



**CLIMATE &
CLEAN AIR
COALITION**

TO REDUCE SHORT-LIVED
CLIMATE POLLUTANTS

CCAC Oil & Gas Methane Partnership

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- 100+ Governments, Int'l Organisations, INGOs
- Addressing Short-Lived Climate Pollutants (SLCPs)
- Close cooperation with GMI
- Oil & Gas considered largest man-made methane emission source after agriculture
- CCAC's Oil & Gas Sector Initiatives
 - **Oil & Gas Methane Partnership (OGMP)**
 - **Oil & Gas Methane Studies**
 - Technology Demonstration (black carbon / flaring)
 - Peer-to-peer regulatory component



Launch of OGMP

- Launched at UN Climate Summit, September 2014
- Voluntary mechanism to help companies
 - Address emissions in a systematic manner
 - Demonstrate this systematic approach
 - obtain recognition of leadership



Focus on nine “core sources”

Technology Application Approach → 9 core emission sources*

- Natural gas driven pneumatic devices, pumps
 - Centrifugal compressors with wet (oil) seals
 - Glycol dehydrators
 - Well venting of liquids unloading
 - Casinghead gas venting
 - Fugitive equipment and process leaks
 - Reciprocating compressor rod seal/packing
 - Hydrocarbon liquid storage tanks
 - Well venting/flaring during well completion for hydraulically fractured wells
- Identified through NGS experience and company consultations to account for much of upstream methane emissions
 - Partner companies agree to survey for & address these 9 in participating operations



Summary of Commitments (MoU)

- Implementation Plan after 6 months (confidential)
 - list of participating assets, expected pace
- Survey participating assets for 9 core sources
 - Determine state of control (ref TGDs)
 - For “unmitigated” sources
 - Quantify emissions
 - Evaluate cost-effective control options
 - Implement feasible opportunities
- Annual report to CCAC – confidential
- Company-specific public version of report



Public report - example



OIL AND GAS METHANE PARTNERSHIP (OGMP) ACCOMPLISHMENTS REPORT PTT PUBLIC COMPANY LIMITED 2015



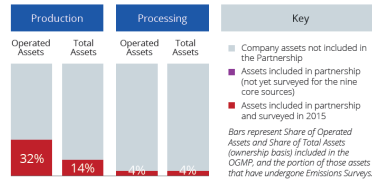
INTRODUCTION TO PTT PUBLIC COMPANY LIMITED

PTT improved its operations based on results received from assessments on methane leakage in PTT's operational areas and PTTEP's S1 drilling platform and various NGV service stations during 2013-2014. As a consequence, 10,700 tCO₂e were saved, accounting for cost savings of 3 million baht per year. In 2015, 9 operational areas were assessed in which the findings and results will be used to develop plans for 2016. In 2015, PTT organized an international workshop to educate its employees on best practices in methane management, inviting experts from various organizations including USEPA, Embassy of the United States in Thailand, UNEP, and Cairn Energy Co., Ltd. to share relevant knowledge.

PROGRESS IN MITIGATING METHANE EMISSIONS

For each asset surveyed, OGMP partners screen for the presence of each of the nine core OGMP sources. Sources found to be present are then further analyzed to quantify the number of sources overall, the number of sources mitigated, and the mitigation technology or practice being used. For unmitigated sources, OGMP partners also quantify the methane emissions in order to evaluate that source for mitigation feasibility (emissions levels are not part of public reporting).

SCOPE OF PARTICIPATING ASSETS AND EMISSIONS SURVEY PROGRESS



CORE SOURCES PRESENT AT SURVEYED ASSETS

Pneumatic Controllers and Pumps	<input checked="" type="checkbox"/>
Fugitives	<input checked="" type="checkbox"/>
Centrifugal Compressors with Wet Seals	<input checked="" type="checkbox"/>
Reciprocating Compressors	<input checked="" type="checkbox"/>
Glycol Dehydrators	<input checked="" type="checkbox"/>
Storage Tanks	<input checked="" type="checkbox"/>
Liquids Unloading	<input type="checkbox"/>
Hydraulically Fractured Completions	<input type="checkbox"/>
Casinghead gas	<input type="checkbox"/>

Core Sources Present at Surveyed Assets	Mitigation Progress (%)	Total Sources Identified as Present	Emissions Reduced under Program (metric tons CH ₄)
Natural gas driven pneumatic controls and pumps	100	83	0
Fugitive equipment and process leaks	100	3	127
Centrifugal compressors with "wet" (oil) seals	100	6	0
Reciprocating compressors rod seal/packing vents	6 12 82	17	126
Glycol dehydrators	100	3	0
Hydrocarbon liquid storage tanks	67 33	3	0

Legend: Mitigated prior to the program (green), Mitigated within the program (blue), Unmitigated (grey)

Total identified sources mitigated to date

Note: With the exception of Fugitive Equipment and Process Leaks, the "Total Sources Identified as Present" column indicates the actual number of equipment or component sources or emissions events. For Fugitive Equipment and Process Leaks, the source is counted on an asset-wide basis, so the number of sources indicates the number of assets counted within the Emission Surveys. Finally, because leaks can occur at random, Fugitive mitigation action must happen on an annual basis for the source to count as mitigated. Therefore all Fugitive mitigation shows as occurring "within the program," even if the practice was in place prior to joining OGMP.

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Mitigation Actions by Source*

Glycol dehydrators

- Dehydrator system has all vents routed to a flare, Vapor Recovery Unit (VRU), or other beneficial use.

Centrifugal compressors with "wet" (oil) seals

- Seal oil is degassed at atmospheric pressure and the gas is recovered and used or flared.
- Compressors use mechanical dry seal.

Hydrocarbon liquid storage tanks

- Stabilization towers are installed ahead of tanks to reduce the amount of entrained gas and flash gas emitted from the tanks(s).

Natural gas driven pneumatic controllers and pumps

- Pneumatic pumps powered by compressed air.
- "Low-bleed" pneumatic controllers continuously bleed less than 6 scfh (0.17 scmh).
- Intermittent controllers confirmed to only emit during the de-actuation portion of a control cycle.

Reciprocating compressors rod seal/packing vents

- Rod packing is vented to the atmosphere and rings are replaced at least every 26,000 hours or no less frequently than every three years.
- Rod packing is vented to the atmosphere and excessive leakage is identified and stopped whenever maintenance occurs between main engine overhauls.
- Reciprocating compressor "distance piece" or rod packing vents are routed to recovery or flare.

Methodology(ies) Used to Quantify Unmitigated Emissions*

Fugitive equipment and process leaks

- Direct measurement

Reciprocating compressors rod seal/packing vents

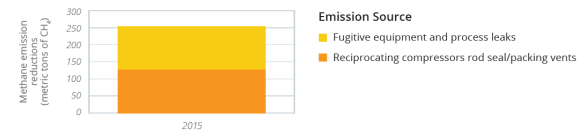
- Direct measurement

Hydrocarbon liquid storage tanks

- Direct measurement

*More detailed descriptions of these actions and methodologies are found in OGMP's Technical Guidance Documents.

Methane Emissions Reductions Under the Program



PTT PUBLIC COMPANY LIMITED'S BACKGROUND

PTT is a state-owned enterprise under supervision of the Ministry of Energy with the Ministry of Finance as a major shareholder. It is listed on the Stock Exchange of Thailand and engages in fully integrated energy and petrochemical businesses. PTT has set a goal to achieve zero unintentional methane emissions in 2020 to reduce GHG emissions into the environment on top of saving operating cost. PTT became a founding member of the CCAC OGMP and partner under USEPA's Natural Gas Star Program.

ABOUT THE PARTNERSHIP

The Climate and Clean Air Coalition (CCAC) has created a voluntary initiative to reduce methane emissions in the oil and gas sector: the CCAC Oil & Gas Methane Partnership. The CCAC officially launched the Partnership at the UN Secretary General's Climate Summit in New York in September 2014. To learn more about this Partnership, visit www.ccacoalition.org/en/content/ccac-oil-gas-methane-partnership.



Important Features

- Up-front flexibility
 - Company selects participating assets – No minimum
 - Company decides pace of implementation/addition
 - Reporting begins following first full year
- Platform for learning
- Recognises prior actions
- Reporting format – aim to synchronise
- Any changes to OGMP are by consensus
- No membership fee



Partner benefits

- Credibility of public-private partnership
- Recognition of present and past efforts to control emissions
- Increased product recoverability and revenue
- Increased operational efficiency and safety
- Harmonisation with other reporting and disclosure standards
- Best practice sharing and support



Methane Science Studies

- Build on experience of EDF-led US studies
- Phase 1 – prioritise studies for Phase 2
- \$6.6 million pledged
- Invitation to participate
 - Funders (\$600k apiece)
 - Researchers to carry out Phase-2 studies
 - Studies manager

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Thank you

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