic Theory and Political Discourse." In *Handbook of Global Climate and Environmental Policy*, edited by R Falkner. Oxford: Wiley Blackwell.
- Jeong, Minhyuk, Sungchun Kim, Eojin Yi, and Kwangwon Ahn. 2023. "Market Efficiency and Information Flow between the Crude Palm Oil and Crude Oil Futures Markets." *Energy Strategy Reviews* 45 (January): 101008. <https://doi.org/10.1016/j.esr.2022.101008>.
- Joshi, Darshan, Dhana Raj Markandu, Rueben Clements Gopalsamy, Chun Sheng Goh, and Alizan Mahadi. 2023. "Carbon Pricing and the Business Case for Emissions Reductions and Nature Conservation in Malaysia." Technical. Kuala Lumpur: Asia Foundation. <https://asiafoundation.org/wp-content/uploads/2023/04/Carbon-Pricing-and-the-Business-Case-for-Emissions-Reductions-and-Nature-Conservation-in-Malaysia.pdf>.
- Jun, Soo Wern. 2021. "Selangor Govt Approves Degazettement of Kuala Langat North Forest Reserve, 536.7ha to Be Developed." *Malay Mail*, August 30, 2021. <https://www.malaymail.com/news/malaysia/2021/08/30/selangor-govt-approves-degazettement-of-kuala-langat-north-forest-reserve-5/2001549>.
- KASA, Ministry of Environment and Water. 2021. "National Guidance on Voluntary Carbon Market Mechanisms." Ministry of Environment and Water (KASA). <https://www.nrecc.gov.my/ms-my/teras/alamsekitar/Documents/National-Guidance-on-Voluntary-Carbon-Market-Mechanisms.pdf>.
- Koh, Lian Pin, Yiwen Zeng, Tasya Vadya Sarira, and Kelly Siman. 2021. "Carbon Prospecting in Tropical Forests for Climate Change Mitigation." *Nature Communications* 12 (1): 1271. <https://doi.org/10.1038/s41467-021-21560-2>.
- Kollmuss, Anja, Helge Zink, and Clifford Polycarp. 2008. "Making Sense of the Voluntary Carbon Market: A Comparison of Carbon Offset Standards." *WWF Germany*, 1–23.
- Kreibich, Nicolas, and Lukas Hermwille. 2021. "Caught in between: Credibility and Feasibility of the Voluntary Carbon Market Post-2020." *Climate Policy* 21 (7): 939–57. <https://doi.org/10.1080/14693062.2021.1948384>.
- Law, Yao-Hua. 2022. "Malaysia's Johor Royals Linked to Forests Felled for Oil Palm Plantations without Full Approval." *South China Morning Post*, July 24, 2022. <https://www.scmp.com/week-asia/health-environment/article/3186193/malaysias-johor-royals-linked-forests-felled-oil-palm>.
- Lim, Byeongho, Kyoungseo Hong, Jooyoung Yoon, Jeong-In Chang, and Inkyo Cheong. 2021. "Pitfalls of the EU's Carbon Border Adjustment Mechanism." *Energies* 14 (21): 7303.
- Loh, SK, AB Nasrin, MA Sukiran, NA Bukhari, N Muzammil, RA Stasha Eleanor, and AA Astimar. 2020. "The Future of Biogas in the Malaysian Palm Oil Industry: Why Need Methane Capture?" *Palm Oil Developments* 72: 1–7.
- Lye, Gerard. 2022. "UMW Toyota Motor Strives to Achieve Carbon Neutrality by 2050 through Mangrove Reforestation Initiative." *Paultan.Org* (blog). July 27, 2022. <https://paultan.org/2022/07/27/umw-toyota-motor-strives-to-achieve-carbon-neutrality-by-2050-through-mangrove-reforestation-initiative/>.
- Malaysia. 2020. "Malaysia. Biennial Update Report (BUR). BUR 3." UNFCCC. December 31,

2020.
https://unfccc.int/documents/267685?gclid=CjwKCAjw04yjBhApEiwAJcvNoZ9Baw8bTysg8CQfPn5IP77QCgM2MZH-KTbL5SOMZ73KiBC_-mmvqBoCR50QAvD_BwE.
- Manaf, Fatimah. 2022. "Bursa Malaysia to Launch the Voluntary Carbon Market." *Revon Media*, January 11, 2022, sec. @green. <https://revonmedia.com/2022/01/11/bursa-malaysia-to-launch-the-voluntary-carbon-market/>.
- Menon, Jayant, and Thiam Hee Ng. 2013. "Are Government-Linked Corporations Crowding Out Private Investment in Malaysia?" SSRN Scholarly Paper. Rochester, NY. <https://doi.org/10.2139/ssrn.2262603>.
- Michaelowa, Axel, and Katharina Michaelowa. 2007. "Climate or Development: Is ODA Diverted from Its Original Purpose?" *Climatic Change* 84 (1): 5–21. <https://doi.org/10.1007/s10584-007-9270-3>.
- Microsoft. 2023. "Microsoft Carbon Dioxide Removal Program." Microsoft Sustainability. 2023. <https://www.microsoft.com/en-us/corporate-responsibility/sustainability/carbon-removal-program>.
- Ministry of Energy and Natural Resources, KETSA. 2021. *Malaysia Policy on Forestry*. Putrajaya: Ministry of Energy and Natural Resources (KETSA). [https://www.nrecc.gov.my//ms-my/pustakamedia/Penerbitan/Malaysia%20Policy%20on%20Forestry%20\(Ver%2020\).pdf](https://www.nrecc.gov.my//ms-my/pustakamedia/Penerbitan/Malaysia%20Policy%20on%20Forestry%20(Ver%2020).pdf).
- Müller, Benito, and Axel Michaelowa. 2019. "How to Operationalize Accounting under Article 6 Market Mechanisms of the Paris Agreement." *Climate Policy* 19 (7): 812–19. <https://doi.org/10.1080/14693062.2019.1599803>.
- Nguyen, Thi Phuoc Lai, Salvatore G. P. Viridis, and Thanh Bien Vu. 2023. "'Matter of Climate Change' or 'Matter of Rapid Urbanization'? Young People's Concerns for the Present and Future Urban Water Resources in Ho Chi Minh City Metropolitan Area, Vietnam." *Applied Geography* 153 (April): 102906. <https://doi.org/10.1016/j.apgeog.2023.102906>.
- Pathak, Sudhanshu, Iskandar Rahim, and Thiagu Vadivalu. 2022. "ASB Action Learning Final Presentation: Carbon Offset Malaysia." Unpublished presented at the ASB MBA Action Learning Symposium, Kazanah Auditorium, Asia School of Business Akademik, 11 Jalan Dato Onn, Kuala Lumpur, December 15.
- Petronas. 2023. "PETRONAS Partners with Malaysia Forest Fund to Explore High-Quality Nature-Based Solutions Projects." Petronas Global. May 31, 2023. <https://www.petronas.com/media/media-releases/petronas-partners-malaysia-forest-fund-explore-high-quality-nature-based>.
- Roldao, Renato. 2022. "Carbon Trading the Chinese Way." *Energy Monitor* (blog). January 5, 2022. <https://www.energymonitor.ai/policy/carbon-markets/carbon-trading-the-chinese-way/>.
- Rosales, Raúl C, Priya Bellino, Marwa Elnahass, Harald Heubaum, Philip Lim, Paul Lemaistre, Kelly Siman, and Sofie Sjögersten. 2021. "Voluntary Carbon Markets in ASEAN: Challenges and Opportunities for Scaling Up." London: S.
- Sallehuddin, Qistina. 2023. "Govt Lifts Ban on Renewable Energy Export." *New Straits Times*, May 9, 2023, sec. nation. <https://www.nst.com.my/news/nation/2023/05/907420/govt-lifts-ban-renewable-energy-export>.

- Sankar, Giridhar. 2020. "Supply and Demand Evolution in the Voluntary Carbon Credit Market." *Kleinman Center for Energy Policy, University of Pennsylvania, Philadelphia*.
- Securities Commission Malaysia. 2022. "Key Developments - 3rd Quarter 2022." Securities Commission Malaysia. 2022. <https://www.sc.com.my/api/documentms/download.ashx?id=6fa7477a-40ea-4047-ad50-e30173dd5c5f>.
- Seddon, Nathalie, Alexandre Chausson, Pam Berry, Cécile A. J. Girardin, Alison Smith, and Beth Turner. 2020. "Understanding the Value and Limits of Nature-Based Solutions to Climate Change and Other Global Challenges." *Philosophical Transactions of the Royal Society B: Biological Sciences* 375 (1794): 20190120. <https://doi.org/10.1098/rstb.2019.0120>.
- Statistics Malaysia. 2018. "Malaysia: Forested and Non Forested Area by State." Statista. 2018. <https://www.statista.com/statistics/948454/malaysia-forested-and-non-forested-area-share-by-state/>.
- Stegemann, Laura, and Marinus Ossewaarde. 2018. "A Sustainable Myth: A Neo-Gramscian Perspective on the Populist and Post-Truth Tendencies of the European Green Growth Discourse." *Energy Research & Social Science, Sustainable energy transformations in an age of populism, post-truth politics, and local resistance*, 43 (September): 25–32. <https://doi.org/10.1016/j.erss.2018.05.015>.
- Stek, Pieter E. 2023. "Malaysia's New Voluntary Carbon Market Disappoints." *Eco-Business*. March 23, 2023. <https://www.eco-business.com/opinion/malysias-new-voluntary-carbon-market-disappoints/>.
- Streck, Charlotte. 2021. "How Voluntary Carbon Markets Can Drive Climate Ambition." *Journal of Energy & Natural Resources Law* 39 (3): 367–74. <https://doi.org/10.1080/02646811.2021.1881275>.
- Streck, Charlotte, Melaina Dyck, and Danick Trouwloon. 2022. "What Is the Role of Carbon Standards in the Voluntary Carbon Market?" *Vcmprimer.Org* (blog). January 13, 2022. <https://vcmprimer.org/chapter-7-what-is-the-role-of-carbon-standards-in-the-voluntary-carbon-market/>.
- Sun, Dong, Jingqi Sun, Xingping Zhang, Qingyou Yan, Qianru Wei, and Yun Zhou. 2016. "Carbon Markets in China: Development and Challenges." *Emerging Markets Finance and Trade* 52 (6): 1361–71. <https://doi.org/10.1080/1540496X.2016.1152811>.
- Susskind, Lawrence, Jungwoo Chun, Selmah Goldberg, Jessica A. Gordon, Griffin Smith, and Yasmin Zaerpoor. 2020. "Breaking Out of Carbon Lock-In: Malaysia's Path to Decarbonization." *Frontiers in Built Environment* 6 (March): 21. <https://doi.org/10.3389/fbuil.2020.00021>.
- Taghikhah, Firouzeh, Alexey Voinov, and Nagesh Shukla. 2019. "Extending the Supply Chain to Address Sustainability." *Journal of Cleaner Production* 229 (August): 652–66. <https://doi.org/10.1016/j.jclepro.2019.05.051>.
- Tan, Vincent. 2022. "Sabah 100-Year Carbon Trading Deal: Controversy as Indigenous Communities Bemoan Lack of Consultation, Details." *Channel News Asia*, March 15, 2022. <https://www.channelnewsasia.com/asia/sabah-nature-conservation-agreement-carbon-trading-hoch-standard-singapore-2562841>.
- Tan, Zhai Yun. 2021. "COP 26: Malaysia Focusing on Climate Ambitions, Financing, Carbon Markets." *The Edge Malaysia*, August 11, 2021. <https://theedgemalaysia.com/article/cop-26-malaysia-focusing-climate-ambitions->

financing-carbon-markets.

- Tarazkar, Mohammad Hassan, Navid Kargar Dehbidi, Ilhan Ozturk, and Usama Al-mulali. 2021. "The Impact of Age Structure on Carbon Emission in the Middle East: The Panel Autoregressive Distributed Lag Approach." *Environmental Science and Pollution Research* 28 (26): 33722–34. <https://doi.org/10.1007/s11356-020-08880-4>.
- The Borneo Post. 2023. "Abg Jo: Carbon Credits Could Bring in up to RM1.09 Bln Annually." *The Borneo Post*, March 15, 2023, sec. Sarawak. <https://www.theborneopost.com/2023/03/15/abg-jo-carbon-credits-could-bring-in-up-to-rm1-09-bln-annually/>.
- Wang, Qiang, Jiaqi Guo, and Zequn Dong. 2021. "The Positive Impact of Official Development Assistance (ODA) on Renewable Energy Development: Evidence from 34 Sub-Saharan Africa Countries." *Sustainable Production and Consumption* 28 (October): 532–42. <https://doi.org/10.1016/j.spc.2021.06.007>.
- White, Michael J., and Lori M. Hunter. 2009. "Public Perception of Environmental Issues in a Developing Setting: Environmental Concern in Coastal Ghana." *Social Science Quarterly* 9 (4): 960–82. <https://doi.org/10.1111/j.1540-6237.2009.00672.x>.
- World Bank. 2022. "Exports of Goods and Services (% of GDP) - Malaysia." World Bank Open Data. 2022. <https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=MY>.
- World Resources Institute. 2023. "Total Greenhouse Gas Emissions (Kt of CO2 Equivalent)." World Bank Open Data. 2023. <https://data.worldbank.org>.
- Yew, Wei Lit, and Zi Zhu. 2019. "Innovative Autocrats? Environmental Innovation in Public Participation in China and Malaysia." *Journal of Environmental Management* 234 (March): 28–35. <https://doi.org/10.1016/j.jenvman.2018.12.081>.
- Zahiid, Syed Jaymal. 2021. "Carbon Trading, Already a Complex Mechanism, to Be Made Shariah-Compliant, Parliament Told." *Malay Mail*, December 1, 2021, sec. Malaysia. <https://www.malaymail.com/news/malaysia/2021/12/01/carbon-trading-already-a-complex-mechanism-to-be-made-shariah-compliant-par/2025078>.
- Zhang, Shengling, Zihao Wu, Yao Wang, and Yu Hao. 2021. "Fostering Green Development with Green Finance: An Empirical Study on the Environmental Effect of Green Credit Policy in China." *Journal of Environmental Management* 296 (October): 113159. <https://doi.org/10.1016/j.jenvman.2021.113159>.
- Zhou, Kaile, and Yiwen Li. 2019. "Carbon Finance and Carbon Market in China: Progress and Challenges." *Journal of Cleaner Production* 214 (March): 536–49. <https://doi.org/10.1016/j.jclepro.2018.12.298>.

APPENDIX

Historical and projected Malaysian gross domestic product and greenhouse gas emissions are calculated based on figures disclosed in Malaysia's BUR3 and on the following assumptions:

1. 4.7% annual economic growth between 2016-2030 (same as 2011-2016) and 2.7% annual growth between 2031-2050; higher economic growth would likely increase greenhouse gas emissions.
2. 0.3% annual growth in greenhouse gas emissions between 2016-2030 (compared to 0.4% annual growth between 2011-2016) and 0.15% annual growth between 2031-

2050. Emissions growth is likely to fall “naturally” due to several factors, including technological changes and also an aging population (Tarazkar et al. 2021).

Year	GDP (mRM, 2010c)	Emission intensity (kgCO ₂ e/RM)	Total emissions (MtCO ₂ e)	Emissions target (MtCO ₂ e)
2005	659,639	0.373	245.797	
2011	864,920	0.323	278.982	
2014	1,012,449	0.309	313.073	
2016	1,108,935	0.286	316.833	
Proj. 2030	2,109,403	0.205	330.403	432.744*
Proj. 2050	3,593,921	0.095	340.457	241.345**

Table 3: Detailed calculations of Malaysia greenhouse gas emission projections and targets.

* target estimated based on emissions intensity falling by 45% compared to 2005

** target estimated based on 2016 Malaysia LULUCF contribution of 241.35 MtCO₂e; target is exceeded by projected total emissions in 2050.