



METHANE
GUIDING
PRINCIPLES

Methane Guiding Principles Signatory Reporting

PETRONAS

January 15th 2021



COMPANY: **PETRONAS**

DATE: **January 15th 2021**

YEAR OF JOINING METHANE GUIDING PRINCIPLES: **2020**

SENIOR REPRESENTATIVE: **Dzafri Sham Ahmad (Vice President, Group Health, Safety, Security and Environment)**

ALTERNATE REPRESENTATIVE: **Prof. Dr. Salmaan Hussain Inayat (Head of Environment and Social Performance)**

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Transitioning to a low carbon future requires an energy player like PETRONAS to strike the optimal equilibrium of providing energy in a secure, affordable and sustainable manner while contributing to economic growth and a better quality of life. In the effort of driving towards low carbon economy, there is an opportunity to promote natural gas and liquified natural gas as a low carbon fuel by effective management of methane emissions in the natural gas / liquefied natural gas value chain.

PETRONAS has officially become a Signatory Member of the Methane Guiding Principles (MGP) partnership in March 2020, joining other industry and non-industry organisations in improving the performance of methane emissions management. The focus is on managing methane emissions throughout gas value chain i.e. from upstream, gas processing and later to the end users.

Being a Signatory Member in MGP would mean PETRONAS is committed to fulfill the expectations of the 5 principles in MGP that focus on priority areas for action along the natural gas supply chain, from production to the final consumer. PETRONAS will therefore to continually reduce methane emissions; advance strong performance across gas value chains; improve accuracy of methane emissions data; advocate sound policies and regulations on methane emissions; and increase transparency. The partnership provides PETRONAS with opportunities to accelerate the implementation of methane emission management programmed through strategic collaborations, upskilling programmes, and access to technical studies as well as best practices.

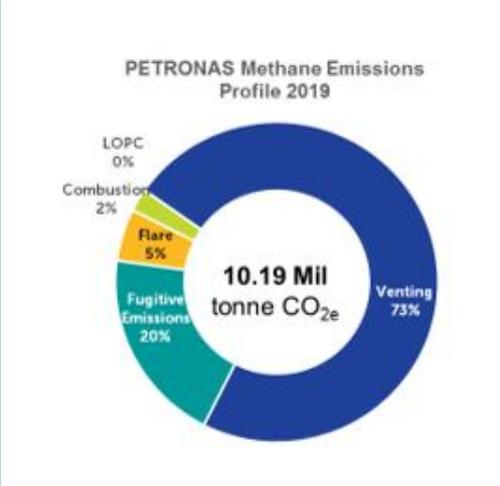
In 2020, PETRONAS has began focuses on two ~~main~~ prongs i.e. improving methane emissions quantification in its gas value chain and advocate other MGP members operating in Malaysia to improve the implementation of methane emissions management in Malaysia upstream operations.

Principle One: Continually reduce methane emissions

2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • PETRONAS has been reducing GHG emissions which includes methane emissions since introduction of PETRONAS Carbon Commitments in 2012. Major methane emissions reductions are from continuous flaring and venting reductions in upstream. • PETRONAS has cumulatively reduced 12.76 Million tCO₂e from 2013 to 2019. 52% of the cumulative GHG reductions are from 30 methane emissions reduction projects namely vent to flare conversions, flare reduction and vent reduction. • In 2020, two methane reduction projects were implemented in Upstream Malaysia. Reduced 2.36 mmscfd of continuous hydrocarbon flaring in Tiong & Samarang offshore fields in Malaysia, of which 0.05 mmscfd was methane. • In addition, Leak Detection and Repair (LDAR) programs is in place to detect and rectify unplanned leaks and fugitive emissions in upstream facilities, gas processing & transmission facilities, LNG facilities and refineries. • However, the LDAR is only limited to detect and repair, and no accurate quantification done for fugitive emissions. 	<ul style="list-style-type: none"> • In 2021, we will continue to implement vent and flare reduction projects in upstream facilities which can potentially reduce up to 50 mmscfd. • Ongoing R&D efforts on carbon capture technologies to increase efficiency of methane and CO₂ separation. Example of the technologies are: <ul style="list-style-type: none"> – Improvement to membrane (PN2) technology in Acid Gas Removal Unit (AGRU) – Cryomin technology uses high gravity concept to enhance the mass transfer in a cryogenic condition • These efforts are in line with our Net Zero Carbon Emissions Aspiration.



What are your organisation’s total methane emissions?

2020 completed activity	2021 intended activity												
<p>In 2019 (verified data), total methane emissions were estimated to be 10.19 Mill tCO₂e. The main sources are as follows:</p> <ul style="list-style-type: none"> • Venting: 7.41 Mill tCO₂e • Flaring: 0.54 Mill tCO₂e • Combustion: 0.24 Mill tCO₂e • Fugitive emissions (high level estimation): 2.00 Mill tCO₂e  <p>PETRONAS Methane Emissions Profile 2019</p> <table border="1"> <thead> <tr> <th>Source</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Venting</td> <td>73%</td> </tr> <tr> <td>Fugitive Emissions</td> <td>20%</td> </tr> <tr> <td>Flare</td> <td>5%</td> </tr> <tr> <td>Combustion</td> <td>2%</td> </tr> <tr> <td>LOPC</td> <td>0%</td> </tr> </tbody> </table> <p>10.19 Mill tonne CO₂e</p> <ul style="list-style-type: none"> • The amount reported is based on operational control (PETRONAS operated assets). Facilities with equity share are not included. • Methane emissions was calculated based on (Direct) Scope 1 emissions from upstream facilities, LNG plants and gas processing plants. • The GHG data, including methane emissions is quantified using API Compendium methodology and the 2019 data was verified based on ISO 14064. • In 2020, we have conducted methane emissions quantification baseline study on LNG, gas processing and gas transmission facilities using more accurate methodology. <p>We have also estimated methane emissions from upstream facilities using production data and IPCC emission factors.</p>	Source	Percentage	Venting	73%	Fugitive Emissions	20%	Flare	5%	Combustion	2%	LOPC	0%	<ul style="list-style-type: none"> • We will continue methane emission quantification baseline study for upstream facilities in 2021 using ground level data and measurement. MGP tool kit and materials will be useful for this purpose. • Upon completion of the study, PETRONAS would have a better overview of methane emissions from its operations. • To improve the practice, PETRONAS will develop an internal standard for methane emissions measurements, quantification and reporting that will be applied across PETRONAS operations.
Source	Percentage												
Venting	73%												
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**Does your organisation report methane intensity?
If so, please specify the intensity.**

2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • PETRONAS Methane Intensity was 0.72% in the base year of 2017. This number is expected to reduce drastically in the coming years due to the upstream flaring & venting reduction efforts. Methane intensity in 2019 was 0.5%. • PETRONAS is currently standardising the methane emissions accounting across the group focusing on gas value chain and methane intensity is not publicly disclosed. • Methane intensity is calculated as follows using OGCI methodology: <ul style="list-style-type: none"> - Nominator: methane emissions (from flaring, venting, combustion and fugitive emissions) - Denominator: Marketed gas 	<ul style="list-style-type: none"> • Standardised methane accounting practice across gas value chain and improve methane emissions accuracy is being pursued . The numbers will be made available upon completion of this initiative.

Do you have a methane emission target?

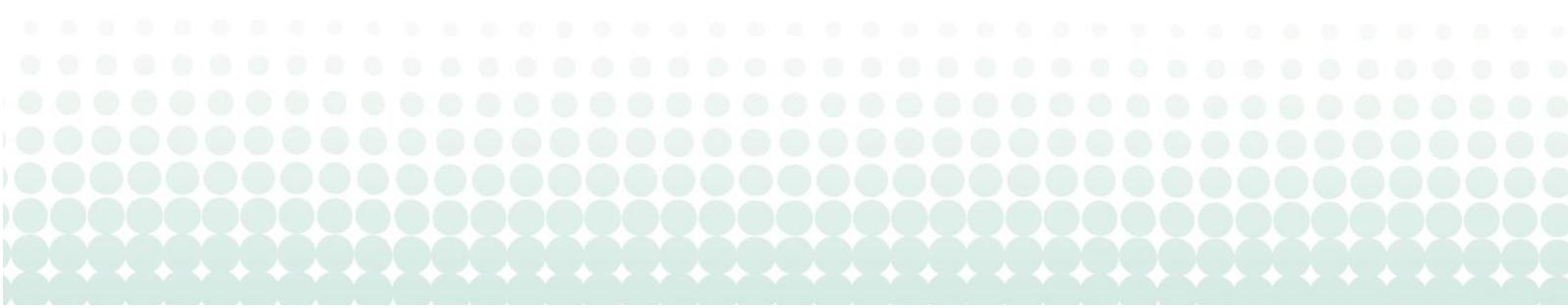
2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • Our PETRONAS Carbon Commitments specify that all new facilities to be designed to be zero continuous venting since 2013. • We have disclosed a short-term target of capping our GHG emissions to 49.5 mil tCO₂e by 2024 which includes methane emissions. • Achieving zero continuous venting in Upstream facilities in Malaysia by 2024 or earlier is part of short-term target which will reduce methane emissions drastically. 	<ul style="list-style-type: none"> • Improve methane emissions accounting and establish a baseline and metric prior to establishing a target. • The creation of the performance metrics for methane will support PETRONAS Aspiration of Net Zero Carbon Emissions by 2050.



Principle Two:

Advance strong performance across the gas supply chain

2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • PETRONAS have initiated collaborations with the other MGP members operating in Malaysia namely Shell, ExxonMobil and Repsol to advocate on the improvement of methane emissions management in Malaysia operations. • Established a Methane Advocacy Working Committee to steer and oversee the implementation of the initiatives. The team is led by PETRONAS as the National Oil Company, and the team members consist of the SMEs from the respective companies. • Conducted Virtual Methane Roundtables to allow for each company to share their practices in Malaysia. In addition, the team have acknowledged the gaps in meeting MGP expectation and have identified the immediate and medium-term solutions to improve methane. Among the solutions are standards on methane emissions measurements and reporting, socialization on the business case and capabilities enhancements. • A plan with milestones was drawn to improve the practice of methane emissions management for Malaysia upstream operations. 	<ul style="list-style-type: none"> • To continue the collaboration efforts and implement the identified initiatives/ solutions. • Regular engagements with the MGP members to keep track on the progress of the initiatives within their operations. • Engagement with the non-MGP upstream operators in Malaysia to advocate methane emissions management in their operations.



Principle Three:
Improve accuracy of methane emissions data

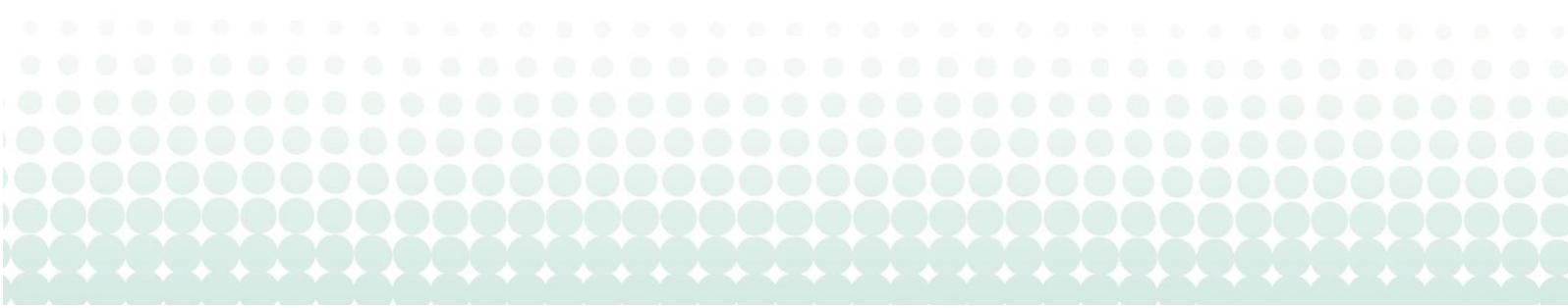
2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • To improve the accuracy of methane emissions quantification in PETRONAS, we have initiated baseline study to measure methane emissions on LNG, gas processing and gas transmission facilities, covering both intended and unintended releases. • A process simulation software that was developed by PETRONAS technical solutions called iCON, where the calculations used in the software are aligned with API compendium, US EPA and IPCC. • Based on the baseline quantified methane emissions, the amount of methane intensity from LNG, gas processing and gas transmission facilities is 0.055%, where the potential value creation of RM 15 mil/year from monetizing the methane emissions. 	<ul style="list-style-type: none"> • We will continue methane emission quantification baseline study for upstream facilities in 2021. Upon completion of the study, PETRONAS would have a better overview of methane emissions from its operations. • To improve the practice, PETRONAS will develop a standard for methane emissions measurements, quantification and reporting that will be applied across PETRONAS operations. This will ensure a standard practice company wide on LDAR and other acceptable technology for measurements and quantification of methane emissions. • To facilitate quantification and reporting, iCON will be used for both GHG and methane quantification. Meanwhile, a digital platform called Environment & Social Performance Integrated & Centralised System (EPICS), which will be used for data repository, dashboard and analytics.



Principle Four:

Advocate sound policy and regulations on methane emissions

2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • PETRONAS is active in the global and international associations i.e. IPIECA, IGU and IOGP in advocating GHG emissions management policies in general, as well as development of methane emissions recommended practice. • In Malaysia, PETRONAS is part of the National GHG Inventory team in providing inputs into the National Communication Report for UNFCCC. • PETRONAS had organised UNEP methane emissions training that is designed for the policy makers and NOC. Management representatives from PETRONAS and Ministries were invited to attend this training as part the efforts to communicate the importance of methane emissions management. • As a National Oil Company, PETRONAS is playing its role in advocating methane emissions management with the upstream companies operating in Malaysia, mainly with the MGP members in Malaysia (i.e. Shell, ExxonMobil and Repsol), as well as with the non-MGP members. <i>(Further updates on this effort as mentioned in Principle Two).</i> 	<ul style="list-style-type: none"> • PETRONAS will continue to support industries efforts in both local and global arena in establishing standards and enhancing best practices on methane emissions management. • The Methane Advocacy Working Committee will continue its efforts in methane emissions management for upstream industry in Malaysia to promote natural gas as low carbon fuel.



Principle Five: Increase transparency

2020 completed activity	2021 intended activity
<ul style="list-style-type: none"> • PETRONAS has been disclosing our GHG emissions performance externally since 2009 for both our (Direct) Scope 1 and Scope 2 emissions. • In 2020, PETRONAS initiated external GHG verification, which provided credibility to the reported GHG data for 2017-2019, covering emissions from entire operations i.e. upstream, mid-stream and downstream. • The efforts of methane advocacy efforts with the MGP members has also been acknowledged globally where the story was featured in the MGP website. • As mentioned in Principle Four, PETRONAS is actively involved as team members in the development of IOGP Methane Measurements Recommended Practice as well as IPIECA’s Flare Management Guideline. • PETRONAS had initiated methane emissions quantification baseline study in 2020 (for LNG and gas processing facilities) and will continue with upstream facilities in 2021. 	<ul style="list-style-type: none"> • PETRONAS will continue to externally disclose GHG emissions performance from the main sources i.e. flaring, venting and combustion and will make available the data once the initiatives to standardize the data capture, calculation and reporting are implemented. In addition, PETRONAS will share the efforts with regards to improving methane emissions management in meeting MGP expectations. • Develop digital solutions for methane monitoring, reporting and verification.

Commentary:

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