

## **Climate Change and GHG Emissions**

The imminent threat of climate change is forcing governments to work together to reduce carbon emissions, as well as to impose various regulations on businesses and industries across the globe. At the 2015 United Nations Climate Change Conference, the Malaysian Government pledged to reduce the nation's carbon intensity per GDP to 45% below what it was in 2005 by the end of the decade.

### **Our Approach**

As a player in the oil and gas industry, we take seriously our responsibility to be part of the global transition to a low-carbon economy. Our climate actions are driven by PETRONAS' Climate Change Position, PETRONAS Carbon Commitments (PCC) and its aspiration to be a Net Zero Carbon Emissions (NZCE) organisation by 2050. Based on the PCC and NZCE, we are reducing our GHG emissions across our operations and investing in renewable energy while creating value and strengthening our businesses.

As part of the PETRONAS Group, we engage with global and local stakeholders on climate change initiatives. PETRONAS is a member of the Climate Change Working Group of the International Petroleum Industry Environmental Conservation Association (IPIECA) and the International Gas Union. Closer to home, PETRONAS engages with regulatory bodies such as the Ministry of Environment and Water and the Ministry of Energy and Natural Resources. It also contributes data to the National Communication and Biennial Update Report for submission to the United Nations Framework Convention on Climate Change, towards realising the country's Paris Agreement pledge.

### **Climate-related Risks and Opportunities**

We recognise that the transition to a low-carbon economy presents both risks and opportunities for our businesses and stakeholders. To better understand these risks and opportunities, we undertook a qualitative analysis of the physical as well as transition risks (policy, market and technology risks) associated with climate change in 2021.

A high-level qualitative assessment identified about 2,050 potential short, medium, and long-term risks and opportunities. The transition risks and opportunities were assessed using International Energy Agency (IEA)'s Stated Policies Scenario (STEPS) and the IEA's Sustainable Development Scenario (SDS) whilst the physical risks were assessed using the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathway (RCP) 8.5 and RCP 4.5. Through this exercise, key drivers and business impacts were also identified.

Additionally, a high-level quantitative assessment of climate-related financial implications of carbon pricing was also performed.

Based on the risk assessment, a preliminary Climate Strategy framework was prepared as a foundation for future alignment with recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) to address increasing stakeholder expectations for greater transparency in the disclosure of climate risks identification and management.

We intend to build on this initial work with more detailed quantitative analysis and disclosures in the coming years. The quantitative analysis will consider the diversity of PDB's business and offerings.

## **PDB's Climate-related Transition Risks and Opportunities**

### **Policy and Legal**

- Carbon pricing and reporting obligations  
Implication to PDB's Business: Restrictive cap and trade policy as well as potential carbon pricing would increase our operating costs
- Mandates and regulations on existing products and services  
Implication to PDB's Business: Higher biofuel blend mandates, International Air Transport Association (IATA) and International Maritime Organisation (IMO) committing to a 50% reduction in emissions by 2050 could lead to a decline in revenues in the absence of any mitigation steps taken

### **Market**

- Increase in demand for recycled products  
Implication to PDB's Business: Absence of recycled or circular products could lead to reduction in revenue from conventional products. This includes products using non-circular packaging material
- Increase in demand for EVs  
Implication to PDB's Business: Demand for traditional fuels will reduce as demand for electricity increase, impacting our revenue
- Increasing pressure from investors and external stakeholders on setting Net-Zero target  
Implication to PDB's Business: Investors and stakeholders are increasing the pressure on companies to commit to net zero which could increase our capital and operating expenditure as we adopt low-carbon options

## Reputation

- Increasing concerns from stakeholders

Implication to PDB's Business: Increase in cost of capital, both debt and equity, as reputation issues could impact credit rating as well as finance availability

- Shift in consumer preferences and stigmatisation of certain sector

Implication to PDB's Business: Reputational risks can degrade the intangible value of the company and goodwill

## Technology

- Substitution of existing products and services with lower emission options

Implication to PDB's Business: Products from less carbon intensive sources or with lower carbon footprint will be preferred. Hence, selling conventional products and services could lead to a reduction in business revenue as demand declines

- Development and maturity of new technologies

Implication to PDB's Business: Technology development in the field of synthetic fuels, renewables, green hydrogen and electrification could lead to reduction in demand for conventional products, leading to a decline in revenue for PDB. Patented technology that is not readily available could lead to additional R&D expenditure, increasing our operational costs

## Criteria for Climate Risk (Qualitative Classification)

PDB's Climate-related Physical Risks																							
Drought				Cyclone				Extreme Heat				Extreme Cold				Flooding				Sea Level Rise			
RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5		RCP 4.5		RCP 8.5	
2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050	2030	2050
1	1	1	1	2	2	2	3	1	2	1	2	-1	-2	-1	-2	3	3	2	3	1	2	1	2

Reference: IPCC, 2014: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*

Category	Drought (Change in likelihood of extreme drought)	Cyclone (Change in maximum sustained wind speed)	Extreme Heat (Change in monthly maximum temperature)	Extreme Cold (Change in monthly maximum temperature)	Flooding (Change in rainfall of very wet day)	Sea Level Rise	
3 Significant Increase	> +0.2	> 5%	> 2°C	< -2°C	< -2°C	> 10%	>50 cm
2 Moderate Increase	> +0.1	> 2.5%	> 1°C	< -1°C	< -1°C	> 5%	>25 cm
1 Increase	> 0	> 0%	> 0°C	< 0°C	< 0°C	> 0	>0
0 No Change	0	0%	0°C	0°C	0°C	0	0
-1 Decrease	< 0	< 0%	< 0°C	> 0°C	> 0°C	< 0	<0
-2 Moderate Decrease	< -0.1	< -2.5%	< -1°C	> 1°C	> 1°C	< -5%	<25 cm
-3 Significant Decrease	< -0.2	< -5%	< -2°C	> 2°C	> 2°C	< -10%	<50 cm

## Vulnerability and Adaptation

We are aided in protecting our assets against climate change risks through PETRONAS' strategies and capability building initiatives. Since 2020, high-level vulnerability assessments and adaptation plans have been completed for eight regions in Malaysia where our facilities are located. During the year under review, a Climate Projection assessment was completed for hazards such as river basin floods, sea level rise, draught and heat, covering all PDB terminals and stations. The assessment was part of PETRONAS Group's contribution to the National Communication Report (Climate Adaptation) that Malaysia submits to UNFCCC. We will conduct further detailed analysis to better understand how climate change may impact specific facilities in coming years.

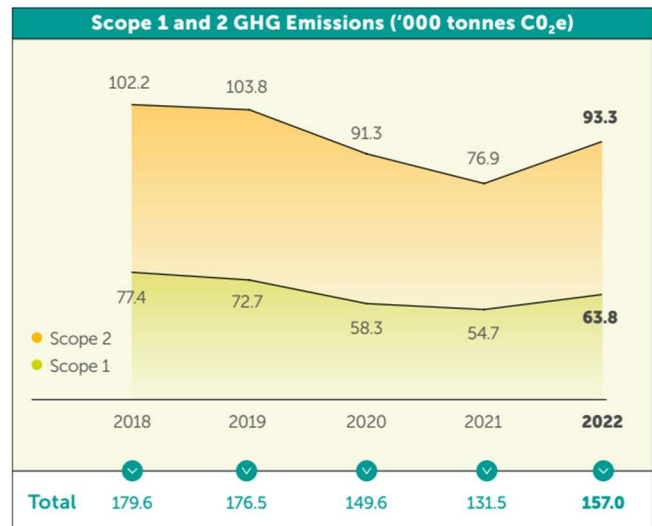
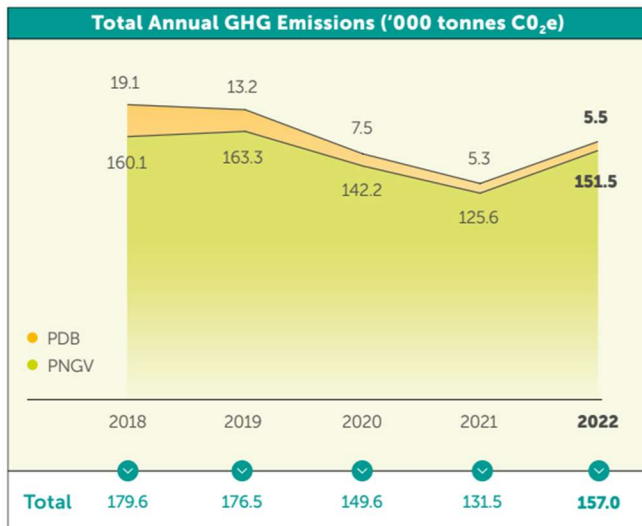
## Our Performance

### Scope 1 and Scope 2 Emissions

We have been monitoring our Scope 1 and Scope 2 emissions closely since 2017.

<b>GHG Emissions (Operational Control)</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>
Total PDB & PNGV Scope 1 and 2 GHG Emissions (thousand tonnes CO <sub>2</sub> e) <sup>(d)</sup>	179.6	176.4	149.6	131.0	<b>157.0</b>
• PDB (Scope 1) <sup>(a)</sup>	69.6	68.6	55.9	52.9	<b>62.0</b>
• PNGV (Scope 1) <sup>(a)</sup>	7.9	4.1	2.4	1.8	<b>1.8</b>
• PDB (Scope 2) <sup>(b)</sup>	91.0	94.7	86.2	73.2	<b>89.5</b>
• PNGV (Scope 2) <sup>(b)</sup>	11.2	9.1	5.1	3.7	<b>3.7</b>
Total GHG Emissions Reduction (tonnes CO <sub>2</sub> e)	47.4	547.3	690.5	1,427.4	<b>2,206.8</b>
• Biodiesel	0	473.7	533.4	1,271.8	<b>2,057.0</b>
• Solar	47.4	73.5	157.1	155.6	<b>149.8</b>
Total Year-end Installed Capacity for Solar PV (kWp) <sup>(e)</sup>	64.78	192.62	212.04	212.04	<b>344.04</b>
Scope 3 Emissions (million tonnes CO <sub>2</sub> e) <sup>(f)(g)</sup>	- NC -	45.6	33.9	33.0	<b>43.9</b>
• Category 1 – Purchased Goods and Services	- NC -	9.2	6.1	5.6	<b>9.0</b>
• Category 11 – Use of Sold Products	- NC -	36.4	27.8	27.4	<b>34.9</b>
Energy Use (thousand Gigajoule)	2,453.3	2,418.3	2,035.5	1,876.3	<b>2,236.1</b>
• Fuel	1,037.2	980.8	770.2	730.5	<b>863.4</b>
• Imported Energy	1,416.1	1,437.5	1,265.3	1,145.8	<b>1,372.7</b>

\* The overall reduction in emissions in 2020 and 2021 was due to movement restrictions during the pandemic.



**Notes:**

<sup>(a)</sup>Scope 1 - Includes all direct GHG emissions from assets that we own or control, such as company vehicles and trucks dedicated to transport our fuels, as well as emissions during equipment maintenance at PETRONAS NGV (PNGV) stations.

<sup>(b)</sup>Scope 2 - Indirect GHG emissions are those generated via the consumption of electricity at our terminals, retail stations, regional offices and training centre.

<sup>(c)</sup>Under operational control consolidation approach, emissions from PETRONAS NGV (PNGV) operations were also included as PDB operates and maintains these NGV stations on behalf of PNGV.

<sup>(d)</sup>Total Scope 1 and 2 GHG emissions data 2017-2020 were externally verified in accordance with ISO 14064-3:2006: Specification with guidance for the validation and verification of greenhouse gas assertions.

<sup>(e)</sup>Short-term target by 2023 – to have Solar PV installed capacity of 1047.36 kWp, with an estimated GHG emissions reduction of 545 tonnes of CO<sub>2</sub>e.

<sup>(f)</sup>Scope 3 - Emissions from sources that are not owned or directly controlled but are related to our activities. The simplified Intergovernmental Panel on Climate Change (IPCC) Tier 1 method using default emission factors was used to estimate our emissions.

- Category 1 includes estimated well-to-tank emissions from refined oil products, LPG, LNG, NGV, biofuels, lubricants, bitumen and petcoke purchased from third parties.
- Category 11 reflects estimated emissions from use-phase of our products, and has been calculated based on sales volume of oil products (eg mogas, diesel and biodiesel, jet fuel, fuel oil), petcoke, LPG, LNG and NGV.
- All other categories are being quantified, and we will be reporting the results in 2023.

<sup>(g)</sup>We are improving the calculation methodology for the above and all additional categories being quantified and will be publishing the results later in 2023.

<sup>(h)</sup>GHG Emissions data excludes one fuel terminal.

## **Journey to Decarbonise our Operations**

We constantly seek to improve our energy efficiency, reduce emissions across our operations and invest in low-emission, renewable technologies. Our ongoing efforts are detailed below:

### **1. Rooftop Solar**

- We installed our first rooftop solar panels at two stations in 2012, and are now powering a total of 14 stations with solar. As at end 2022, our total installed capacity stood at 532 kWp, equivalent to powering 100 households for a year. During the year under review, approximately 222.7 MWh of electricity was generated, cutting our Scope 2 emissions by 149.8 tonnes of CO<sub>2</sub>e. The lower generation of electricity was due in part to the maintenance of one of our solar stations.

### **2. EV Charging Facilities**

- **Powering Electric Mobility Needs**
- PDB entered into an MoU with EP Blueshark Sdn. Bhd. and Blueshark Holding Limited to roll out battery swap stations for electric two-wheelers. Starting with the installation of Battery Swap Stations at nine PETRONAS stations in two-stage pilot runs, we will explore further collaborations along the electric 2-wheeler value chain.
- **Launch of First EV Charging Hub at PETRONAS Station**
- We launched our first electric vehicle (EV) charging hub at PETRONAS Station Bandar Baru Ayer Hitam along the North-South Expressway (NSE), in collaboration with Mercedes-Benz Malaysia Sdn. Bhd. and EV Connection Sdn. Bhd.. First of its kind in Malaysia, the hub comprises three direct current (DC) fast chargers and two alternating current (AC) EV chargers. Our endeavours to expand the number of EV charging points at our stations will grow in tandem with market demand.
- **Commence Commercial EV initiative with pod reviewing e-bus adoption**
- PDB entered into a tripartite MoU with Gentari Green Mobility Sdn. Bhd. And Handal Indah Sdn. Bhd. (Handal Indah) in commencing Commercial EV initiative on e-bus adoption. DC fast EV chargers will be installed at three PETRONAS stations in Johor as part of a pilot project before scaling the solution as a viable business for PDB.

### **3. Giving Customers Greater Choice**

- Our customers have been able to reduce as much as 1.5 million tonnes of CO<sub>2</sub>e in 2022 through the use of our biodiesel. This, in turn, contributes to overall reductions to the nation's carbon intensity, in line with the Malaysian Government's pledge.



#### 4. Sustainable Aviation Fuel

- PDB has collaborated with Malaysia Aviation Group (MAG) to explore the supply and adoption of Sustainable Aviation Fuel (SAF) at Kuala Lumpur International Airport. In 2022, the adoption of SAF continued with refuelling of eight more flights. This supply of SAF is in line with long-term commitments with MAG and augurs well in our efforts to reach out to other domestic and international airlines to secure further SAF supply commitments. Neste's MY Sustainable Aviation Fuel™ is produced from sustainably-sourced, 100% renewable waste and residue raw materials, such as used cooking oil and animal fat waste. In its neat form, Neste MY Sustainable Aviation Fuel™ reduces GHG emissions by up to 80%\* compared to conventional jet fuel.

*\*Calculated based on established life cycle assessment methodologies, like Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) methodology*

#### 5. LNG as Lower Carbon Fuel

- In 2022, with more customers converting from diesel or marine gasoil to LNG as a cleaner fuel option, GHG emissions have been cut by approximately 23,000 tonnes CO<sub>2</sub>e, which is the equivalent to CO<sub>2</sub> sequestered by four million mangrove trees in one year.

### Looking Ahead

As a measure of our commitment towards climate action, we too embrace the NZCE by 2050 ambition. Our immediate, short-term target is to install additional solar PV with 20kWp each at 54 more stations by 2023, reducing approximately 545 tCO<sub>2</sub>e (in reference to the 2019 baseline) from our Scope 2 emissions. At the same time, our extensive Scope 3 quantification exercise is still ongoing, results of which will allow us to develop a detailed GHG reduction roadmap.

We also have a refrigerant management inventory and phase out plan, that is carried out in compliance with Environmental Quality (Refrigerant Management) Regulations 2020 by DOE. This effort is also aligned with the National Phase Out Plan for HCFC by DOE.

- **By 2025** - no more installation of new products and equipment using HCFCs
- **By 2030** - approval limit to 2.5% of baseline for serving use only
- **By 2040** - total ban on the import and use of HCFCs



Our other short to mid-term decarbonisation efforts include:

- Establish medium and long-term reduction targets to support PETRONAS NZCE ambition
- Improve energy efficiency through energy audit and monitoring via digital platform
- Incorporate GHG emissions and climate impact consideration in our new growth plans
- Incorporate TCFD-recommended disclosures in our public domains, with the aim to be fully compliant by the end of 2025, as required by Bursa Malaysia