

PETRONAS TECHNICAL STANDARDS
HEALTH, SAFETY AND ENVIRONMENT

**GREENHOUSE GAS (GHG) MONITORING, REPORTING
AND VERIFICATION STANDARD**

PTS 60.3305

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PTS 60.3305 – GREENHOUSE GAS (GHG) MONITORING, REPORTING AND VERIFICATION STANDARD has been developed to incorporate PETRONAS Lessons Learnt, Best Practice and new information issued by relevant industry code and standards.

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PREFACE

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ABBREVIATION

API	American Petroleum Industry
BOE	Barrel of Oil Equivalent
CEI	Carbon Emission Intensity
CMU	Carbon Management Unit
CUF	Centralized Utility Facility
E & P	Exploration and Production
DOD	Downstream Operations
GHG	Greenhouse Gas
GHSE	Group Health, Safety and Environment
GSDD	Group Sustainable Development Department
GWP	Global Potential Warming
IPIECA	International Petroleum Industry Environmental Conservation Association
JOB	Joint Operating Blocks (i.e. operated jointly with PCSB)
JVC	Joint Venture Company
LNG	Liquefied Natural Gas
OGP	International Association of Oil and Gas Association
OPU	Operating Unit
PCSB	PETRONAS Carigali Sdn. Bhd.
PETRONAS	Petroleum Nasional Berhad
PMU	Petroleum Management Unit
PSA	Production Sharing Agreement
PSC	Production Sharing Contract
UNFCCC	United Nations Framework Convention on Climate Change
MISC	Malaysia International Shipping Corporation
OBO	Operated by others (i.e. other than PCSB)
COB	Carigali Operated Blocks (Operated by PCSB)

1.0 INTRODUCTION

Climate Change is the biggest issue in the 21st Century. Multinational organisations are increasingly facing business challenges in a carbon constrained world. PETRONAS as a leading multinational business entity will need to anticipate, mitigate and develop adaptation strategies to face the upcoming carbon risk. Thus the first task of monitoring and tracking GHG emissions is very crucial for a variety of reasons. This is defined as carbon footprinting. Some of the main reasons for carbon footprinting in PETRONAS operation include:

- Identify source of GHG emissions and promote systematic Monitoring, Reporting and Verification of GHG emissions in PETRONAS
- Compliance with current or potential regulatory requirements
- Demonstrate continuous improvement in operational and energy efficiency, as well as reductions in flaring and venting.
- Voluntary reporting to external stakeholders. i.e. PETRONAS Sustainability Report

The GHG Accounting and Reporting PTS will be used by BU's and OPU's to:

- a) Monitor and track the changes in their operational and organisational boundaries and will provide better understanding of selected approaches to account for GHG's in PETRONAS.
- b) Report GHG emissions using systematic reporting system
- c) Verify the GHG emission according to International standards (e.g. ISO 14064-3)

This document will enable the Carbon Management Unit (CMU) under Group Sustainable Development Department (GSDD) of GHSE to effectively execute its responsibilities by creating better awareness and understanding of OPU and BU roles and responsibilities related to GHG accounting and reporting.

The PTS has been developed based on the following guidelines and is cross-referred:

- The "Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions," issued by the International Petroleum Industry Environmental Conservation Association (IPIECA), American Petroleum Industry (API) and International Association of Oil and Gas Association (OGP) in December 2003 (Industry Guideline):
http://www.ipieca.org/downloads/climate_change/GHG_Reporting_Guidelines.pdf
- The "Compendium of Greenhouse Gas Emissions Methodologies for the Oil And Gas Industry" issued by the API in February 2009 (Compendium):
http://www.api.org/ehs/climate/new/upload/2009_GHG_COMPENDIUM.pdf
- GHG Protocol, WRI (Protocol): <http://www.wbcsd.ch/web/publications/ghg-protocol-revised.pdf> (2004)
- *ISO 14064-1 Greenhouse Gases—Part 1: Specification with guidance at the organizational level for quantification and reporting of greenhouse gas emissions and removals* issued by International Standards Organization.

1.1 OBJECTIVE

The objectives of the GHG Emission Accounting and Reporting PTS are to:

- Identify source of GHG emissions and promote systematic Monitoring, Reporting and Verification of GHG emissions in PETRONAS
- Provide guidelines to OPU's and BU's to develop their own customized GHG Monitoring, Reporting and Verification Procedure.

1.2 SCOPE

This PTS covers all PETRONAS Operations

1.3 GHG INVENTORY PROCESS OVERVIEW

The GHG inventory process can be summarized into 3 phases as:

- Setting boundaries or limitations
- Design and conduct inventory
- Report, review & verify

GHG Inventory Steps		Sub-Task	Responsibility
STEP 1	Set Boundaries or Limitations	National Boundaries	CMU
		Organizational Boundaries	
		Operational Boundaries	
		Type of GHG emissions	
		Base year for reporting	
STEP 2	Design & Conduct Inventory	Design Reporting format (e.g. iHSE)	OPU/ BU
		Identify emission sources	
		Collect GHG data	
		Validate GHG data	
		Analyze Data (i.e. SANGA)	
STEP 3	Report, Review, Audit & Verify	Report GHG data (i.e. iHSE)	OPU/ BU
		Review and approve GHG data (i.e. iHSE)	
		Monitor & Review GHG data	
		Set Targets for improvement	
		Internal GHG Audit (Tier1 and Tier 2)	
		Auditing GHG Inventory System (Tier 3)	CMU/GHSE
		External GHG Verification (Third Party)	BU & CMU

Table 1.1: GHG Accounting & Reporting Implementation

Details of each step above are discussed in Section 1.3.

1.4 GHG REPORTING PRINCIPLES

PETRONAS OPU faces a range of options of how they account for and report emissions from the facility to the corporate level. The principles for GHG accounting and reporting for the Group follow those outlined in the Industry Guidelines, i.e.:

- **Relevance** – Define boundaries that appropriately reflect the GHG emissions of the organizations and the decision-making needs of users
- **Completeness** – Account for all GHG emissions sources and activities within the chosen organizational and operational boundaries. Document and justify any specific exclusion. Any specific exclusion should be stated and justified
- **Consistency** – Use consistent methodologies and measurements to allow meaningful comparison of emissions over time. Transparently document any changes to the data, methods or any other factors in the time series
- **Transparency** – Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose assumptions and make appropriate references to the calculation methodologies and data sources used
- **Accuracy** – Ensure that estimates of GHG emissions are systematically neither over nor under true emission, as far as can be judged, and that uncertainties are quantified and reduced as far as practicable. Ensure that sufficient accuracy is achieved to enable users to make decisions with reasonable assurance as to the integrity of the reported GHG information

2.0 ESTABLISHING ORGANISATIONAL BOUNDARIES

PETRONAS is a fully integrated petroleum company engaged in a wide range of operations, ranging from the exploration and production of oil and gas to the delivery of petroleum products to customers. The figure below indicates an overview of the key focus areas of carbon management for PETRONAS.

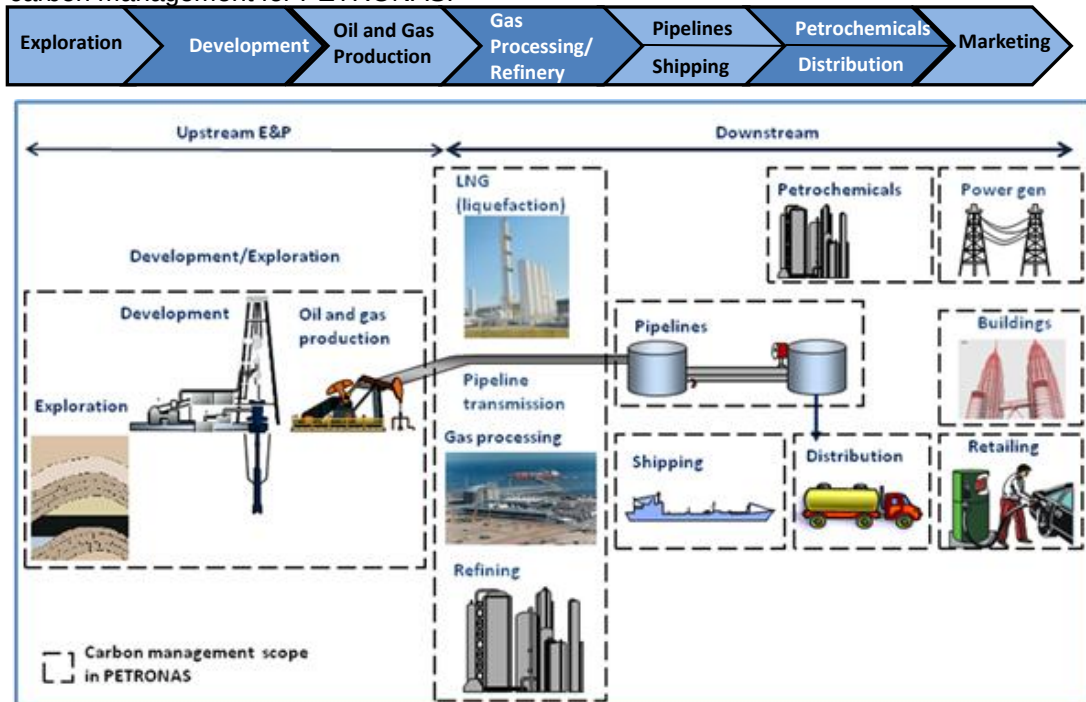


Figure 1.1: Overview of Carbon Management in PETRONAS Value Chain

PETRONAS OPU's involved in the following major sectors shall account for and report GHG from both domestic and international operations.

- a) **Upstream Activities**
 - Includes exploration, development and production of oil and gas.
- b) **Gas & Power**
 - *Gas & Power sector* – the processing, distribution, and marketing of products derived from gas e.g. LNG and NGV and power generation activities.
- c) **Downstream activities**
 - *Oil Sector* - the refining, processing, distribution, and marketing of products derived from oil, and includes service stations and depots.
 - *Petrochemicals sector* – the manufacturing, distribution, and marketing of petrochemical products.
- d) **MISC**
 - Includes ports, logistic and maritime transportation
- e) **Other Activities**
 - This includes and is not limited to all non-process assets, including buildings.

OPUs which do not account for and report their GHG emissions should provide an explanation for this.

2.1 DEFINITION OF EQUITY SHARE & OPERATIONAL APPROACH

The accounting of GHG emissions from joint ventures¹ may be performed in one of two ways: on the basis of equity share or on the basis of operational control.

Equity share approach

Under equity share approach, a company account for GHG emissions from operations according to its share of equity in the operations. The equity share reflects economic interest, which is the extent of rights a company has to the risks and benefits flowing from an operation.

Operational control approach

Under the operational control approach, a company reports 100% of emissions from joint ventures over whose operations it has control and none of the emissions from joint ventures it does not control. A variety of criteria exist for determining operational control. PETRONAS follows the IPIECA "Petroleum Industry Guidelines for Reporting GHG Emissions" criteria which define companies in the petroleum industry to have operational control when:

"The company has the authority to introduce and implement its operational and environmental, health and safety (EHS) policies at the joint venture".

Organizational boundaries can either be based on operational control or equity share. The section below describes the selected approach for PETRONAS GHG reporting and the rationale behind it.

Table 2.1 describes the difference between operational control and equity share.

No.	Operational Control	Equity Share
1	Accounting based on control - emissions are accounted based on management control	Accounting based on equity share. Provides a realistic picture on risks and liabilities associated with GHG emission on management, employees, shareholders and other company stakeholders
2	Performance tracking - a greater degree on influence because of control	Environmental reporting as part of financial liabilities
3	Situation where resources for inventorying emissions are limited	
4	Less costly	More expensive than operational control approach

Table 2.1: GHG Emission Accounting based on Equity Share and Operational Control Approach

¹ Unless otherwise indicated, "joint venture" is used as a generic term in the IPIECA guidelines for any operations or activities involving more than one party.

PETRONAS APPROACH

PETRONAS shall account its GHG using operational control approach. However, equity share of the operation under control should be calculated separately. Gathering information from OPU's under PETRONAS operational control is much easier and it can ensure that the GHG data meet the minimum quality standards and is consistent as well as reliable. The list of OPU's under operational control is maintained by the Assurance & Performance Management Department, GHSE.

Note:

- 1. Please refer to Figure 2 in Section 4.1 for more details*
- 2. BU's and OPU's shall develop their respective GHG procedure to define the boundaries
More clearly*

3.0 ESTABLISHING GHG OPERATIONAL BOUNDARIES

3.1 DEFINITION OF DIRECT & INDIRECT EMISSIONS

The below definition of direct and indirect emissions are derived from *Petroleum Industry Guidelines for Reporting GHG*, *IPIECA*, and are according to the *GHG Protocol*.

Direct (Scope 1) GHG emissions are from sources that are owned or controlled by the reporting company, for example emissions from exhaust stacks in refining and upstream operations, emissions from process vents in oil and gas treatment, oil refining, and chemical production, and exhaust emissions from company owned motor vehicles and vessels.

Indirect (Scope 2 & Scope 3) GHG emissions are a consequence of the activities of the reporting company, but occur from sources owned or controlled by another party.

- **Scope 2** Emissions refers to indirect emissions resulting from the consumption of purchased energy (such as electricity purchased from the local power company).
- **Scope 3** Emissions refers to all other types of indirect emissions (such as emissions due to contract manufacturing, contracted drilling operations, and product transported by third parties).

OPUs must quantify and report all Scope 1 and Scope 2 emissions.

Details of the applicability of the operational boundaries definition for PETRONAS are described in the Section 3.2.

3.2 ACCOUNTING FOR DIRECT GHG EMISSIONS IN PETRONAS

The OPUs shall account for and report all direct GHG emissions at operations that fall within their established organizational boundaries. General categories of direct emissions sources that should be included in inventories are:

- i. Operational flaring and venting (excludes flaring and venting during exploration activities and well tests shall be accounted for separately from flaring);
- ii. Fuel combustion in turbines, boilers, incinerators, engines, heaters, furnaces, etc.
- iii. Fuel combustion from company owned vehicles
- iv. Acid gas removal processes;
- v. Physical or chemical process emissions such as from gas processing, oil refining, and petrochemical manufacture (e.g. emissions from glycol dehydrators, catalyst regeneration, fluid cokers and flexi cokers).
- vi. Fugitive emissions, such as emissions from leaking seals, gaskets or valves