

# Safeguard the Environment

## 2022 Greenhouse Gas (GHG) Emissions Management

As part of the embedment process and to ensure sustainable GHG management practice across PETRONAS operations, several initiatives were undertaken during 2022:

### 1 Enhancement of GHG Management System

Following the mainstreaming of GHG Management as part of PETRONAS HSE Mandatory Control Framework (MCF) in January 2022, PETRONAS has conducted four internal assurance activities – second line assurance and internal reviews – based on a risk-based approach. This activity helped to identify key gaps and enablers to improve GHG accounting and reporting.

### 2 GHG Digital Tools

PETRONAS has improved and automated the quantification of Scope 1 and Scope 2 GHG emissions in Gas business by linking activity data from plant information systems to the calculation tool, eliminating the need for human intervention in the process.

### 3 GHG Capability

PETRONAS has identified GHG Management as a crucial skill set to be developed as an enabler to realise our NZCE 2050 Pathway. A new discipline has been established under the HSE skill group with a set of competency requirements, recommended trainings and required resources across corporate and business functions.

### 4 Physical Impacts of Climate Change

A vulnerability assessment was conducted on PETRONAS' assets covering 1,140 locations in Upstream, Gas and Downstream in Malaysia as part of Malaysia's Fourth National Communication Report (NC4) to the United Nations Framework Convention on Climate Change (UNFCCC). Through this assessment populated in a Geographic Information System (GIS) system, climate hazards data such as sea level rise, coastal floods, river floods, droughts and temperature rise were gathered and forecasted up to year 2100 for Peninsular Malaysia, Sabah and Sarawak. This initiative has created value by identifying high risk assets and serves as an input to our adaptation strategy.

PETRONAS also has completed vulnerability assessments in South Africa for Downstream refinery and retail operations. Key climate hazards are floods and storms. A training and upskilling session was conducted for Engen staff to enable them to develop and maintain an adaptation plan.

## Accelerating Methane Emissions Management in PETRONAS

We align our methane emissions management with the Methane Guiding Principles (MGP) that prioritise key actions along the natural gas supply chain.

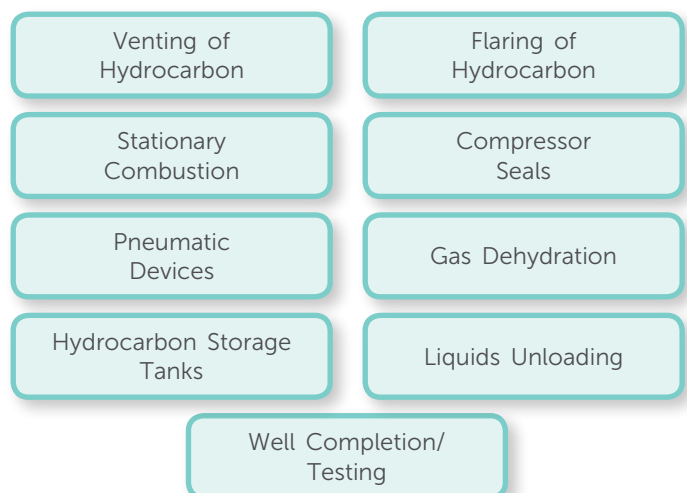
As a signatory member of the Methane Guiding Principles, we commit to advancing robust performance across gas value chains, enhancing the accuracy and quality of methane emissions data, advocating best practices, sound policies, and regulations on methane emissions, capability building and increasing the transparency of methane emissions to better manage them.

In 2022, PETRONAS became a member of the United Nations Environment Programme (UNEP) Oil and Gas Methane Partnership 2.0 (OGMP2.0) Reporting Framework, a multi-stakeholder initiative established by UNEP and the Climate and Clean Air Coalition (CCAC). OGMP2.0 provides a comprehensive, measurement-based reporting framework that improves the accuracy and transparency of methane emissions reporting in the energy sector.

### 1 Advancing Techniques for Methane Measurement

Acknowledging the importance of reporting accurate methane emissions to facilitate effective reduction, PETRONAS is improving our quantification beyond the main emissions sources of flaring, venting and combustion. Rigorous efforts were made throughout 2022 to improve methane data accuracy for PETRONAS' natural gas value chain covering 11 common sources below:

#### Intended Releases:



#### Unintended Releases:



Methane quantification was based on best available operational data guided by internal and international standards from Oil and Gas Methane Partnership 2.0 (OGMP2.0) and Oil and Gas Climate Initiative (OGCI). Additionally, PETRONAS' Group Technical Solutions department have developed a quantification tool using location specific operational data and emission factors from the American Petroleum Institute (API) Compendium to perform the detailed quantification of methane emissions covering 11 common methane emissions sources.

Major methane sources i.e., flaring and venting, were measured using direct measurements (flowmeters) or quantified using detailed engineering calculations based on specific process parameters. For the remaining methane sources, improvements were made to the quantification by inventorying the equipment and components. Methane emissions were then estimated by multiplying the respective emission factors according to the equipment type with the number of equipment of the same type.

We are improving quantification of fugitive emissions by moving away from an estimation approach using production values, to a more detailed quantification method at component level, or using actual leak survey data where available. This method provides a better understanding of methane emissions from each source. A key finding was that quantified fugitive methane emissions using granular data were lower than calculated estimates. We also have a better understanding of our emissions from compressor seals and pneumatic devices, which were never quantified previously.

➤ **80 per cent to 90 per cent** of our methane emissions along the natural gas value chain can be attributed to hydrocarbon venting, flaring and gas-driven pneumatic devices. We prioritise our mitigation measures to these areas through our current GHG emissions reduction projects.

## 2 Advocating for Methane Management to Partners

As the regulatory body overseeing Upstream operations in Malaysia and collaborating with partners across the ASEAN region, PETRONAS has initiated methane advocacy efforts nationally as well as internationally with the aim to increase awareness among our partners to effectively manage methane emissions. Through Malaysia Petroleum Management (MPM), PETRONAS rolled out the Exploration and Production Minimum Environmental Specification (MES) that outlines the requirements on methane emissions measurements, quantifications, and reporting by all upstream operators that are operating in Malaysia. Adhering to these standards ensures that reported methane emissions are accurate and consistent, thereby driving efforts towards reduction.

### The ASEAN Energy Sector Methane Roundtable

Hosted by PETRONAS and supported by Thailand's PTT Public Company Limited (PTT) and Indonesia's Pertamina.

#### Objective:

To set a networking platform among the oil and gas players in Southeast Asia to advocate and promote effective methane emissions management.

#### Outcome:

- Attended by participants from ASEAN national oil companies, several energy companies, as well as international, multilateral and non-governmental organisations such as the International Energy Agency (IEA), World Bank, United Nations Environment Programme (UNEP) and the Environmental Defense Fund (EDF).
- Strong network presence at the roundtables set the foundation for promoting capability building and technical knowledge sharing, improving methane emissions management practices and transparency in performance reporting, aligned with internationally recognised frameworks and standards.

## Safeguard the Environment

### USAID Workshop on Innovative Technologies 2022

Conducted in collaboration with USAID Smart Power Programme (SPP), ASEAN Centre for Energy (ACE), PTT Exploration and Production (PTTEP) and Asia Natural Gas and Energy Association.

**Objective:**

To identify and measure oil and gas sector methane emissions in Southeast Asia.

**Outcome:**

- 👉 Attended by participants from ASEAN oil and gas operators, EDF, United States Environmental Protection Agency (US EPA) and methane emissions management technology providers.

### 3 Accelerating Competency for Methane Management

Since 2020, we have increased our efforts to raise awareness, build skills, and take action to reduce methane emissions throughout our operations. We conducted training sessions to improve employee knowledge on methane management and put into practice internal standards. These standards were aligned with industry expectations and guidance on managing methane emissions.

In addition, we developed e-learning modules on methane management to promote self-learning and increase awareness on achieving methane reduction targets.

In 2022, PETRONAS conducted five upskilling sessions on methane emissions management for 84 internal practitioners aimed at strengthening their understanding in support of operationalising our internal standards, aligning to industry expectations and guidance on methane emissions management. In addition, methane e-learning was also developed to create an avenue of self-development that could accelerate awareness on methane emissions management.

### Harnessing the Power of Technology to Aid GHG Emissions Reduction

PETRONAS is continuously finding opportunities to reduce its carbon emissions to meet our NZCE 2050 Pathway through various climate actions. In 2022, we achieved GHG emissions reductions of 0.6 Million tCO<sub>2</sub>e and cumulatively since 2013, we have reduced 18.1 Million tCO<sub>2</sub>e of GHG emissions from our operations. PETRONAS has classified its operational emissions reduction efforts into four decarbonisation levers as follows:

