

Climate Change and Greenhouse Gas (GHG) Emissions

Why Is It Important?

Climate science plays a significant role in driving the transition to renewable energy sources and low-carbon technologies. As awareness of the need to mitigate climate change grows, there is increasing demand for cleaner, sustainable energy. This shift creates both risks and opportunities for PETRONAS.

We risk being left behind as the world transitions to a low-carbon economy, leading to stranded assets, lost revenue streams and reputational damage. However, we see opportunity to lead in the energy transition, leveraging our legacy, expertise and resources to develop greener technologies and business models.

What Is Our Approach?

PETRONAS is dedicated to our role as custodian of Malaysia’s hydrocarbon resources and to meet customer energy demands, while contributing towards the climate ambitions of the Paris Agreement. Our NZCE 2050 Pathway was launched in November 2022, outlining the actions needed to achieve our net-zero ambitions. The

development of the NZCE 2050 Pathway was informed by our business context, national policies, international frameworks, and scientific consensus on climate change.

In driving a focused delivery of the NZCE 2050 Pathway, 20 per cent of total capital expenditure will be allocated for decarbonisation projects and expansion into cleaner energy solutions from 2022 to 2026. We will also track our GHG emissions to ensure we are on the right trajectory to meet the targets.

We aspire to proactively strengthen transparency in reporting while shaping the national climate-related risk disclosure practice in Malaysia. We have commenced to apply the framework recommendations put forward by the Task Force on Climate-related Financial Disclosures (TCFD) to our assessment of climate risk. By aligning our strategic assessment of risk with TCFD, we strive to effectively manage and capitalise on climate-related risks and opportunities and accelerate progress towards our path to net zero.

1 Governance

We recognise that climate change is a critical business issue, contributing to a set of risks and opportunities. We are taking more deliberate actions to elevate sustainability, especially climate-related discussions at the Board, to shape the long-term strategic direction of the company.

[The role of the Board in climate-related matters can be referred to in the Sustainability Statement section on page 155]

2 Addressing Climate-Related Risks and Opportunities

In November 2022, we defined our NZCE 2050 to accelerate and advance groupwide actions and commitment. The NZCE 2050 Pathway – with its short-, medium- and long term targets – will steer the group towards realising our ambitions.

The Pathway is two-pronged, reducing operational GHG emissions and increasing investments in business growth opportunities in the low carbon economy. PETRONAS will implement activities through four main decarbonisation levers – zero routine flaring and venting, energy efficiency, electrification and carbon capture and storage (CCS) – to reduce operational emissions as far as possible and offset remaining hard-to-abate emissions with nature-based climate solutions.

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PETRONAS Energy Transition Strategy is Shaped In Response to Expectations of Changes in Customer Demand and Climate Risk Considerations

<p>Core Business >></p>	<ul style="list-style-type: none"> Operate oil and gas in a differentiated manner, with targets in place to produce carbon abated volumes at competitive cost to ensure asset portfolio is resilient to changes in demand. 		
<p>New Business >></p>	<ul style="list-style-type: none"> Capture growth opportunities in renewables and cleaner, less emission-intensive energy solutions, including wind and solar, hydrogen and green mobility. 		
<p>Specialty Chemicals</p> <ul style="list-style-type: none"> Strengthen presence in the specialty chemicals business segment, with an emphasis on strong sustainability attributes. 	<p>Carbon Capture and Storage (CCS)</p> <ul style="list-style-type: none"> Position Malaysia as a leading CCS hub in Asia by offering CCS as a service for high emitting industries around the region. 	<p>Bio-based Value Chain</p> <ul style="list-style-type: none"> Scale up bio-based products and offerings to meet changing customer preference. 	<p>Renewable Energy, Hydrogen and Green Mobility</p> <ul style="list-style-type: none"> Establish Gentari as our clean energy solutions arm with strong growth portfolio in renewables, hydrogen and green mobility.
<p>Net Zero Carbon Emissions (Operational Levers) >></p>	<ul style="list-style-type: none"> Ongoing emissions reduction of our portfolio delivered through key abatement levers, based on their abatement potential and doability to ensure a credible Pathway to Net Zero Carbon Emissions by 2050. 		
<p>Zero Routine Flaring and Venting</p> <ul style="list-style-type: none"> Flare gas recovery projects, improved compressor capacity, vent-to-flare conversion and vent recovery projects. Delivery in support of the World Bank's Zero Routine Flaring by 2030 Initiative. Pledged to avoid routine flaring in new oil field developments and end routine flaring at existing oil production sites by 2030. 	<p>Energy Efficiency</p> <ul style="list-style-type: none"> Digital solutions and process equipment advancement to uplift process optimisation initiatives, by optimising gas turbine operations, superior heat transfer, furnace, and boiler efficiency. 	<p>Electrification</p> <ul style="list-style-type: none"> Renewable energy infrastructure to power our operations and processes, which include fuel gas replacement with electricity, where feasible. 	<p>Carbon Capture and Storage (CCS)</p> <ul style="list-style-type: none"> CCS solutions delivered through technology partnerships.

[Details of Risks and Opportunities Quantification on Financial Performance can be referred on page 165]

3 Climate-Related Risks and Opportunities

Risk management accountability and oversight is an integral part of our governance including Climate Change governance. The Board reviews and considers our principal risks in the PETRONAS Corporate Risk Profile, covering operational and strategic risks based on periodic updates. The updates include an overview of the principal risks, a summary of material changes, as well as updates on mitigations and performance against key indicators. The Risk Management Committee, Executive Leadership Team (ELT) and Risk Committee assist the Board with the oversight of risk management including environmental, social, and governance (ESG) and climate-related risk management.

[Further details on risk governance can be referred to in the Risks Linked to Creating Values section on page 86]

We apply a groupwide approach to the management of risk through the establishment of the PETRONAS Risk Policy and complemented by the PETRONAS Resiliency Model, which the Enterprise Risk Management (ERM) Framework is part of. These policies and frameworks provide an integrated and holistic view of the overall strategy towards effective risk management.

[Details of PETRONAS Resiliency Model can be referred to in the Risks Linked to Creating Value section on page 87]

Our ERM includes requirements and guidance on the tools and processes involved to systematically identify, assess, evaluate, manage, report and monitor all types of risks. The ERM process requires a thorough assessment of entities and functional risks, including climate-related risks. It also includes an impact and likelihood assessment, which supports consideration of the relative significance of risks. Principal risks are identified and approved by management as pertinent risks to the entity and requires close monitoring.

[Details of Sustainability Risk and other principal risks can be referred to in the Risks Linked to Creating Value section on page 90]

Recognising the exposure of climate-related risks to our business operations and strategies, the impact of climate change has been taken into consideration and reflected in the development of relevant principal risks such as Sustainability Risks, Financial Liquidity Risk, Market Risk and Legal and Regulatory Risks. We are also strengthening our climate-related risk management efforts and corresponding disclosures to ensure they align with global sustainability frameworks and standards. Our efforts are positioned to align with the TCFD recommendations and the World Economic Forum's Stakeholder Capitalism Metrics.

We have been actively addressing climate change for almost a decade with our Climate Change Position and Framework which is the impetus of our climate change risk assessments that have been conducted since 2015. However, increasing stakeholders' expectations towards energy companies to align the climate risk assessment with global sustainability standards and frameworks has led us to progressively review and enhance our climate-related risk assessment approach.

We have adopted TCFD's categorisation of climate-related risks into two major categories which are transition risks and physical risks.

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Transition Risks

Transition risks refer to potential risks arising from the global shift towards a more sustainable, net-zero economy, which encompasses policy, regulatory, market and technological changes that could impact our business operations.

One of the transition risks identified is the impact of oil and gas pricing or margins, which may reduce commercial returns stemming from the change in consumer preferences, regulatory pressure and/or our approach to sustainability. This in turn may result in diminished revenue, cash generation and returns realisation.

International Energy Agency (IEA) scenarios provide oil and gas prices, which are built on underlying assumptions of socio-economic growth and climate policies and commitments' development. For instance, oil prices are expected to be the lowest in the Net Zero Emissions by 2050 Scenario (NZE), due to reduced demand for oil. This would have a material impact on our upstream business. We also recognise carbon pricing as a means of driving emissions reduction across economic activities. Carbon pricing is used to assess our potential cost impact based on the different climate scenarios.

Furthermore, the energy transition calls for better disclosures and enhanced transparency given the impact of significant climate-related issues or risks to our financials. Our inability to respond at pace will lead to reduced access to capital, inflated capital cost and limited investment types. In addition, a downgrade of our ESG score may lead to higher borrowing costs, which further limits capacity to access capital markets.

Strategic measures to manage the implication of transition risks to our organisation are highlighted in the Our Approach to Climate-related Risks and Opportunities section. These measures are aligned with the mitigations and Key Risks Indicators of the identified principal risks in the PETRONAS Corporate Risk Profile, which are Sustainability Risk, Financial Liquidity Risk, Market Risk, and Legal and Regulatory Risk in the Risks Linked to Creating Value section.

[Further information on actions to address climate-change-related risks by our businesses can be referred to in the Business Review section]

Physical Risks

Physical risks resulting from climate change can be in the form of acute risks due to one-time events or chronic risks due to longer-term changes in climate patterns such as rise in sea levels and average global temperature, water shortages, and intense precipitation. Our physical assets and ongoing projects are exposed to physical risks as we have presence in more than 30 countries globally. Thus, we are not and will not be spared from the direct and indirect damages brought about by the impact of physical climate-related risks.

While actions are ongoing to manage physical risks, we continuously re-assess implications, taking into consideration the changing outlook for geographical locations where we are present. The re-assessment outcome serves as an imperative to strengthen our existing mitigation strategy in ensuring robustness and sustainability of our organisation moving forward.

Taking into account these factors, we will continue to pursue a deliberate energy transition strategy, balancing Core Business and New Business with our NZCE 2050 Pathway aligning with changing customer preferences, evolving regulations and increasing expectations by stakeholders for low-carbon energy solutions.

[Details of PETRONAS Energy Transition Strategy can be referred to on page 102]

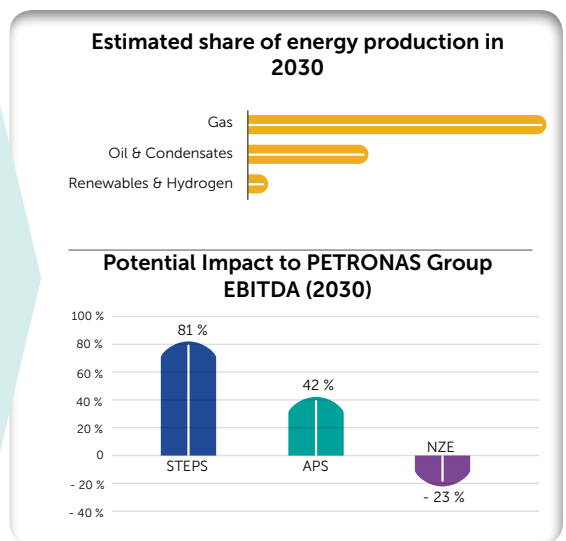
Risks and Opportunities Quantification on Financial Performance

We have identified certain risks and opportunities to our business based on the three International Energy Agency (IEA) scenarios – Stated Policies Scenario (STEPS), Announced Pledges Scenario (APS), and Net Zero Emissions by 2050 Scenario (NZE). The scenarios were chosen based on their breadth that consider the world’s different states based on energy makeup and carbon dioxide emission levels. They present three climate pathways, with temperature rise ranging from below 2°C to 2.7°C by 2100, providing granular and regional data breakdown.

The time horizons used were short term (2024), medium term (2030) and long term (2050). Identified risks relate to how oil, gas and carbon prices will impact PETRONAS Group EBITDA*, based on analysis for Upstream, Gas and Downstream businesses for FY2030. We have identified opportunities in renewable energy, hydrogen and green mobility based on their impact on our EBITDA for the New Energy business for FY2030. The chosen scenarios and the corresponding climate outcomes are summarised as below:

Stated Policies Scenario (STEPS)	Announced Pledges Scenario (APS)	Net Zero Emissions by 2050 Scenario (NZE)
<ul style="list-style-type: none"> Reflects current policy context based on sector-by-sector assessments of specific policies and measures affecting the energy markets that are in place and those that have been announced by governments around the world, as of mid-2021. Includes relevant policy proposals, though implementation measures are yet to be developed to put them into effect. Where policies are time-limited, they are generally assumed to be replaced by measures of similar intensity, but the scenario does not assume future strengthening – or weakening – of future policy action, except where there already is specific evidence to the contrary. 	<ul style="list-style-type: none"> Assumes that all climate commitments made by governments around the world, including Nationally Determined Contributions (NDCs) and longer-term net zero targets, will be met in full and on-time. 	<ul style="list-style-type: none"> Sets out a narrow but achievable pathway for the global energy sector to achieve net zero carbon emissions by 2050, with developed economies reaching net zero emissions in advance of others. Does not rely on emissions reductions from outside the energy sector to achieve its goals. Assumes that non-energy emissions will be reduced with the same proportion as energy emissions. This is consistent with limiting the global temperature rise to 1.5°C without a temperature overshoot (with a 50 per cent probability). Meets key energy-related United Nation’s Sustainable Development Goals, in particular achieving universal energy access by 2030.

- Reduce our Scope 1 emissions (emissions directly associated with our operations) and Scope 2 emissions (includes the energy we buy to run them).
- Establish a centralised Carbon Management Division to drive the decarbonisation of our upstream value chain.
- Manage our carbon storage portfolio for emissions produced by our operations.
- Position Malaysia as a CCS solutions hub in the region.
- Position Gentari as a one-stop clean energy solutions provider. Designed for pace and innovation, Gentari is expected to run independently to deliver our renewables, hydrogen and green mobility aspirations.
- Allocate approximately 20 per cent of our CAPEX for decarbonisation projects and expansion into cleaner energy solutions from 2022 to 2026 to reduce Group emissions and overall carbon intensity.



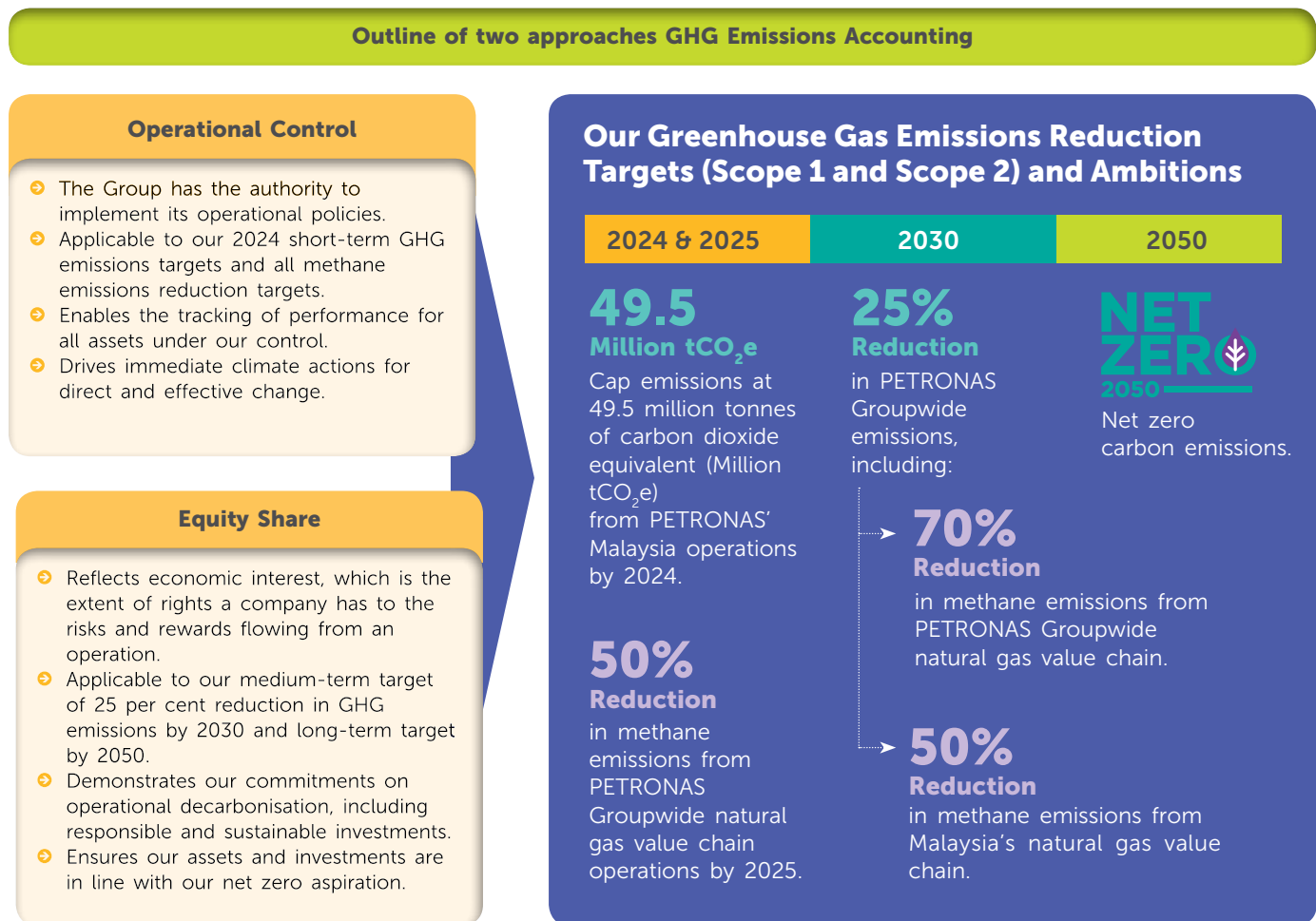
* EBITDA stands for Earnings Before Interest, Taxes, Depreciation, and Amortisation, and is used to evaluate a company’s operating performance.

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4 Metrics and Targets

We have revised our carbon emissions accounting method to adhere to international frameworks and sector specific guidance to give us a robust basis for Scope 1 and Scope 2, and a better understanding of Scope 3 GHG emissions. The financial year 2022 marks the beginning of disclosures of GHG emissions through both operational control and equity share approaches.

In charting our NZCE 2050 Pathway, PETRONAS has adopted the equity share approach to account for our emissions inventory and performance against mid- and long-term milestone targets, with 2019 as the base year.



Our 2024 short-term GHG emissions target and all methane emissions reduction targets are based on the operational control approach. This allows us to track performance of all assets under our control and to drive immediate climate actions for direct and effective change.

The equity share approach will guide our assets and investments to be in line with our Pathway and be reflected in our annual integrated report. This methodology allows for business' long-term energy transition pathway development and portfolio transition tracking.