POLICY BRIEF

Estimating a Fair Share Carbon Budget for Malaysia

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rimbawatch

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About RimbaWatch

RimbaWatch is an environmental think-tank conducting research and advocacy on climate-related issues in the Maritime Southeast Asian region.

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Executive Summary

Notwithstanding narratives downplaying Malaysia's emissions contributions, it is in fact a significant contributor to the crisis of planetary unravelling. This is largely due to its role as a major oil and gas producer and consumer; for example the country's national oil company is listed as the 36th highest CO2-emitting entity in the world since the Industrial Revolution. Despite this reality, Malaysia's climate policies and targets fail to effectively address mitigation, with no plans for a complete and immediate phase-out of fossil fuels. These short falls are underpinned by a lack of attempt, by Malaysia and relevant operators, to establish a fair-share carbon budget for the nation, aligned with a 1.5 degree pathway. Defining this budget will enable effective target-setting towards net-zero, accounting for scientific emissions thresholds and planetary fair shares of emissions.

Given these gaps in climate policies and target-settings, this report sets out to establish an estimate of Malaysia's fair share of the global carbon budget from 2023, utilizing allocation methodologies encompassing four main interpretations of fairness - equality, responsibility, capability, and responsibility and capability. Equality and capability allocations are measured from a 2015 baseline (when the Paris Agreement was adopted), while responsibility, and responsibility and capability are measured from 1990 (encompassing the decades when Malaysia's economic growth, carbon-intensive sectors and emissions experienced an acceleration)

The resulting estimates have shown that Malaysia has overshot its remaining carbon budget under the capability, responsibility, and responsibility and capability approaches, by -0.6 GtCO2, -1.4 GtCO2 and -1.7 GtCO2 respectively. As such, every tonne of CO2 emitted by the country from 1st January 2023 contributes to the increasing unlikeliness of staying within the crucial 1.5C limit. While the country is still within its fair-shares under the equality approach, the remaining budget is miniscule (0.4 GtCO2) and is estimated to have been overshot in 2025. Given these worrying findings, RimbaWatch urges the Malaysian government to account for the nation's remaining carbon budget (or lack thereof) in undertaking its mitigation responsibilities, such as by taking immediate steps to cease fossil fuel production and expansion and end deforestation, amongst other measures.

Glossary

Abbreviation	Explanation
CBDR-RC	Common But Differentiated Responsibilities and Respective Capabilities
EDGAR	Emissions Database for Global Atmospheric Research
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
NDC	Nationally Determined Contributions
NETR	National Energy Transition Roadmap
NOC	National Oil Company
NZCE	Net-Zero Carbon Emissions (by 2050)
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change

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Introduction

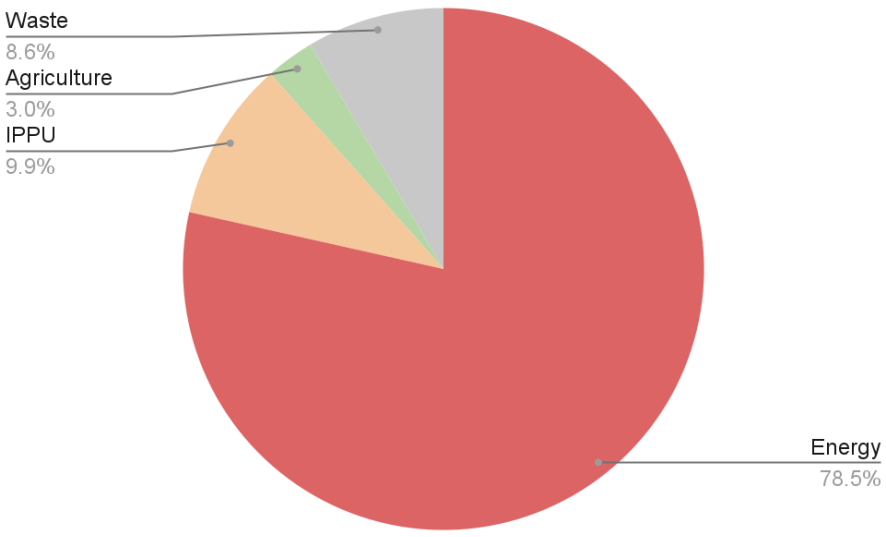
The Paris Agreement of 2015 set a global common objective to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels" (UNFCCC, 2015). However, since 2015, instead of reducing, global annual emissions have hit a plateau, with fossil emissions reaching an all-time high in 2024 (Carbon Brief 2024). The United Nations Environmental Program's latest Emissions Gap Report predicts that existing climate targets, including nationally determined contributions (NDCs), could result in a 3.1°C temperature rise by 2100, with catastrophic consequences for planetary health, unless climate ambitions are improved (UNEP, 2024).

Despite narratives expounded by certain commentators and government officials, Malaysia is a significant contributor to global anthropogenic emissions. While Malaysia's annual emissions contribution in percentage terms is often cited as negligible, it must be noted that, in 2024, only 17 countries had an emissions contribution of more than 1%, and many highly extractive economies such as France, the United Kingdom and Spain, have a similar annual emissions contributions compared to Malaysia. Further, Malaysia's per capita GHG emissions are on par with those of China and are nearly twice the global average (EDGAR, 2024).

Lawford-Smith and Eriksson (2020), wrote that, in emphasising the state's role as primary emitter, their branches, such as companies owned by them, must be brought to attention. In this vein, it must be noted that, coupled with high rates of carbon stock loss associated with decades of deforestation, a significant reason for Malaysia's high historical emissions responsibility is its role as a major oil and gas consumer, producer and exporter (see Figure 1 for a breakdown of Malaysia's GHG emissions by sector in 2019). Tenaga Nasional Berhad, the state-owned electricity utility company for Peninsular Malaysia and Sabah, emitted 39.17mtCO2e in 2024, equivalent to the 2024 emissions of entire countries such as Slovakia.

In 2024, Malaysia was Asia's second largest-LNG exporter, and its national oil company (NOC), PETRONAS, is listed as the 36th highest CO2-emitting entity in the world since the Industrial Revolution, contributing 0.43% of all global fossil fuel and cement-related CO2 emissions. This is comparable to other Global North-based carbon majors, such as Equinor, Eni and Rio Tinto (Carbon Majors, 2025). PETRONAS's most recently-disclosed annual emissions, at 377.75mtCO2e in 2024, are equal to France's emissions from that year. If PETRONAS were a country, it would have been the 22nd highest emitting country in the world in 2022, contributing almost 1% of total GHG emissions. This underscores Malaysia's present and historical emissions responsibility.

Figure 1: Malaysia Sector-Based GHG Emissions (2019) (GtCO2e)



Data: Ministry of NRECC (2022) Compiled by authors

An Oxford Net Zero Tracker Report (2023) finds that, while delivery of the Paris Agreement's emissions goals would require an end to fossil fuel exploration, production and use, only 7% of global net-zero commitments involve explicit phase-out plans. Malaysia is part of this 93% grouping of laggards.

Malaysia ratified the Paris Agreement in 2016 and, as outlined in Malaysia's Climate Change Policy 2.0, has an explicit commitment to achieve net-zero emissions by 2050. Malaysia's updated nationally determined contributions (NDCs) targets peak carbon emissions by 2034 and achieve an economy-wide absolute emissions reduction of 15–30mtCO2e from the peak level by 2035, but does not specifically target mitigation in the energy sector.

Further, the Climate Change Policy 2.0 mentions the need to "study the usage of fossil fuel sources for the transition (…), such as natural gas", and has no targets to reduce fossil fuel production. In terms of climate-specific legislation, while there is a Climate Change Act in development, the draft circulated for public consultation did not establish requirements for emissions reductions, nor any binding targets in general. Individually, states such as Penang, Sabah and others have established sustainable development blueprints, but these do not explicitly address emissions caps either.

At a sectoral level, the National Energy Transition Roadmap (NETR), published in 2023, aims to set " the goal to accelerate [the] energy transition and change the way energy is generated to improve climate resilience", and establishes a "Responsible Transition (RT) Pathway 2050 to shift Malaysia's energy systems from fossil fuel-based to greener and low-carbon systems" . However, while the NETR does aim to phase out coal by 2050 and plans for a 70% renewable energy (RE) installed capacity by 2050, these plans do not translate into significant RE shares in the projected total primary energy supply (TPES). The NETR plans instead to increase the share of fossil gas in the TPES by 16% from 2023, to 57% in 2050, making it the primary energy source for the country, which would sustain Malaysia's fossil fuel emissions.

Meanwhile, PETRONAS, in 2021, established a Net-Zero Carbon Emissions by 2050 Pathway (NZCE). However, this pathway excludes their Scope 3 emissions, which represent roughly 80% of a fossil fuel entity's emissions, and focuses instead on reducing the emissions intensity of fossil fuel extraction, shipping and processing, including through carbon capture, utilization and storage (CCUS); a common corporate approach which has been criticised for essentially encouraging an increase in gross entity emissions (Arnold and Toledano, 2021). The NZCE does not identify any absolute caps for emissions or production for PETRONAS.

Malaysia's commitment to the Paris Agreement while planning to sustain and grow its fossil fuel industry represent a direct conflict of interest that has not been addressed by Federal, or the NOC's, initiatives. Underpinning this problem is the lack of an attempt, by both parties, to establish a fair-share carbon budget for the nation, aligned with a 1.5 degree pathway. Without defining this budget, Malaysia's climate targets, which claim to align the country to a net-zero pathway, ignore scientific emissions thresholds and planetary fair shares of emissions, resulting in targets which are inconsistent with what the atmosphere can absorb without exceeding the 1.5 degree limit, and with equitable criteria such as historical emissions responsibility. Instead, these targets propose to sustain or grow certain sectors of the economy without imposing emissions caps, allowing the country to pollute large amounts until a distant year (i.e 2050), and without setting scientifically-sound yardsticks to measure progress. This essentially adopts a 'shooting in the dark' approach that could exacerbate planetary unraveling.[1]

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1 Chao (2021; 5) defines planetary unraveling as " anthropogenic activities […] threatening global ecosystems and their diverse human and other-than-human dwellers at an unprecedented scale and speed". This terminology is utilised over the myopic framings of the 'climate crisis'. Planetary unravelling refuses to be bounded by linear ways of knowing, recognising the entangled threads of diverse more-than-human ecosystems and how humans are implicated in these webs through consumerism, extraction and cohabitation on a planet in peril (Price and Chao, 2023).

A carbon budget is the concept that, to stabilize global warming to a certain temperature threshold, cumulative global emissions need to be capped, with global GHG emissions reducing to net-zero levels at an eventual point in time. In the case of the Paris Agreement, it sets a common objective to limit the temperature increase to 1.5 degrees above pre-industrial levels. Therefore, this threshold requires limiting global anthropogenic emissions to a cumulative amount of GHG emissions which would not exceed a 1.5 degree threshold (IPCC, 2021).

Estimating the size of a remaining carbon budget aligned with 1.5 degrees depends on a number of choices. This includes 1) The probability with which we intend to ensure that warming is limited to that threshold (i.e, a 50% chance), 2) Assumptions of how successful caps on emissions of other greenhouse gases, such as methane, will be 3) estimating how much the planet has already warmed, 4) how much warming is expected per cumulative tonne of CO2 and 5) the amount of warming expected after net-zero CO2 emissions is achieved. As an example, for a 50% chance of limiting the global temperature rise to 1.5 degrees, the remaining carbon budget is 500 billion tCO2e, which is 12.5 years of emissions at current levels (IPCC, 2021 and Greenpeace, 2025).

Estimating carbon budgets at a national-level becomes more complex. The Paris Agreement, which sets requirements for NDCs, states that such NDCs must reflect a nation-states “highest possible ambition, reflecting equity and its common but differentiated responsibilities and respective capabilities (CBDR-RC)” according to national circumstance (UNFCCC, 2015). Further, the IPCC states that “it is only in relation to a ‘fair share’ that the adequacy of a state’s contribution can be assessed" (IPCC, 2021). The Global Stocktake under the UNFCCC and the IPCC have established that current NDCs and emissions pledges are collectively insufficient at limiting the global temperature rise to 1.5 degrees. Therefore, it is imperative that such pledges are anchored to remaining carbon budgets that take into account criteria such as a nation’s historical emissions responsibility and current capacity to transition (Greenpeace, 2025).

There is no single authoritative source defining national-level fair share carbon budgets. While the IPCC has documented a number of emissions allocations methods according to various criteria of equity, (IPCC, 2014), they did not translate these into numerical findings to suggest 1.5 degree-aligned emissions levels for countries. Instead, nations have either independently and proactively (such as Ireland, the UK and New Zealand), or have been forced by court decisions to (such as Switzerland), establish their own carbon budgets according to a range of methodologies and assumptions.

Reflecting these developments, and the climate imperative for Malaysia to establish such a budget as described above, this policy brief aims to:

1. **Calculate Malaysia’s fair share of the remaining global carbon budget to remain below 1.5°C with a 50% likelihood, according to various interpretations of fairness, using the same methodological approach as Pelz et al (2023; 2025), which was based on principles underscored in European Climate Law, international environmental law and peer-reviewed literature considering mitigation approaches. The authors’ methodology sets out selected allocation approaches.**
2. **Estimate when Malaysia would run out of its fair share carbon budget based on a linear reduction of its emissions.**
3. **In reference to 1) and 2), provide an assessment of the adequacy of Malaysia’s existing climate targets.**

The interpretations of fairness under point 1) is described as below:

1. **‘Equality’, as expressed through an equal per capita division of the global carbon budget accounting from 2015;**
2. **‘Responsibility’, as expressed through an equal per capita division of the global carbon budget, accounting from 1990;**
3. **‘Capability’ , considering Malaysia’s relative per-capita GDP, accounting from 2015; and**
4. **‘Responsibility and Capability’, considering Malaysia’s relative per-capita GDP, accounting from 1990.**

These interpretations are described in full in the methodology.

Methodology

a) Retrospective estimates of the global remaining carbon budget (RCB)

The IPCC (2021), in its Sixth Assessment Report (AR6), estimated the remaining global carbon budget for a baseline year (2020), which enables projections for the quantity of carbon dioxide that can be released in order to remain within the 1.5C threshold. Pelz et al (2023; 2025) utilises the IPCC's estimates to measure the remaining global carbon budgets for 1990 and 2015, respectively, by adding the estimated historical CO2 emissions from these years to the IPCC's 2020 remaining carbon budget (this was the latest data available when the report was published). Pelz et al (2025) has updated the IPCC's AR6 Report for 2023, estimating a remaining global carbon budget of 380 GtCO2 for a 50% chance of keeping within the 1.5C limit. As such, for the purposes of this report, we added historical emissions from 1990-2022 and 2015-2022 to the Updated AR6 remaining carbon budget estimate (380 Gt CO2) (Our World in Data, n.d [a]). This resulted in estimates of RCB1990 of 1,368 GtCO2 and RCB2015 of 670 GtCO2.

b) Justifications for baseline years employed

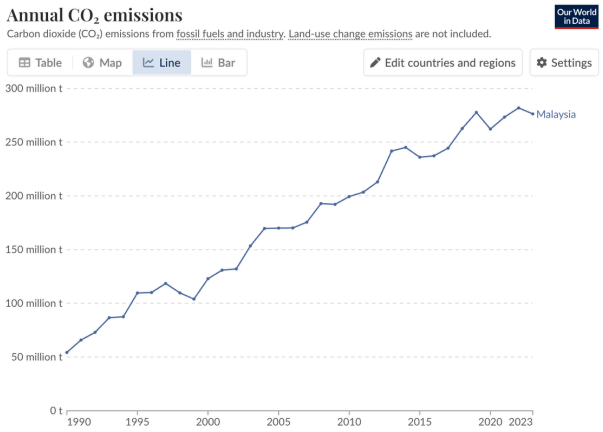
Based on the methodology employed by Pelz et al (2023; 2025), this report estimates Malaysia's fair share of the carbon budget and possible overshooting utilising 1990 and 2015 as baseline years. As described by the authors, 1990 was selected as it was the year of the IPCC's First Assessment Report, forming the basis of the UNFCCC. 2015 was selected due the adoption of the Paris Agreement in that year. These baselines enable estimates of equality (from 2015), responsibility (from 1990), capability (from 2015) and a combination of both.

Apart from the aforementioned justifications employed by the methodology's authors, this report underscores this approach as evidence demonstrates that more than half of all CO2 emissions emitted since 1990 have been released by countries located in the Global South (Fuhr, 2021). It is acknowledged that this is largely attributed to historical 'carbon colonialism' perpetrated by states in the Global North, thus justifying the 'right to development' of Global South states over the past three decades. However, it must be understood that this neoliberal development 'myth' hinges upon the need for exponential economic growth, coupled with unequal income and wealth distribution to sustain capitalist markets. This neoliberal development framework inadvertently has been criticised for leading to increased extractivism and emissions (Furtado, 2020).

Illustrating this, milestones in Malaysia's neoliberal development agenda caused an increase in both annual GDP and CO2 emissions between 1990 and 2023 (see Figure 2). This can be explained by the dominance of three carbon-intensive sectors, namely timber, oil palm and fossil fuels, in Malaysia's economy beginning in the 1990s. Illustrating this, Malaysia joined the International Tropical Timber Organisation (ITTO) in 1990 when it was the largest single tropical timber exporter in that year. It also became the ITTO's largest exporter of processed wood in 1998 (Adams, 2000). Between 1980 and 1990, the contribution of oil palm to Malaysia's GDP doubled, and in 1990 Malaysia was the largest single exporter of oil palm in the world (Alias et al., 1992). Accompanying these milestones, between 2000 and 2012, Malaysia had the world's highest rate of tropical deforestation (Butler, 2013). Further, domestic energy demand in Malaysia exploded from 20,000GWh in 1990 to more than 140,000GWh in 2018, driven by coal and gas (SEDA, 2021). In terms of its upstream and processing capacities, crude oil production in Malaysia peaked in 1995, while fossil gas production peaked in 2023 (CEIC, 2025).

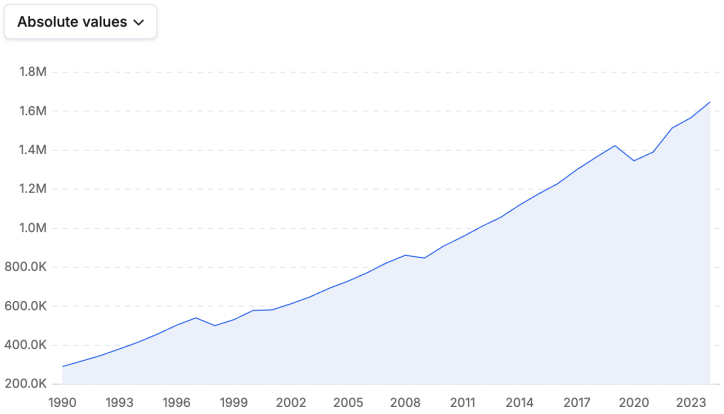
Figure 2: Malaysia Annual CO2 Emissions [left] and Annual Real GDP [right], 1990-2023

Annual CO2 Emissions from FF and Industry Post-Independence, 1990-2023



Source: Our World in Data (n.d.)(a)

Annual Real GDP, 1990-2023 (RM absolute values in trillions)



Source: Department of Statistics Malaysia (2024)

c) Understanding the allocation methods used

Pelz et al (2025: 14) undertook several value judgments that were "aligned to desired foundational principles" (these include legal principles - such as polluter pays, precautionary and do no significant harm - as well as ethical principles). These value judgements included considerations of the following parameters:

i. The year from which the carbon budget is calculated
ii. Historical responsibility allocations (i.e. from 1990 or 1850).
iii. Proxy variable for the ability to pay (i.e. GDP per capita)
iv. The population variable (i.e. to consider only the year in which the carbon budget is calculated or to encompass the cumulative population over the whole period from the starting year up to net-zero CO2).

Further, the authors undertook the task of inversing the range of selected parameters (i.e. GDP per capita) to "allocate proportionally lower budgets to countries with higher levels of capability" (Pelz, 2025; p.14). It must be noted that the report aligned with the most lenient or generous results. While acknowledging the importance of stricter interpretations, normative equity discussions were outside the report's scope. The authors noted that by focusing on lenient quantifications, the methodologies would indicate that a breach of these parameters would highlight "a breach of any submitted parameterisation" (Pelz et al, 2025; p. 15). This resulted in historical responsibility calculated from 1990, as opposed to 1850. GDP per capita (expressed in purchasing power parity - PPP) is utilized to measure capability and each approach is distributed in per capita terms according to the country's population for the year in which the carbon budget is calculated.

According to Pelz et al (2025; p.14), the parameters and approaches used in their report aligns with three guidelines in evaluating equity within climate mitigation pathways:

i. To not claim value neutrality and being explicit regarding value judgements;
ii. To visibilise losses of the poor and marginalised
iii. To provide analytical quantification to support, but not substitute, political debates involving normative decisions.

Based on these understandings, this report calculates Malaysia's remaining carbon budget according to Pelz (2023; 2025)'s allocation methods. The following section explains in detail the reasoning and calculations for each approach - equality (2015), capability (2015 PPP), responsibility and responsibility and capability. For the purposes of this report, 2023 is used due to data limitations for 2024 or 2025 estimates.

Calculating Malaysia's Estimated Remaining Carbon Budget

a) Equality (2015)

This estimate reflects the most lenient approach to carbon budget accounting, involving an equal per capita allocation of the remaining carbon budget in 2015. The calculation requires subtracting Malaysia's cumulative emissions (from 2015 to 2023) from the country's per capita carbon budget in 2015 (for a 50% chance of staying below the 1.5C limit). Variables and results are as follows:

i. Malaysia's cumulative emissions (2015 to 2023):

2,370 MtCO2 (Our World in Data, n.d.)(a)

ii. Malaysia's per capita carbon budget in 2015:

World remaining carbon budget (2015, 50% 1.5c) x [Malaysia population, 2015/World population, 2015) (Our World in Data, n.d. [b])

670 GtCO2 x [31.2 million/7.5 billion] = 2,787 MtCO2

iii. Result

Malaysia's per capita carbon budget (2015) - Malaysia's cumulative emissions (2015 to 2023)

2,787 MtCO2 - 2,370 MtCO2 = **417.2 MtCO2**

Estimated remaining carbon budget, 2023 = 0.42 GtCO2

Accordingly, as of 2023, Malaysia is still within its remaining carbon budget, according to equal per capita calculations from 2015. However, to remain within this budget, the country must not emit more than 0.42 GtCO2 after 2023. Data from the Emissions Database for Global Atmospheric Research estimates Malaysia's emissions for 2024 at 0.33 GtCO2, which means that Malaysia likely exceeded this budget in 2025 (EDGAR, 2025). Further, the 'equality' approach has been dubbed the most lenient allocation method and as such, should not be heavily relied upon in estimating fair-shares, particularly by developed and emerging economies.

b) Capability (2015 PPP)

This estimate reflects Malaysia's ability to pay for or implement efforts for carbon emissions mitigation, utilising a per capita allocation of the remaining carbon budget in 2015, scaled in inverse proportion to GDP per capita in the same year, expressed in PPP (2023). This requires subtracting Malaysia's cumulative emissions (2015-2023) from Malaysia's PPP adjusted per capita carbon budget (50% 1.5C) (2015). It must be noted that the inverse proportion (GDP per capita) is calculated to ensure wealthier and higher emitting countries are allocated proportionally lower remaining budgets. Variables and results are as follows:

i. Malaysia's cumulative emissions (2015 to 2023):

2,370 MtCO2 (Our World in Data, n.d. [a])

ii. Malaysia's PPP adjusted per capita carbon budget (50% 1.5C) (2015)

Malaysia's per capita carbon budget 2015 (50% 1.5C) x Malaysia's GDP per capita 2015 (PPP 2023, inverse factor)

Malaysia's GDP per capita 2015 (PPP 2023, inverse factor):

World GDP per capita 2015 (PPP 2023)/Malaysia's GDP per capita 2015 (PPP 2023) (World Bank, 2024; World Bank, n.d.)[2]

USD 20,409.05/USD 31,855.00

Inverse factor = ***0.64***

2,787 MtCO2 x 0.64 = ***1,786 MtCO2***

iii. Result

Malaysia PPP adjusted per capita carbon budget (2015) - Malaysia's cumulative emissions (2015 to 2023)

1,786 MtCO2 - 2,370 MtCO2 = -584.28

Estimated remaining carbon budget, 2023 = -0.60 GtCO2

According to this estimate via the 'capability' allocation methodology, Malaysia has overshot its 2023 remaining carbon budget by 0.6 GtCO2.

2 Due to data limitations, GDP per capita adjusted to 2023 purchasing power parity was calculated by the authors utilising 2021 constant values and GDP deflator percentages from the World Bank

c) Responsibility (1990)

These estimates reflect Malaysia's historical responsibility for climate mitigation, utilising an equal per capita allocation of the remaining carbon budget in the years 1990. The calculation requires subtracting Malaysia's cumulative emissions (1990 to 2023) from the country's per capita carbon budget in 1990 (for a 50% chance of staying below the 1.5C limit). Variables and results are as follows:

i. Malaysia's cumulative emissions (1990 to 2023):

6,002 MtCO2 (Our World in Data, n.d. [a])

ii. Malaysia's per capita carbon budget in 1990:

World remaining carbon budget (1990, 50% 1.5c) x [Malaysia population, 1990/World population, 1990) (Our World in Data, n.d.)(b)

1,368 GtCO2 x [17.8 million/5.3 billion] = ***4,594 MtCO2***

iii. Result

Malaysia's per capita carbon budget (1990) - Malaysia's cumulative emissions (1990 to 2023)

4,594 MtCO2 - 6,002 MtCO2 = -1,408 MtCO2

Estimated remaining carbon budget, 2023 = -1.41 GtCO2

According to this estimate via the 'responsibility' allocation methodology, Malaysia has overshot its 2023 remaining carbon budget by 1.41 GtCO2.

d) Responsibility and capability (1990)

These estimates reflect responsibility for climate mitigation, while also accounting for the nation's ability to fund these efforts. This approach underscores a per capita allocation of the 1990 remaining carbon budget, scaled in inverse proportion to GDP per capita (1990), expressed in PPP (2023). This calculation requires subtracting Malaysia's cumulative emissions (from 1990 to 2023) from Malaysia's PPP adjusted per capita carbon budget (50% 1.5C) in 1990. Variables and results are as follows:

i. Malaysia's cumulative emissions (1990 to 2023):

6,002 MtCO2 (Our World in Data, n.d. [a])

ii. Malaysia's PPP adjusted per capita carbon budget (1990)

Malaysia's per capita carbon budget 1990 (50% 1.5C) x Malaysia's GDP per capita 1990 (PPP 2023, inverse factor)

Malaysia's GDP per capita 1990 (PPP 2023, inverse factor):

World GDP per capita 1990 (PPP 2023)/Malaysia's GDP per capita 1990 (PPP 2023) (World Bank, 2024; World Bank, n.d.)

USD 12,901.85/USD 13,816.10

Inverse factor = ***0.93***

4,594 MtCO2 x 0.93 = ***4,290 MtCO2***

iii. Result

Malaysia PPP adjusted per capita carbon budget (1990) - Malaysia's cumulative emissions (1990 to 2023)

4,290 MtCO2 - 6,002 MtCO2 = -1,712 MtCO2

Estimated remaining carbon budget, 2023 = -1.71 GtCO2

According to this estimate via the 'responsibility and capability' allocation methodology, Malaysia has overshot its 2023 remaining carbon budget by 1.71 GtCO2.

Malaysia's Fair Share of the Remaining Global Carbon Budget

The application of the allocation methods outlined above provide a range of estimates of Malaysia's fair-share carbon budget, presented in Table 1. Estimates of the remaining carbon budget are presented from 1st January 2023.

As of 2023, the capability (from 2015), responsibility (from 1990) and responsibility and capability (from 1990) allocation methods indicate that Malaysia's carbon budget has already been exhausted. From the start of 2023, the carbon budget is estimated to have been exceeded by between 0.6 Gt CO2 and 1.7 Gt CO2. While the equal per capita (equality) allocation method indicates that the country is still within its fair share, the remaining budget is negligible and was likely overshot in 2025.

Table 1

Allocation	Equality (2015)	Capability (2015 PPP)	Responsibility	Responsibility & Capability (2023
1990 (GtCO2)	NA	NA	**-1.41**	**-1.71**
2015 (GtCO2)	0.42	**-0.6**	NA	NA

Estimate When Malaysia Would Run Out Of Its Fair Share Carbon Budget

Given these findings, there can be no estimation of Malaysia's remaining fair-share carbon budget for the capability, responsibility and responsibility and capability approaches (1990), as such a budget has already been exhausted. As for an equality (2015) budget, it is estimated that the country would have overshot this budget by 2025, given persisting emissions trends. As stated, in 2024, Malaysia emitted 0.33 GtCO2 (EDGAR, 2025). These findings do not provide Malaysia with a remaining carbon budget with which a net-zero trajectory aligned with a 1.5 degree target can be derived. For capability (2015), responsibility (1990) and responsibility and capability (1990), every tonne of CO2 emitted in Malaysia after 1st January 2023 is already in excess of Malaysia's fair share allocation.

Malaysia's Existing Climate Targets Not Fit For Purpose

This report has estimated fair share budgets for Malaysia based on the methodological approaches taken in Pelz (2023; 2025), using the most up-to-date estimates of the remaining global carbon budget as a basis for calculations.

None of the allocation approaches used, apart from the "lenient" 'equal per capita' approach, provide Malaysia with any remaining carbon budget from the start of 2023. Further, the remaining budget under the equal per capita approach would have likely been overshot in 2025. All CO2 emissions emitted today exceed Malaysia's carbon budget using these fair share approaches. Excess of these fair share budgets come at the cost of other countries' carbon budgets, lead to an overshoot of the global carbon budget and increase the burden on other countries which have contributed the least to climate change but are experiencing the worst of its impacts.

To reinforce this concept for policymakers and corporate readers, the remaining **global** carbon budget as of 2023, for a 50% chance of limiting the global temperature rise to 1.5 degrees, is estimated at 380Gt CO2, which is less than 7 years of current emissions levels. Any delays in addressing a highly-likely over-exceedance will lock the world into breaching the 1.5 degree threshold, which would be permanent. This will result in successive climate tipping points being breached, continuously compounding the climate impacts, which are estimated to include the collapse of polar ice caps, the conversion of the Amazon forest into a savannah, permafrost thaw and disruption of ocean currents that distribute heat and cooling (OECD, 2022). For policymakers and corporate readers, a number of real-world outcomes will arise from this scenario (World Bank, 2022; Mahmood and Guinto, 2022; Paterson, 2023; IPCC, 2022), with an indicative list of impacts including:

1. Between 1-2 meters of sea level rise, submerging significant urban, industrial and agricultural centres.
2. 60% reduction in rice yields, with similar reductions for other commodities including oil palm and rubber.
3. Increased days where temperatures exceed the 35 degree threshold that is habitable for humans, causing heat-related mortality.
4. Loss of all coral reefs and associated fish populations.
5. Internal climate displacement, worsening poverty, social, economic and gender inequality.

As a consequence, the broad practical implications for Malaysia's climate regulations include, but are not limited to, the following:

- **Establishing National and Sectoral Carbon Budgets**
    - Based on the fair-share methodologies and estimates in this report, an official national carbon budget needs to be urgently established in order to provide a scientific foundation for climate policies and targets.
    - Alongside this national budget, sectoral budgets should be set, specifically for the domestic energy sector, taking into account both production and consumption. These national and sectoral carbon budgets should be cemented in the upcoming Climate Change Act.
    - Based on these budgetary allocations, the following steps need to be urgently addressed.

- **An Immediate Phase-out of Fossil Fuels, including:**
    - Legislated targets to achieve a phase-out of all fossil fuels, including fossil gas, from the domestic energy grid at the soonest possible date.
    - Legislated targets to phase-out all existing fossil fuel production at the soonest possible date, which includes an end to the provision of all upstream licenses.
    - Legislated targets to phase-out internal combustion engine (ICE) vehicles, which would include:
        - Targeting 80% or more public transport usage by 2030 across the entirety of Malaysia, in both urban and non-urban areas. This would include vast improvements in the availability of public transportation, transit-oriented town planning and walkability, an eventual ban on the production and new registration of ICE vehicles, and incentives to reduce private vehicle ownership (both ICE and EV) in general.
    - Immediately spearheading the development of a national Just Energy Transition framework, with specific and granular, not high-level, policy levers identified to facilitate the transition of the country's economy and communities from fossil fuels.
    - Joining other developing economies, such as Colombia, Pakistan and Cambodia, in endorsing the call for a Fossil Fuel Non-Proliferation Treaty. This Treaty would establish global mechanisms to manage a global just transition away from coal, oil and gas.
    - Including the right to a clean, healthy, and sustainable environment to be explicitly recognized as a fundamental right in Malaysia's Federal Constitution.

- **Permanent Protection of Carbon Sinks**
    - An immediate moratorium on all forest degradation and conversion in existing forestry and plantation concessions across Malaysia.
    - For Malaysia to formally adopt the definition of 'Naturally Regenerating Forest' from the Food and Agriculture Organisation (FAO) in policy documents and related environmental legislation.
    - For Malaysia to legislate the target to maintain permanent natural forest cover above a certain minimum percentage of land cover, which must be set at Malaysia's current and existing natural forest cover
    - For all relevant development and planning frameworks, from State Structure Plans to the Environmental Quality Act 1974, to be amended to reflect updated targets as above.
    - For all forestry and plantation concessions which exceed the updated targets to be revoked.
    - The relevant agencies should spearhead constitutional amendments to reflect the right of Indigenous communities to legal ownership over their Traditional Territories.

Appendix - Data Sources

Data	Year	Unit	Value	Source Name	Description
World remaining carbon budget (50% 1.5C)	1990	GtCO2e	1,368	IPCC, 2021; Pelz et al, 2025	Carbon budget for 2023
				Our World in Data (n.d.)(a)	Historical emissions, 1990-2022
	2015	GtCO2e	670	IPCC, 2021; Pelz et al, 2025	Carbon budget for 2023
				Our World in Data (n.d.)(a)	Historical emissions, 1990-2015
World population	1990	billion pax	5.3	Our World in Data (n.d.)(b)	World population data from 1990 and 2015
	2015	billion pax	7.5		
Malaysia population	1990	million pax	17.8	Our World in Data (n.d.)(b)	Malaysia population data from 1990 and 2015
	2015	million pax	31.2		
World GDP per capita PPP (2023 value)	1990	USD	12,901.85	World Bank (2024); World Bank (n.d.)	World Bank (2024) - GDP per capita, PPP at a 2021 constant (USD); World Bank (n.d.) - GDP deflator data (used to adjust to 2023 values)
	2015	USD	20,409.05		
Malaysia GDP per capita PPP (2023 value)	1990	USD	13,816.10	World Bank (2024); World Bank (n.d.)	World Bank (2024) - GDP per capita, PPP at a 2021 constant (USD); World Bank (n.d.) - GDP deflator data (used to adjust to 2023 values)
	2015	USD	31,855.00		
Malaysia cumulative emissions to 2023	1990	GtCO2e	6,002	Our World in Data (n.d.)(a) (Malaysia)	Emissions from 1990 and 2015, respectively, to 2023
	2015	GtCO2e	2,370		

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