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Carbon Emission in Malaysia: Trends and Initiatives of Government

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Abstract

Malaysia is one of the world's most vulnerable countries to global warming and climate change, mainly brought on by the release of greenhouse gases (GHG) from the burning of fossil fuels (Knoema, 2021). In 2015, Malaysia committed to the Paris Climate Accord, working with the rest of the world to reduce carbon emissions and keep the rise in temperature to 1.5 °C. The increased use of electricity, transportation, and the growing rate of industrialization are among the factors that lead to a higher temperature in the atmosphere. Thus, several initiatives have been taken by the government to overcome the issue. This paper aims to provide a brief overview of the carbon emission trends and initiatives of the government toward global warming in Malaysia.

Keywords: Carbon Emission, Factors, Trends, Initiatives, Malaysia

Introduction

The repercussions of climate change are becoming more apparent in every region and continent, and it negatively impacts the economy and people's lives. It is expected that weather patterns to change, sea levels to rise, and the intensity of extreme weather events to increase due to excessive industrial activities (United Nations, 2020). Although these changes could be the consequence of natural processes, human actions have been recognized as the main cause to accelerate the event, which already started in the 1800s (United Nations, 2020). The Earth is warming faster than at any other time in recorded history due to GHG covering the planet and trapping the sun's heat.

From a real statement, 2019 was the second warmest year and marked the conclusion of the most generous ten-year period (2010–2019) (United Nations, 2020). In 2020, it was anticipated that the COVID-19 pandemic-related travel bans and economic slowdowns would reduce GHG by 6%. However, this improvement is only temporary. The pace of global

warming has not slowed. Emissions are projected to climb once the global economy has recovered from the pandemic (United Nations, 2020). A worldwide energy catastrophe has now been caused by Russia's invasion of Ukraine. The world is currently experiencing its first major energy crisis, which is unprecedented in its scope and complexity. According to the World Energy Outlook 2022, which was published on October 27, 2022, Russia's invasion of Ukraine is a pivotal moment in the history of the world's energy markets and offers an unmatched incentive to hasten the switch to clean energy sources of fuel (International Energy Agency, 2022).

The terrifying prospect of irreversible global warming must be accepted by humanity. Since the repercussions of the climate catastrophe are being felt by countries worldwide, there is no longer any safe place on Earth. As temperatures continue to rise and forest fires spread like wildfires, all life on Earth is now in immediate danger. With 225 million tonnes of carbon dioxide (CO₂) released in 2019, Malaysia is one of the ASEAN region's top emitters of CO₂ (Muhammad, 2021). Malaysia and other developing nations which are Singapore and Indonesia are responsible for between 39 and 47 percent of global CO₂ emissions, rising global air temperatures, warming the upper oceans, and degrading resources such as soil, water, and air (Muhammad, 2021).

Malaysia is vulnerable to global warming. It is a typical Southeast Asian nation that has a developed economy and a moderately sized population compared to its land area. As the country has grown, energy and carbon emissions have been a concern for Malaysia (Energy Commission, 2017). In addition, the levels of CO₂ emissions produced by Asian countries are highly variable and Southeast Asia is a center of economic expansion which is expected to produce more CO₂. While concerning carbon emissions, Malaysia's average surface temperature could rise by 3 to 5 degrees Celsius by 2100. (Energy Commission, 2017). Immediate action to reduce emissions is required to prevent the worst sequels of the climate crisis. On the other hand, the question of how the responsibility should be divided up between the various areas, nations, and individuals has been a topic of ongoing discussion at a global level (Shaftel, 2022). Therefore, this study aims to show the trends of carbon emissions and the initiatives by the government to combat the issue so that it can give the audience an overview of the current situation and help the authorities in planning for a better future.

Trends of Carbon Emission in Malaysia

In Malaysia, there has been a general tendency toward reducing global warming over the previous few decades. The primary source of climate change is the generation of CO₂, which is a major contributor to this problem. CO₂ emissions are produced by both cement manufacture and fossil fuel burning, resulting from the combustion of solid, liquid, and gaseous fuels (Knoema, 2021). According to recent estimates, CO₂ emissions will continue to rise as the Malaysian economy expands. Science has demonstrated that the amount of GHG produced by humans, such as CO₂ influences the total extent of global warming (Babatunde et al., 2018).

Figure 1 shows the annual carbon emission of Malaysia from 1970 to 2020. The overall trends slightly increased from 1970 to 1998 together with decreased for certain years but dropped significantly in 2000. According to the Global Carbon Project, deforestation-related CO₂ emissions decreased globally by 25% in that year. This is mostly because tropical deforestation has decreased, which is supported by reports of satellite data over the Brazilian Amazon and Indonesia (Jha, 2021). Nevertheless, Malaysia's industrial and fossil fuel CO₂

emissions have significantly increased since 2000. Overall, Malaysia's CO₂ emissions increased at an average yearly rate of 6.12% from 14.7 million tonnes in 1972 to 251.6 million tonnes in 2021 (Ritchie et al., 2020).

The figures are based on "production" or "territorial" emissions, such as those from combusting fossil fuels or making cement within a country's borders. It excludes other GHG like nitrous oxide and methane from consideration, instead focusing solely on CO₂ emissions (Ritchie et al., 2020). The line graph also demonstrates that Malaysia's carbon emissions declined from 264.7 million tonnes in 2019 to 262.2 million tonnes in 2020, a decrease of 0.95 percent. Meanwhile, it also decreased to 251.6 million tonnes of emissions in 2021. The global proliferation of COVID-19 and the establishment of lockdown procedures in other countries, including Malaysia itself, were the cause of the emissions decline in 2021 (Tan et al., 2021). However, during the lockdown time, environmentalists advise people to live more sustainably because they predict a large increase in global carbon emissions after the epidemic (Farudin, 2022).

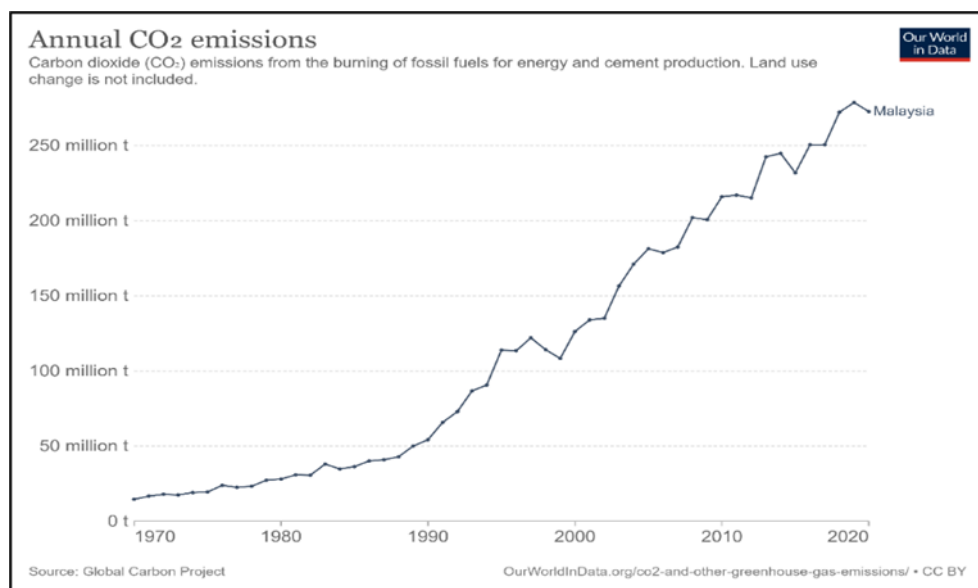


Figure 1. Annual Carbon Emission 1970-2020 in Malaysia
Source: Our World in Data based on the Global Carbon Project

Since 2000, the level of CO₂ in the atmosphere has risen to a higher concentration in the atmosphere as a direct result of the actions of humans, more specifically the burning of fossil fuels, using coal and oil. This rise in the concentration of CO₂ in the atmosphere is directly attributable to humans. When fossil fuels like coal or oil are burned, the carbon and oxygen in the atmosphere combine to generate CO₂, which is the gas that is ultimately accountable for this occurrence. The heat and power industries are responsible for the most significant amount of Malaysia's GHG emissions (Ritchie et al., 2020). Rising energy demand places pressure on the government to choose cheaper energy sources when renewable alternatives become too expensive as the country tries to attain a high-income economy by 2020. The electricity sector also has made relatively little progress in terms of analyzing the current situation and figuring out efficient emissions reduction plans (Huda et al., 2017). To solve the issue, numerous studies have been done to find effective strategies including those on biological carbon fixation, technologies for carbon capture and utilization (Daneshvar et al., 2022).

Next, transportation is considered as 2nd contributor to GHG production since it uses many fossil fuels. The burning of fuel in this sector was responsible for a total of 8,040 million tonnes of GHG emissions in 2017, placing it in second place among other economic sectors in terms of total CO₂ emissions (24.5% of total emissions) and accounting for 18% of global manufactured economy emissions (Huizenga et al., 2017). For instance, the transportation sector consumes the vast majority of its energy in the form of fossil fuels in the seven economies responsible for generating the most CO₂ worldwide (Solaymani, 2019). Land transportation is not only the most polluting but also the most difficult to decarbonize of the many modes of transportation (Giannakis et al., 2020).

In Malaysia, the transportation industry is responsible for 28% of all CO₂ emissions, with 86% of those emissions coming from road transportation. The level of CO₂ emissions is anticipated to rise along with the demand for transportation services. Therefore, Malaysia aims to mitigate its CO₂ emissions by up to 40% by 2020, and the importance of road transportation in this effort cannot be overstated (Mustapa et al., 2016). The newest innovation in environmentally and economically sustainable company practices is green logistics. A growing number of logistics companies are implementing green logistics to combat global warming (Lew et al., 2018). In addition, globalization and industrialization are occurring everywhere, and the world's ecosystem is deteriorating. Using alternative fuels in the aviation industry may reduce flight-related GHG emissions by 60 to 80 percent, according to estimates (Lew et al., 2018).

Besides, industrialization is the next contributor to emissions. The burning of fossil fuels to produce energy results in emissions, most of which are linked to manufacturing products such as clothing, plastics, electronics, and other building materials. Gaseous emissions are produced whenever mining or any other industrial process is carried out (Lee et al., 2018). The manufacturing industry in Malaysia plays an essential part to reduce carbon emissions since the sector contributes a lot to the climate crisis. Since the energy sector is responsible for practically all carbon emissions, energy policies and the regulatory frameworks that go along with them are necessary to fulfill the obligations laid out in the Kyoto Protocol (Lee et al., 2018).

Deforestation also is regarded as one of the factors that make the country's temperature higher. When trees are cut down to make pastures, farms, or for any other reason, they release the carbon they have been holding. Due to forests' ability to absorb CO₂, destroying them reduces nature's capacity to keep emissions out of the atmosphere. Carbon dioxide equivalents (COEs) are often used to measure GHG emissions generated by human activity, whether they are emitted directly or indirectly. One of the most important tools for assessing environmental safety and health is the carbon footprint (Ercan et al., 2016).

Furthermore, urbanization affects the emission release into the atmosphere as more people move to that area and pollute the air quality there through transportation. Human activities are significantly altered due to urbanization, both a migratory and transforming phenomenon. Investigating the relationship between GHG emissions and urbanization is critical for Malaysia to meet its pollution reduction targets (Bekhet et al., 2017). CO₂ emissions will continue to rise due to urbanization, followed by an increase in the carbon intensity of energy. Due to urbanization, city growth, and land use inequalities, some places are experiencing a faster increase in carbon emissions than others. Southeast Asia's carbon emission records are no exception to this rule (Sarkar et al., 2018).

The Initiatives of Government Towards Global Warming

Malaysia must envision acceptable frameworks for the future concerning climate change challenges, potential modifications, and national activities while formulating measures to lessen vulnerabilities. This is insufficient, and without additional steps, it is anticipated that emissions would increase, with some regions, particularly those with high output, and developing nations expected to see even greater pollution. As a long-term policy, the Malaysian government is committed to raising environmental awareness (Jinggut et al., 2018). Malaysia has ratified the Kyoto and Paris agreements, which were signed in 1997 and 2015, respectively, to tackle the issue of global heating and climate crisis. A 40 percent reduction (compared to 2005 levels) by 2020, a 45 percent reduction (compared to 2005) by 2030, and achieving a net zero by 2050 are only three lofty goals the country has set for itself to overcome the issues (Begum, 2017).

According to an agreement in Paris in 2015, the rise in world average temperature throughout this century should be kept from exceeding 2 degrees Celsius over pre-industrial stages. It is the first global accord requiring all countries to reduce their GHG emissions (Dimitrov, 2016). This agreement operates horizontally and vertically in its management since climate governance is a global issue that impacts all governments equally. Through this agreement, Malaysia has strongly emphasized global transparency for national mitigation activities, mitigation and adaptation, financial support, technological transfer, and comfort (Dimitrov, 2016). According to the Paris Agreement, each party is required to implement a new National Determined Contribution (hence referred to as an "NDC") every five years to reflect their headway and aspirations (Wilhite et al., 2016).

The Malaysian government started working on a framework for its national carbon disclosure program in May 2012. In a four-month project called MYCarbon, which stands for a National Corporate GHG Reporting Programme in Malaysia, the Ministry of Natural Resources and Environment (NRE) and the United Nations Development Programme (UNDP) collaborated. Engaging businesses and sectors using green technologies and carbon reduction is a strategic move. The National GHG Centre under the Minister of Environment and Water was established by the Malaysian government to strengthen openness in environmental data and information reporting and to boost investor confidence in low-carbon investment, among other measures, to improve climate change governance in the country (Ministry of Environment and Water, 2021). All these reporting policies will encourage the companies to disclose their dangerous activities to the Earth and therefore emissions can be reduced as they want to keep their names decent in the eyes of investors.

Additionally, change detection analysis was conducted in Malaysia for certain areas such as commercial forest reserves, protected areas, and places that did not have any designation of the forest's use. The transformation of the forest into an oil palm plantation was examined in the analysis to prevent deforestation. United Nations Framework Convention on Climate Change (UNFCCC) mechanism called "Reduced Emissions from Deforestation and Degradation" proposes using these data for continuous efforts to keep an eye on things from a distance, such as the impact deforestation has on carbon emissions. The UNFCCC is an international organization aimed at curbing emissions of climate-warming gases (Morel, 2012).

Many countries have proved their commitment to renewable energy sources to reduce carbon emissions considerably. In combating global warming, a renewable energy production is a viable option (Ghazali et al., 2021). Malaysia has implemented Minimum Energy

Performance Standards (MEPS) since 2013 to encourage energy efficiency. To assess the sales volume of MEPS-compliant instruments and therefore calculate the overall electricity usage and savings, the study collected sales data from 2013 to 2015. Additionally, the rising electricity cost burdens the citizens and the environment, particularly in the backcountry. Solar energy has become increasingly popular as an alternative energy source in nations like Malaysia due to its potential as a renewable energy source in the country's tropical climate (Alam et al., 2014).

In assisting Malaysia to establish itself as a green technology center by 2030 and support the achievement of the National Green Technology Master Plan's objectives (2017–2030) was also introduced. It signifies an important turning point in the nation's quest for sustainable economic growth which includes short, medium, and long-term goals that fall under the several Malaysia Plans (Ministry of Energy, Green Technology and Water, 2017). Among the important strategic goal is to accelerate the development of human capital for sustainable growth. The ability to meet local and worldwide market demand for green technology projects, the creation of possibilities, and helping to boost the national economy should be the driving forces behind these efforts. The Ministry of Energy, Science, Technology, Environment, and Climate Change is responsible for GreenTech Malaysia (MESTECC). Additionally, the current administration has made the fight against climate change and developing green technologies a national priority (Jaafar et al., 2014).

Consequently, the government is exerting a lot of effort through the Malaysian Green Technology Corporation to propose the Low Carbon Cities Framework (LCCF). A low-carbon city design guideline, measurement, and reporting technique, and an assessment and recognition program are some of the components that make up the framework of LCCF as guidance. Low Carbon Cities (LCCs) provide high energy efficiency, use renewable energy, produce the least amount of pollution feasible, use land efficiently, recycle materials, and convert waste to electricity. LCCs are fundamentally cities that adopt and incorporate sustainable development concepts to contribute as little as possible to global warming (Ministry of Energy, Green Technology and Water, 2017). Therefore, the Low Carbon Cities Fund was established to urge city governments to act because cities are liable for as much as 70% of the entire world's carbon emissions (Khoo, 2019).

The security of the energy supply was enhanced during the Tenth Malaysia Plan (2011-2015), also known as the RMK-10 plan era, to satisfy the rising energy demand. Through resource diversification, efforts were made to safeguard the long-term viability of the energy sector through ongoing spending on new construction and technology development. The addition of domestic reserves to ongoing investments improved energy security (Ministry of Energy, Green Technology and Water, 2017). Besides, initiatives to increase production and efficiency as well as to use resources more effectively were implemented. In Malaysia, there have been many policies, legislations, and actions put in place for CO₂ emission reduction significantly. Overall, the government may be able to accomplish its goal with the support of effective policies by boosting the use of renewable sources, developing low-carbon cities, enhancing reporting policies, and many more (Raihan et al., 2022). However, to achieve a comprehensive result, every stakeholder not only the government must involve together in ensuring that the reduction of emissions can happen soon. Efforts to implement resource-saving measures must be done over time and with consistency by every individual and organization.

Conclusion

This research would help raise awareness among Malaysia's stakeholders about the need to fight global warming and prevent the temperature from rising above 1.5 °C. Stakeholders in Malaysia include citizens, government officials, businesses, and regulators. It is the responsibility of individuals and organizations to be informed about the trends in Malaysia's carbon emissions and to support the government's efforts to reduce carbon release. Therefore, this article will add to educational knowledge and gives a piece of significant information to readers for ensuring that global warming is controlled for a better generation, a healthier globe, and sustainable earth growth. This study has emphasized current elements in Malaysia that make it different than other existing knowledge that more prioritized carbon performance, carbon disclosure, and its relations with corporate governance.

Recent projections state that as Malaysia's economy grows, CO₂ emissions will continue to climb. Science has shown that human-produced GHG like CO₂ have an impact on the overall severity of global warming (Babatunde et al., 2018). In general, CO₂ emissions marginally climbed from 1970 to 1998, declined in some years, and then sharply decreased in 2000. However, Malaysia's CO₂ emissions have substantially increased since 2000. Overall, Malaysia's CO₂ emission rose by 6.12% annually from 14.7 million tonnes in 1972 to 251.6 million tonnes in 2021 (Ritchie et al., 2020). Various factors lead to the increase of CO₂ emissions in Malaysia which are heat and electricity, transportation, industrialization, deforestation, and urbanization.

The Malaysian government has undertaken so many initiatives to combat global warming and achieve the goals agreed upon through Kyoto Protocol and Paris Agreement. The initiatives include forming effective policies, plans, and actions to be taken by all the stakeholders legally. For example, develops low-carbon cities, forms National Green Technology Master Plan, provides renewable energy, and many more. The nation wants to reach net zero by 2025, which is the term for offsetting positive emissions by reducing atmospheric emissions to achieve carbon neutrality. When it comes to "getting out" of the carbon lock-in, changing the behavior of individuals and organizations is one of the most difficult things for Malaysia to do (Susskind et al., 2020). However, everything is accessible and reliable with great support from the government.

The government of this nation has set a goal for the year 2030 of achieving a 45 percent decrease in the intensity of carbon emissions across the entire economy, based on the Gross Domestic Product (GDP) (Bernama, 2021). Future demands for communication, transportation, energy, housing, shopping centers, and other urban amenities will make it difficult for Malaysia to control pollution, particularly CO₂ emissions. Therefore, steps like encouraging innovation, managing the industrial structure, and lowering emission intensity brought on by household demand should be taken. Additionally, households need to be aware of how critical it is to combat environmental issues by introducing low-carbon lifestyles (Chik et al., 2013).

Carbon emissions occurring from diverse factors are widely regarded to have a mixed impact on the environment due to increased economic growth and technological advancement in different places. As environmental concerns mount, governments are under greater pressure to take immediate action. Emphasis must be placed on implementing personal carbon trading, programs to reduce carbon emissions from travel, and many other policies (Yuaningsih, 2021). In addition, the implementation of a non-financial indicator is now

required for any company to achieve its strategic goals since financial indicators are no longer the only ones being measured. It is now the responsibility of boards of directors to assess and manage the effects of climate change (Ong et al., 2021).

Global climate change poses unprecedented risks to sustainability, development, and the environment. Through national mitigation efforts and intergovernmental mechanisms that aim to reduce atmospheric concentrations of GHG, the majority of countries are actively participating in reducing CO₂ emissions. Malaysia has already expressed its enthusiasm to reduce carbon release despite having no specific quantitative commitments under the Kyoto Protocol because it is a developing nation (UNFCCC, 2020). In keeping with the "whole of nation" strategy, all parties involved must cooperate to advance the climate change agenda and integrate the problem into the nation's development and implementation plans.

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