



Methane Emissions Management at Ecopetrol

Orgullosamente
ECOPETROL



Introduction

Methane is a mighty greenhouse gas (GHG) that, when emitted, can warm the planet's atmosphere. Its global warming potential is 28 times greater than that of carbon dioxide (CO₂). Methane is responsible for 30% of the total increase in global temperatures since the industrial revolution - the second greatest perpetrator of global warming after CO₂.¹

To limit the increase in the world's average temperature to 1.5°C, a global appeal has been made to intensify efforts and aspirations to reduce methane emissions and achieve the goals set out in the Paris Agreement.²

In its March 2024 report, titled *Global Methane Tracker*, the International Energy Agency reported that the energy sector accounts for more than a third of global methane emissions, and reducing emissions from the hydrocarbon sector offers the greatest short-term potential, and a reduction of around 75% in methane emissions by this sector is vital to achieving global climate goals.

Various countries and sectors are implementing measures to control methane emissions and have set specific targets for its reduction. More than 150 countries, including Colombia, signed the *Global Methane Pledge* at the Conference of the Parties on Climate Change (COP26) in Glasgow, committing to reduce methane emissions by 30% by 2030 relative to 2020 levels.

For its part, Ecopetrol, in 2023, established its specific methane emissions reduction goal of 45% by 2025 and 55% by 2030, and adhered to voluntary initiatives such as the Oil and Gas Methane Alliance 2.0 (OGMP 2.0), Zero Routine Flaring by 2030 (ZRF by 2030), the Oil and Gas Decarbonization Charter (OGDC), and the "Aim for Zero Methane Emissions by 2030" headed by the Oil and Gas Climate Initiative (OGCI).

To meet the reduction goals and the voluntary commitments achieved through these initiatives, it is necessary to further improve the detection, quantification, monitoring, and reporting processes to produce more accurate, reliable information with lower uncertainty and to implement projects and initiatives that reduce these emissions.

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Since 2019, Ecopetrol has carried out direct measurements using top-down and bottom-up

¹ IEA: *The Imperative of Cutting Methane from Fossil Fuels: An assessment of the benefits for the climate and health.* <https://www.iea.org/news/urgent-action-to-cut-methane-emissions-from-fossil-fuel-operations-essential-to-achieve-global-climate-targets>

² The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 195 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016. Its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels." To limit global warming to the aforementioned target, countries must peak their greenhouse gas emissions as soon as possible to achieve a climate-neutral planet by mid-century. <https://unfccc.int/process-and-meetings/the-paris-agreement>



technologies across the Company's assets, with support from the Government of Canada, the United Nations Environment Program, and universities with extensive global experience in monitoring and reporting methane emissions in the hydrocarbons sector.

Objective and Scope

The objective of this document is to present Ecopetrol's progress in managing methane emissions. This includes the oversight of emissions from Ecopetrol's operations in Colombia, specifically its directly operated assets, and focuses mainly on the production segment of the hydrocarbons business line, where material emissions are concentrated (+95% of methane emissions).

In addition, governance and risk management matters in relation to methane emissions management are also addressed.

Governance in this area

Board of Directors

Ecopetrol's Board of Directors is the Company's highest administrative body, with six (6) permanent committees that support its governance. The main function of these committees is to conduct a preliminary analysis and issue informed recommendations on issues submitted to the Board for consideration. The most relevant of these committees are:

- **CORPORATE GOVERNANCE AND SUSTAINABILITY COMMITTEE:** assists the Board of Directors in matters related to good corporate governance and the sustainability agenda.
- **TERRITORIAL TRANSFORMATION AND HSE COMMITTEE:** monitors and manages risks associated with occupational health and industrial and process safety for workers and contractors. In addition, it monitors environmental performance and contributions to territorial development.
- **AUDIT AND RISK COMMITTEE:** responsible for supervising the handling and effectiveness of the Internal Control System, ensuring timely risk management and the effectiveness of the controls implemented, among other duties.

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These committees have the power to intervene in Ecopetrol's actions they consider strategic to the Company's growth and may request specific reports from Management.

In this way, Board members delve deeper into key issues, including the business risk map, the sustainability agenda, environmental performance, contributions to territorial development, occupational health and safety, and industrial and process safety, among others.

Senior Management

The Strategic Committee is the highest-level body, led by the Company's president, and serves as a forum for articulating the Ecopetrol Group's strategy. Its main value lies in ensuring alignment between strategic pillars and long-term corporate decisions.

In this space, fundamental strategic issues are reviewed, monitored, and approved, including



decarbonization objectives, investments in clean technologies, and environmental management across the Ecopetrol Group.

In turn, the Business Line Committees — Hydrocarbons, Transition Energies, and Transmission and Toll Roads — perform supervisory and strategic alignment functions within their respective operational areas. These committees monitor progress on the specific environmental objectives of each line, promote the exchange of good practices and ensure coherence between operations and the corporate environmental strategy. Their role is essential for the effective implementation of the environmental strategy in daily operations. These business line committees, within the framework of their agenda, address specific methane management issues that need to be communicated to each segment.

At the operational level, a systematic decarbonization meeting is held to review progress on implementing the methane management plan, OGMP 2.0 Gold Standard requirements, scientific studies, direct measurement campaigns, regulatory compliance, and progress toward meeting the targets.

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Senior Management Compensation

Total compensation at Ecopetrol includes fixed salary, short- and long-term variable compensation, and benefits. Short-term incentives are linked to Balanced Scorecard results and aligned with the 2040 Strategy.

In 2024, 20% were climate-related metrics, including reduction of GHG emissions (5%), energy efficiency (5%), renewable energy (5%), and contribution to sustainability (5%), which captures the return of sustainability initiatives on climate change, water, sustainable territories, and innovation.

Individual performance agreements for vice presidents and equivalent roles may include climate KPIs aligned with their responsibilities. 100% of C-suite positions have climate-related incentives. The Long-Term Incentive Plans (2022-2024, 2023-2025, 2024-2026) include low-emission business decarbonization and diversification targets, with an average weighting of 23% for climate-related targets.

Material Elements and Roadmaps

In 2020, Ecopetrol updated its materiality analysis, which serves as the basis for its T ESG strategy. This exercise identified 28 elements that significantly impact the Company's ability to generate value in the short-, medium-, and long-term, and/or that significantly influenced its stakeholders' decisions.

Of the 28 material elements, three (3) were classified as exceptional. These are areas in which Ecopetrol seeks to stand out and gain international recognition by establishing best practices in Climate Change, Sustainable Territories, and Integrated Water Management.



In 2021, the Board of Directors, through its Strategy Committee, reviewed matters related to the energy transition and TSEG, as well as decarbonization and fugitive emissions. This same year, the Company established roadmaps for the material issues of Integrated Water Management, Climate Change, and Biodiversity, establishing goals, management indicators, and short-, medium-, and long-term milestones. The HSE Committee of the Board of Directors was responsible for reviewing the Climate Change roadmap.

This roadmap, whose commitments remain in force at the time of publication of this document, includes:

- Achieve net-zero carbon emissions in scopes 1 and 2 by 2050
- Reduce emissions in scopes 1 and 2 by 25% by 2030
- Reduce emissions by 50% in scopes 1, 2 and 3 by 2050

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In February 2022, Ecopetrol launched its new 2040 corporate strategy, called “Energy that Transforms”, to strengthen the Ecopetrol Group’s leadership in Colombia and the region. This strategy remains in place at the time of this document’s publication.

As part of this process, the Company analyzed energy transition scenarios to adapt its business strategy to a low-carbon economy and ensure long-term value creation. These considerations led to business scenarios that fed into 2040 Strategy.

The new strategy also incorporates a pillar titled “Generating Value through TSEG”, reflecting the importance of sustainable development for the Ecopetrol Group. Sustainability at Ecopetrol means executing responsible, safe, and efficient operations; maintaining harmonious relationships with the environment and stakeholders; operating under a transparent, ethical governance framework; and leveraging technology to deliver innovative solutions to current and future challenges.

In 2022, the Board of Directors, through its HSE Committee, initiated an assessment of the methane reduction target. In 2023, it received two updates on GHG emissions progress, as well as a complete assessment of the methane emissions reduction goal for 2030.

In 2023, Ecopetrol also updated its materiality exercise to a dual materiality approach, considering more than 80 impacts of its operations on the environment and society, as well as the financial effects of more than 360 environmental risks and 20 ESG opportunities on its ability to generate economic value.

As a result of this exercise, the Company identified 14 material elements, all of equal importance and priority in their handling, including Climate Change, Water, Biodiversity, and Ecosystem Services. In addition, it identified four (4) transversal issues to Ecopetrol’s strategy that are not treated as specific elements but rather serve as enablers of the material elements, including the Fair Energy Transition.

During 2025, Ecopetrol’s Business Risk Map was updated to include the risk of “Inadequate response to challenges associated with climate change, water, and biodiversity”. In addition,



the roadmaps for the material elements defined in the new materiality exercise were updated or developed, as appropriate, to establish their strategic aspirations, technical goals, and technological outlooks.

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Specifically regarding Climate Change, a strategic option focused on adaptation was included, which addresses the management of physical and transition risks. This roadmap, along with others, was approved by the Strategic Committee in 2025.

Policies and Procedures

Ecopetrol S.A. has implemented an HSE Management System with the aim of providing the necessary elements for the Company to manage risks effectively, protect life, and promote environmental care.

The mandatory basic requirements of the HSE Management System are based on the international standards ISO 14001:2015 and ISO 45001:2018 and are certified to ensure compliance with national legislation.

Ecopetrol S.A.'s Environmental Strategy is implemented within the framework of said system, seeking to establish guidelines for environmental protection, and is integrated and coordinated with Ecopetrol S.A.'s T ESG and Corporate Responsibility Strategies. It also aims to advance corporate goals within the energy transition framework.

The guidelines built into this strategy allow the organization to provide a vision of Ecopetrol's environmental performance by seeking:

- Environmental legal compliance.
- The identification and systematic management of the potential environmental impacts and risks associated with the activities of Ecopetrol S.A., focusing on continuous improvement and applying the mitigation hierarchy.
- The generation of long-term environmental value in the surrounding areas of our operations.
- Enabling the fulfillment of corporate environmental goals on the path towards the energy transition strategy.

Based on the above, the following strategic pillars for environmental management were established:

- Environmental Planning & Compliance
- Climate Related Action
- Water Neutrality
- Biodiversity and Ecosystem Services
- Circular Economy
- Clean Air for the Environment
- Integrated Waste Management
- Prevention and Enhanced Remediation of Environmental Impacts from Process Safety and Operational Incidents



The Climate Action pillar establishes that, as part of Ecopetrol's efforts to contribute to the Sustainable Development Goals, the Paris Agreement, and Colombia's Nationally Determined Contribution (NDC), mitigation actions are being carried out to reduce carbon emissions across direct operations and the value chain, reduce the vulnerability of the operation to climate variability and change, as well as to properly manage risks and identify opportunities related to climate change.

Specifically, mitigation efforts aim to reduce greenhouse gas emissions (CO₂e) from the Company's operations and value chain, aligned with the business objectives of competitive and sustainable growth, in the short, medium, and long term. The mitigation actions are consistent with Ecopetrol's Corporate Strategy, the T ESG agenda, and the roadmap to promote the energy transition, and are supported by a detailed decarbonization plan that ensures the Company's competitiveness and resilience.

The decarbonization plan includes the following elements:

- Administration of GHG emissions information, which includes ensuring the quality, integrity, consistency, and transparency of the information reported.
- Investment in GHG emission reduction technologies, based on the identification and implementation of initiatives associated with the optimization of energy consumption, renewable energies, the reduction of flaring and methane emissions, and the development of novel low-emission technologies.
- Strategic portfolio management by implementing economic instruments associated with GHG emissions and climate change criteria to incorporate and divest assets.

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The mitigation actions are consistent with Ecopetrol's Corporate Strategy, the T ESG agenda, and the roadmap to promote the energy transition, and are supported by a detailed decarbonization plan that ensures the Company's competitiveness and resilience.

Risk Management

Risk management at Ecopetrol is supported by the Integrated Risk Management System (IRS), based on the COSO 2013, COSO ERM 2017, and ISO 31000:2018 standards, and governed by the stipulations included in the internal regulations, incorporated in the bylaws, the integrated policy, Corporate Governance Code, handbooks, manuals, and internal instructions issued for this purpose. Integrated risk management seeks to establish general guidelines for risk management (identification, assessment, treatment, monitoring, and disclosure) and to foster a culture that enables informed decision-making by anticipating events that may positively or negatively affect the Company's objectives. Under IRS guidance, risks are classified as strategic, tactical, and operational based on the level at which they are managed, in accordance with the specific regulations and standards adopted.

At a strategic level, the current business risk map reflects events that could divert the Company from achieving its strategic objectives; it is created and corroborated with the Company's management, submitted to the Audit and Risk Committee of the Board of Directors, and



approved by the Board of Directors.

The Company has included in this map the risk of “inadequate response to challenges related to climate change, water, and biodiversity in the face of market and stakeholder expectations”. This risk assesses the Company’s exposure to negative impacts due to a decreased capacity to provide a timely, efficient, and effective response to commitments, obligations, and expectations related to climate change, water, and biodiversity, concerning:

- i) the short, medium, and long-term goals included in the business strategy;
- ii) the value chain to ensure operational continuity;
- iii) energy-related costs;
- iv) the expectations of stakeholders (government, society, community, workers, investors);
- v) adapting to climate variability and change, and to the normal climatological conditions of the country that affect water availability and security in the regions.

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Integrated risk management seeks to establish general guidelines for risk management (identification, assessment, treatment, monitoring, and disclosure) and to foster a culture that enables informed decision-making.

Regarding tactical risk, Ecopetrol’s Internal Control System includes self-control as a fundamental pillar, promoting transparent and effective performance that facilitates the achievement of organizational objectives. In the self-control and supervision sphere, certifications and self-evaluations are conducted periodically, along with assessments on the effectiveness of the controls.

The entire Company participates in the Internal Control System, which the Board of Directors supervises through its Audit and Risk Committee, acting as the highest control body responsible for monitoring its implementation and effectiveness. The Internal Control System aims to provide reasonable assurance regarding the achievement of process objectives through the timely management of risks and the effectiveness of controls, ensuring the individual and consolidated financial statements. Additionally, Ecopetrol has a risk and control matrix for its processes derived from the stages of the single risk management cycle.

Furthermore, internally, the organization has prepared the following documents that guide the management of methane emissions:

- HSE-G-145: Establishes for the Implementation of the “Zero Routine Flaring by 2030” Initiative: establishes the internal guidelines required to implement the World Bank’s “Zero Routine Flaring by 2030” initiative and applies to upstream (exploration and production) activities operated directly by Ecopetrol and its subsidiaries.
- HSE-G-144: Establishes guidelines to implement an applicable LDAR (Leak Detection and Repair) Program. for Ecopetrol’s directly operated upstream (exploration and production) activities, based on the provisions of Resolution 40066 of the Ministry of



Mines and Energy issued on February 11, 2022.

- HSE-G-190: Establishes guidelines to monitor and account for the Ecopetrol Group's decarbonization goals, including the basis for quantifying the reduction of Greenhouse Gas (GHG) emissions within the framework of the Ecopetrol Group's decarbonization efforts.

Regulatory Backdrop

In Colombia, the specific regulation managing methane leaks, vents, and flares was issued in February 2022 by the Ministry of Mines and Energy through Resolution 40066, which establishes the "Technical requirements for the detection and repair of leaks, exploitation, flaring, and venting of natural gas during hydrocarbon exploration and exploitation activities". Ecopetrol actively contributed technical information to the drafting of this regulation and has organized workshops and collaborative meetings with other operators in the country to develop action plans for compliance.

Within the framework of the regulation issued by the Ministry of Mines and Energy, in February 2024, Ecopetrol submitted to the National Hydrocarbons Agency (ANH) the fugitive emissions baseline and the Leak Detection and Repair (LDAR) program. Additionally, it submitted the vent closure program for each asset, and the ANH set a deadline to submit the respective closure reports for 2026. At the end of 2024, the calculation of flare burning efficiency was presented, and in October 2025, the results of methane burning and destruction efficiency in flares were presented based on direct measurements conducted in compliance with the regulation.

Strategies and Practices

Since 2019, Ecopetrol has made progress in direct methane emissions measurements using bottom-up and top-down technologies across the Company's facilities.

In 2019, it launched the first bottom-up campaign to detect and measure fugitive emissions in the upstream segment. In 2021, technical support was obtained from the Canadian government to conduct bottom-up methane measurements from leaks and vents in tanks and wells at the main assets in this segment. In 2024, it conducted bottom-up measurements of vents in wells, tanks, and combustion equipment on prioritized assets. In 2025, Ecopetrol carried out direct measurements of flaring in wells.

At the end of 2021, the first top-down measurement campaign was conducted across 95% of assets in Colombia (excluding the Tibú region due to the public order situation). Subsequently, in 2023, 2024, and 2025, the Company carried out top-down measurements on Ecopetrol's operated and certain non-operated tangible assets.

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Ecopetrol is committed to a methane emissions reduction goal of 45% by 2025 and 55% by 2030 in the upstream segment.

Additionally, in 2024 and 2025, Ecopetrol participated in a scientific study to measure methane emissions in Colombia, led by the International Methane Observatory (IMEO) of the United



Nations Environment Program and Canada's Carleton University. The aim of this study is to measure and identify the sources and causes of methane emissions in Colombia's oil and gas sector; generate a methane inventory for the country based on direct measurements; identify and understand material emission sources; and guide mitigation efforts. For this study, Ecopetrol's tangible assets, operated and some non-operated, were included. Top-down measurements were conducted in March and May 2024, and bottom-up measurements in March and April 2025.

In March 2023, committed to a methane emissions reduction goal of 45% by 2025 and 55% by 2030 in the upstream segment, compared to the 2019 baseline, in direct operations within the upstream segment. During 2020-2024, Ecopetrol reduced methane emissions by ~17,300 tCH₄ (~484,000 tCO_{2e}) through initiatives focusing on the closure of leaks and reducing venting in tanks and wells.

Voluntary commitments

Ecopetrol has made voluntary commitments in order to make significant progress in the management of methane emissions. In 2018, it joined the Climate and Clean Air Coalition's (CCAC-OGMP) Hydrocarbon Methane Alliance, and in 2020, it joined the new version of this initiative, called the Oil and Gas Methane Partnership (more commonly known as OGMP 2.0), led by the United Nations Environment Program (UNEP, UNEP) - the highest industry standard for managing, reporting, and reducing methane emissions from global oil and gas value chains.

In 2020, Ecopetrol joined the World Bank's Zero Routine Flaring by 2030 ("ZRF") initiative, which brings together governments, oil companies, and institutions that recognize routine gas flaring as economically and environmentally unsustainable, thus agreeing to cooperate in order to eliminate routine gas flaring by 2030 at the latest in production activities.

In November 2023, Ecopetrol pledged its support for the Oil and Gas Climate Initiative (OGCI) "Aiming for Zero Methane Emissions", which points the oil & gas industry towards zero methane emissions by 2030. It is also a signatory to the Oil & Gas Decarbonization Charter (OGDC), as of COP28, alongside more than 50 global firms across 5 continents and representing 40% of worldwide hydrocarbon production, who have signed this agreement to accelerate the sector's decarbonization efforts.

Acknowledgement of Methane Management Efforts

Ecopetrol received Gold Standard Pathway recognition in 2023 and Gold Standard Reporting recognition in 2024 and 2025 from the Oil & Gas Methane Partnership 2.0 (OGMP 2.0), the flagship UNEP, for the quality and level of detail of its methane emissions reporting. The Gold Standard is awarded to companies in the oil and gas sector that have a detailed plan to measure, report, and reduce methane emissions and have achieved a credible level of direct measurements.

Additionally, in its most recent report detailing its progress of climate actions within the oil & gas sector, the International Energy Agency highlighted Ecopetrol's accomplishments as one of the companies that received the highest ratings, noting it was among the "Best Performers."



Furthermore, in another recent report on the progress of more than 30 state-owned companies in quantifying and reducing methane emissions, the Agency specifically highlighted Ecopetrol's performance in managing these emissions, the relevance of its direct measurement campaign, and the progress made in reducing them.

Conclusions

- In line with the 2040 Strategy and the Company's climate change roadmap, a plan has been developed to manage methane emissions, taking into account the importance of reducing said emissions in order to fulfill the commitments acquired by Ecopetrol and the country within the framework of the Paris Agreement objectives.
- In recent years, Ecopetrol has intensified its actions related to the detection, quantification, monitoring, and reporting of methane emissions in the Company's different operations through the implementation of different cutting-edge technologies (bottom-up and top-down) following international standards and with the support of different scientific and multilateral organizations.
- Ecopetrol's governance and management of risks associated with methane emissions are key pillars in its strategy to strengthen its environmental performance through the structuring of follow-up, control, monitoring, and decision-making mechanisms across all organizational levels to ensure a safer, transparent, and more coherent operation with its climate commitments.
- Ecopetrol has complied with the provisions of the national regulation issued in February 2022 by the Ministry of Mines and Energy, within the deadlines granted by the National Hydrocarbons Agency.
- As a result of the Company's improved understanding of its current methane emissions, Ecopetrol is on track to meet its methane reduction targets mentioned above and has been recognized as a leading company in this regard among national oil and gas firms globally and in the region.