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	ECOPETROL CLIMATE CHANGE MANAGEMENT PLAN		
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1. INTRODUCTION

Ecopetrol S.A. defined climate change as a material issue considering the direct impact on operations, infrastructure, sustainability of the company and decisions towards different stakeholders. The company manages climate change based on an established roadmap, which incorporates the components of decarbonization (hereinafter mitigation), compensation and adaptation to climate change in line with the 2040 strategy "Energy that Transforms".

The mitigation component includes the management of Greenhouse Gases (hereinafter GHG) emissions information, scenario analysis, definition and implementation of GHG reduction opportunities and strategic management of the company's asset portfolio to guide additional actions that contribute to avoid the increase of GHG emissions. Although GHG emissions management aim to achieve their reduction following the concept of the mitigation hierarchy, the company also has an offsetting component to support compliance with climate ambition, through the consolidation of a portfolio of Natural Climate Solutions.

The adaptation component contributes to managing physical climate risks by considering the direct impact on operations, infrastructure and the environment, due to the increase in global average temperature and its consequent effect on climatic conditions (precipitation and temperature) in the areas where the company operates, based on future climate scenarios. This component includes analyses associated with physical risks in terms of exposure and vulnerability to natural hazards, in addition to developing transition risks, which evaluate the speed of acceleration of decarbonization and its effect on the company's asset portfolio.

Additionally, it incorporates a governance component that develops the means of implementation, through the appropriation of climate-related issues at distinct levels and areas of the organization, the allocation of resources for the implementation of mitigation and adaptation actions, and the monitoring and dissemination of climate-related issues and metrics.

In addition to the above, the company supports its climate change management through transversal axes focused on supply chain management; the commercialization of carbon offset or lower emissions products; disclosure, communication and relations with different stakeholders; participation in public policy and regulatory processes; and the development of science, technology and innovation, which leverage the company's climate ambition and the structuring of alternatives to achieve sustainable financing.

This document, is built following the recommendations of the guidelines for the formulation of the Comprehensive Business Climate Change Management Plans (PIGCCe), published by the Ministry of Mines and Energy in 2023, whose objective is to guide companies in the mining and energy sector in the identification, definition, implementation and monitoring of initiatives or measures for climate change management. This is part of the Comprehensive Climate Change Management Plan for the mining and energy sector (PIGCCme) adopted by Resolution 40807 of 2018 and updated by Resolution 40350 of 2021 of the Ministry of Mines and Energy; instrument through which, the sector implements actions for compliance with the goals established in Colombia's Nationally Determined Contribution (NDC), Colombia's Longterm Climate Strategy (E2050) and Laws 1931 of 2018 (guidelines for climate change management) and 2169 of 2021 (Climate Action Act), through which actions and goals in climate change management are provided. Likewise, it considers other guidelines required for a transparent and timely disclosure of climate issues.

The information contained in the document is based on current analyses for all its components, which may be modified or updated in response to national or international regulatory changes or other issues that influence Ecopetrol S.A.'s climate change management.



2. GENERAL CONSIDERATIONS

2.1. SCOPE

The scope of this document is to communicate to the different stakeholders the management of Ecopetrol S.A. in relation to climate change, to maintain a low-carbon operation and resilient to the effects of climate change.

2.2. OBJECTIVE

Establish and communicate actions and objectives in relation to mitigation, compensation and adaptation, based on scenario analysis and the application of methodologies for climate change management, in line with the corporate strategy to 2040 "Energy that Transforms".

2.3. ASSOCIATED DOCUMENTS

The documents associated with climate change management at Ecopetrol S.A. are listed below.

- HSE-P-038 Procedure for Quantification and Reporting of Atmospheric Emissions in ECOPETROL S.A.
- HSE-I-108 Instructions for uploading information to the Atmospheric Emissions Management System SIGEA.
- HSE-F-587 SIGEA Facilities Update Form.
- HSE-F-588 SIGEA Data Entry Form.
- HSE-F-589 Monitoring Results Capture Form.
- HSE-G-144 Guide for the definition of guidelines for the implementation of the LDAR (Leak Detection and Repair) Program.
- HSE-G-145 Guidance for the implementation of the Zero Routine Flaring by 2030 Initiative.
- HSE-H-017 Greenhouse Gas Emissions Reduction Indicator GHG.
- HSE-P-042 Procedure for Offsetting Greenhouse Gas Emissions in the Ecopetrol Business Group.
- HSE-G-174 Greenhouse Gas Emissions Offsetting Guideline.
- Regional plans for adaptation to climate variability and climate change.

Other documents:

- ISO 14064-1 Greenhouse gases Part 1: Specification with guidance, at the organization level, for the quantification and reporting of greenhouse gas emissions and removals.
- Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (World Resource Institute).
- Assessment Reports of the United Nations Intergovernmental Panel on Climate Change (AR5).

2.4. REGULATORY FRAMEWORK

This document was prepared with reference to the following standards, regulatory frameworks and national and international policies:

- a. International public policy instruments on climate change:
- United Nations Framework Convention on Climate Change (UNFCCC) 1992.
- Paris Agreement (2015).
- b. National Legal Framework:
- United Nations Framework Convention on Climate Change. Law 164 of 1994.



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- Dec. 298/2016 "Whereby the organization and operation of the National Climate Change System is established, and other provisions are issued".
- Law 1819/2016 (Structural Tax Reform) creates the national carbon tax.
- Dec. 926/2017, whereby the procedure for the non-causation of the national carbon tax was established.
- Law 1844/2017 whereby the "Paris Agreement" is approved.
- National Climate Change Policy of Colombia (2017).
- Res. 1447/2018 "By which the monitoring, reporting and verification system is regulated.
- Law 1931/2018 "Whereby guidelines for climate change management are established".
- Law 2169/2021 "Whereby the low carbon development of the country is promoted through the establishment of minimum goals and measures in terms of carbon neutrality and climate resilience and other provisions are enacted".
- Colombia's Long Term Climate Strategy to comply with the Paris Agreement (E2050).
- Res. 40807/2018 whereby the Comprehensive Climate Change Management Plan for the Mining and Energy Sector PIGCCme (acronym in Spanish) is adopted.
- Res. 40350/2021 by which the Integral Plan for Climate Change Management of the Mining and Energy sector is modified.
- Res. 40066/2022 establishing technical requirements for the detection and repair of leaks, exploitation, flaring and venting of natural gas during hydrocarbon exploration and exploitation activities.
- Res. 948/2022, adopts the "Rules for the Delivery of the baseline of natural gas leaks and the Delivery and Reporting of the Leak Detection and Repair Program by the operators of the hydrocarbon sector of the National Agency of Hydrocarbons ANH (acronym in Spanish)".
- Res. 40317/2023 which amends Res. 40066/2022 establishing technical requirements for the detection and repair of leaks, exploitation, flaring and venting of natural gas during hydrocarbon exploration and exploitation activities.
- Res. 0839/2023, whereby a new regulation is issued in relation to the Subsystem of Information on the Use of Renewable Natural Resources (SIUR, acronym in Spanish) and the Single Environmental Registry – RUA (acronym in Spanish) and the adoption of the Protocol for the Monitoring and Follow-up of the SIUR for the productive sectors and the Pollutant Release and Transfer Register – PRTR (acronym in Spanish).

3. BUSINESS CONTEXT

The Ecopetrol Group defined its 2040 strategy "Energy that Transforms", with the objective of consolidating an agile and dynamic organization that adapts quickly to the changes faced by the energy industry. The strategy is based on four fundamental pillars:

- a. Growing with the Energy Transition: its objective is to maintain the Ecopetrol Group's competitiveness in the integrated hydrocarbon value chain and increase gas supply, offshore exploration and enhanced recovery, thus strengthening traditional businesses with state-of-the-art technology and innovation to have more sustainable processes and maximize the value of future reserves and barrels, as well as the useful life and value of the hydrocarbon portfolio, while advancing in the decarbonization strategy and diversification of low-emission businesses.
- **b.** Generate Value with Sustainability: This pillar seeks to strengthen transparent and ethical relationships with stakeholders, applying ambitious standards of corporate governance to achieve environmentally responsible, safe and efficient operations, in which innovation and technology act as catalysts to accelerate solutions to the challenges of the future. To achieve this, the Ecopetrol Group has identified five strategic lines: (i) build and generate value through efficient, clean and safe production, (ii) accelerate and prioritize decarbonization and energy efficiency, (iii) ensure circular water management, (iv) support local development in the places where we operate, and (v) generate trust in the social context through proactive dialogue and improving the quality of life of people seeking mutual benefits, with a focus on inclusion, and reactivation and diversification of local economies.



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- c. Cutting-edge knowledge: This pillar seeks to develop the skills and capabilities required to meet the challenges of growth and sustainability through a comprehensive strategy of science, technology and innovation, as well as to improve the competitiveness and resilience of current assets, contribute to diversification, increase clean energy, decarbonize operations and strengthen talent through transformational practices, by means of training programs to optimize performance (upskilling) or fill new positions (reskilling).
- **d.** Competitive returns: The fourth pillar ensures the continuity of strict capital discipline, efficient use of resources and cash protection, all of which have been leveraging the Ecopetrol Group's strategy since 2015.

Figure 1 shows the summary of the Long-Term Strategy "Energy that Transforms" and the corporate scope goals of each of its pillars.



Figure 1. Long Term Strategy

Source: Own information Ecopetrol 2023

3.1. Materiality Analysis

Ecopetrol S.A. has an environmental, social and governance (ESG) materiality exercise, whose main objective is to identify, evaluate and manage environmental risks and opportunities, from a financial perspective, as well as the impacts that its activities have or could have on the environment and society.

This analysis is characterized by the adoption of the dual materiality approach that promotes a comprehensive view of sustainability management and the impact that ESG issues have on Ecopetrol's financial performance, strategic objectives, and reputation, promoting, in turn, responsibility, transparency and accountability with its Stakeholders. As a result of the analysis, climate change was recognized as a material issue for the company. Figure 2 shows the result of the dual materiality analysis.

¹For further information, please consult the following link. https://www.ecopetrol.com.co/wps/portal/Home/strategy2040/

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Figure 2. Results of the dual materiality analysis 2023



Source: Own information Ecopetrol 2024

Likewise, four (4) issues were identified which, due to their transversal nature to Ecopetrol's strategy, were not considered as elements to be managed, but rather acquire a strategic and enabling nature of the material issues. These issues are: Just Energy Transition, Circular Economy, Human Rights and Corporate Governance.

As a complementary exercise, an analysis was made of the relationship between ESG issues (very strong, strong, or medium), in relation to the nature and actions developed and managed from each of them. This information highlights the importance of managing the elements in an integrated manner, considering that the actions developed within the framework of one of the issues may have effects on another, achieving, for example, maximizing results or reducing efforts. The result of the relationship between material issues is shown in Figure 3.

Figure 3. Relationship between ESG issues



Source: Own information Ecopetrol 2024

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Based on the above exercise, long-term roadmaps are structured for each material element that consider all relationships between ESG elements.

4. MITIGATION COMPONENT

The Ecopetrol Group committed to achieve Net Zero Carbon Emissions by 2050 and to reduce 25% of its emissions by 2030 with respect to 2019. Additionally, to reduce 50% of its scope 1, 2 and 3 emissions by 2050. To meet this ambition, other intermediate targets have been defined, which are shown in Figure 4.

Figure 4. Targets associated with climate change



Source: Ecopetrol 2024 own information

On the other hand, the company has joined a series of global initiatives on climate issues, ratifying some of the goals mentioned above.



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Ecopetrol S.A.'s climate ambition contributes to Colombia's commitment to reduce GHG emissions by 51% by 2030 in line with the mitigation objectives of the Paris Agreement.

To achieve the above, the mitigation component is managed based on the following levers:

- i. **GHG emissions information management**, which includes continuous improvement of the GHG inventory, thirdparty verification, and development of technological tools that optimize data management for greater traceability, transparency, and information analysis for decision-making.
- ii. **Reduction of GHG emissions**, in which the establishment, monitoring and review of decarbonization goals is carried out, the development of initiatives in technological levers such as energy efficiency, reduction of leakage and venting, reduction of burning in tea and renewable energies, the evaluation of emerging technologies (Hydrogen and Carbon Capture, Sequestration and Use CCUS), the permanent identification of mitigation opportunities, the updating of emission projection scenarios and the analysis of closing gaps for the fulfillment of goals;
- iii. Strategic management of the portfolio, incorporating actions such as the implementation of the internal carbon price as an evaluation criterion for decision-making in capital allocation, asset analysis with a focus on emissions and value generation for the group, definition of climate change criteria for the analysis of the incorporation and divestment of assets and evaluation of other economic instruments that promote the development of low-emission projects carbon;
- iv. **Offsetting emissions**, in this lever the Natural Climate Solutions Portfolio is implemented to enable the supply of carbon credits and develop a robust and standardized strategy for the commercialization of carbon credits.

In a transversal way, these strategic levers are supported by innovation, development and research, the circular economy and articulation with the country's public policy.

4.1. GHG emissions information management

Ecopetrol estimates its greenhouse gas emissions inventory based on the provisions of the Greenhouse Gas Protocol for Corporate Inventories (*GHG Protocol*) and the Colombian Technical Standard (NTC) ISO 14064 Part 1 – Organizational Inventories (ISO). The GHG inventory is consolidated from a **Bottom-Up** *approach*, using **Operational Control** as an organizational limit, that is, 100% of the emissions are accounted for in those facilities where the company has control of the operation, regardless of whether it is an owner or a partner.

As for the greenhouse gases that are part of the inventory, due to their relevance and participation in the oil and gas industry, Ecopetrol estimates the emissions of **Carbon Dioxide – CO2**, **Methane – CH4**, **Nitrous Oxide – N2O**, which are taken to CO2 equivalent. As for the other GHGs that are associated with cooling systems, they are excluded because they are not considered materials within the oil and gas industry, as indicated by the *American Petroleum Institute* (API) in chapter 2 of its 2021 methodological compendium. However, progress is being made in the consolidation process for its reporting within the framework of Resolution No. 0839 of August 28, 2023 (Pollutant Emissions and Transfers Registry – RETC.

In relation to global warming potentials (GWPs), Ecopetrol, as well as Colombia, uses the potentials of the **IPCC's fifth assessment report (AR5):** for CO2 – GWP (1), for CH4 – (28) and for N2O – GWP (265), which will be updated once the IPCC completes its evaluation period of the GWPs reported in AR6.

The GHG emissions estimation methodology, used in Ecopetrol's inventory, is a combination of mass balances, emission factors, simulation models, and fixed measurements. The choice of methodology to estimate GHG emissions from each source that is part of the inventory was defined depending on the quality of the available input data. The mass balance is based on the application of the law of conservation of mass in the process, in that sense all the carbon that enters a process must come out. Emission factors are based on a sample of measured data, calculated as an average to determine a representative rate of emissions for a level of activity. Simulation models are used in particular cases where

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the emission depends on more than one variable that is recreated in a model to reproduce its behavior. Fixed measurements have been implemented in the fugitive and vent categories of the production segment.

The most used sources within the inventory to obtain public emission factors are the following: (i) *Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry* – API, (ii) FECOC, (iii) UPME, (iv) AP-42, (v) ARPEL, and (vi) CORINAIR.

Ecopetrol's GHG emissions are calculated through the Atmospheric Emissions Management System – SIGEA, which uses the **SAP Environmental Compliance** – *SAP EC* calculation engine. This tool is parameterized from a Bottom-Up approach, finding each emission source, with the master information required so that, from an activity variable, its emissions are estimated in the defined periodicity. The tool allows you to export an emissions report by source of information for each estimated GHG.

4.1.1. GHG Emissions Inventory – Ecopetrol S.A.²

4.1.1.1. Scope 1 and 2 emissions

In Graphic 1, Ecopetrol S.A.'s GHG emissions inventory is presented, consolidated for the period 2019 - 2023, for scope 1 and 2 emissions. In Scope 1, emissions from combustion, tea, venting, fugitive and mobile are reported, and in Scope 2 the purchase of electricity. Of the total scope 1 and 2 emissions, 56% correspond to the production segment and 44% to refining.



Graphic 1. GHG Emissions Inventory (Scope 1 and 2) Ecopetrol S.A. 2019 – 2023

Source: Atmospheric Emissions Management System Report – SIGEA (March 2023)

4.1.1.2. Scope 3 emissions

In 2021, the first estimate of Scope 3 emissions was made, covering 14³ of the 15 categories established by the GHG Protocol applicable to Ecopetrol's production process, among which category 11 (Use of products) and categories 1 and 2 (purchase of goods and services) stand out. Estimated emissions in this scope are ~153 MtCO_{2e} by 2023. In Graphic 2, the estimate of GHG emissions for scope 3 in the period 2019-2023 is presented.

² Considering the recommendation of ISO 14064-1 and the GHG Protocol, base year emissions should be recalculated whenever a company experiences major changes such as acquisitions, divestitures and mergers, as well as significant changes in the emissions estimation methodology or systematic errors in the estimation. This recalculation is carried out not only for the base year but for the historical series to maintain consistency in the reported data.

³ The category corresponding to Franchises was not estimated, considering that Ecopetrol S.A. does not have this figure.



Graphic 2. GHG Emissions Inventory (Scope 3) in KtCO2e Ecopetrol S.A. 2019 – 2023



Source: Ecopetrol's own elaboration, 2023.

Ninety-five percent of scope 3 emissions correspond to the use of products sold, 4% to the acquisition of goods and services and the remaining 1% to investments and other categories.

The updated information on Ecopetrol S.A.'s GHG emissions inventory (scope 1, 2 and 3) can be consulted on Ecopetrol's website. <u>https://www.ecopetrol.com.co/wps/portal/Home/sostecnibilidad</u>, Climate Action section.

4.1.1.3. GHG Emissions Inventory – Grupo Ecopetrol⁴

The Ecopetrol Group's emissions for the 2019 base year were 17.9 MtCO2e (scopes 1 and 2). Ecopetrol S.A. (including Reficar) accounts for 85% of the group's emissions. Considering that the emission reduction goals were established at the group level, the emissions of the Ecopetrol Group are reported.

Graphic 3 corresponds to the estimated distribution of the issuances including subsidiaries and associated companies.

Considering that the emission reduction goals were established at the group level, the emissions of the Ecopetrol Group are reported.



Graphic 3. GHG Emissions Inventory (Scope 1 and 2) in MtCO2e Ecopetrol Group - Base Year 2019

⁴ The scope of Grupo Ecopetrol or Ecopetrol, corresponds to Ecopetrol S.A., the subsidiaries associated with production (Hocol), transportation (Cenit, Ocensa, ODL-OBC, ODC), refining (Barrancabermeja and Cartagena Refinery, Esenttia and Ecodiesel) and transmission and roads (ISA).



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4.2. GHG emissions reduction

As a result of the analyses carried out, the Ecopetrol Group announced in 2021 its climate ambition to reach net zero carbon emissions by 2050 (scopes 1 and 2), as well as the intermediate goal by 2030 of reducing emissions by 25% for scopes 1 and 2. To achieve this, other goals have been defined that leverage its fulfillment, which were mentioned in the introduction of this component.

Based on the commitment set, Ecopetrol carries out a periodic analysis of compliance with the established goals, which aims to: (i) update the emissions of the 2019 base year, with respect to which the progress associated with the fulfillment of the decarbonization goals is measured, (ii) estimate emissions projection for different analysis scenarios, in order to determine the gap for compliance with the goals, and (iii) identify the portfolio of emission reduction opportunities and the associated costs, with the aim of prioritizing investments in decarbonization.

During 2023, the analysis was updated, considering the group's current business portfolio, considering three scenarios (maximum, base and minimum). Likewise, **2019 was maintained** as the base year, considering its relevance, representativeness and reliability of the available information.

The estimated emissions level in 2019 was **17.9 MtCO2e** (scopes 1 and 2), which includes the emissions of Ecopetrol S.A., Reficar, subsidiaries in the transport segment, assets with partners, Esenttia, Hocol and ISA.

In Graphic 4, the type of dynamic exercises that are carried out on the projection of emissions to the year 2030 for the 3 scenarios analyzed is presented in an illustrative way⁵ and the level of emission reductions necessary to meet the target.



Graphic 4. GHG emissions 2030 projection (scope 1 and 2)

Source: Ecopetrol's own elaboration, 2023.

To prioritize emission reduction initiatives and capital allocation, the marginal cost of abatement (MACC) curve was developed, which represents the volume of CO2 that can be abated by the different technological levers (MtonCO2e) and the dollar cost per reduced ton of CO2e of each of them. The portfolio of reduction initiatives is grouped into six

⁵ It is important to note that the development of the analysis was carried out during 2023, therefore, the emissions of that year indicated in the **Error! No se encuentra el origen de la referencia.** correspond to the estimated projection at the time of the analysis.

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technological levers: leakage and venting, teas, energy efficiency, renewable energies, hydrogen and carbon capture, use and sequestration (CCUS). (See Figure 5).

Figure 5. Emission reduction levers



Source: Ecopetrol 2023 own elaboration

Based on the portfolio of initiatives and the potential for emission reductions in some categories, the abatement cost of each opportunity is calculated to construct the marginal abatement cost curve (MACC - Graphic 5).



Graphic 5. Abatement cost curve for minimum scenario

Source: Ecopetrol's own elaboration, 2023.

The curve identifies the emission reduction opportunities for closing the gap for each of the three emission projection scenarios. The analysis identified cost-effective opportunities and even below the internal carbon price US\$50/Ton, whose emission reduction potential is ~1.6 MtCO2e for the minimum scenario, made up exclusively of mature levers such as the reduction of leaks and vents, energy efficiency, flaring in teas and some renewable project initiatives. The potential for operational reduction for the fulfillment of the goals is aligned with the precept of not exceeding compensation by more than 30%.

For the purposes of this document, the detail of the abatement analysis for the minimum scenario, considered the most likely, is presented. This scenario focuses on the most cost-effective emission reduction initiatives that are below the domestic carbon price (50 USD/tCO2e by 2030). In this sense, it is relevant to increase the ambition of the levers that report the greatest potential for reducing emissions at a lower cost. In Graphic 6, illustrates the breakdown of the analysis for the minimum scenario.



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Minimum (most likely) scenario:

- 2019 Base Year Emissions: 17.9 MtCO2e
- Projected emissions to 2030: 19.1 MtCO2e
- Emissions limit to 2030 (25% reduction base year 2019): 13.4 MtCO2e
 - Amount of GHG emissions to be reduced by 2030 target: ~5.6 MtCO2e, which corresponds to:
 - 70% operational reduction: 3.9 MtCO2e
 - 30% Offset: 1.7 MtCO2e
- Progress in the reduction period 2020-2023: 1.5 MtCO2e
- Progress in compensation by 2030: 1MtCO2e
- Target Achievement Gap: ~3.2 MtcO2e
 - Operational reduction: 2.5 MtCO2e
 - Offsetting: 0.7 MtCO2e





Source: Ecopetrol's own elaboration, 2023.

To achieve the goal of reducing emissions of 25% by 2030, the Ecopetrol Group's emissions must not exceed 13.4 MtCO2e by 2030.

Note: The analyses presented in this section may be updated due to better available information, the entry of new technological options or a change in the emissions projection scenario, among others.

4.2.1. Progress in reducing GHG emissions.

An emission reduction goal is defined annually based on the identification and implementation of new operational mitigation initiatives in the levers mentioned above. As a result of the above, in the period 2020-2023, a reduction of close to 1.5 MtCO2e has been achieved. In Graphic 7, the progress in the reduction of GHG emissions of the Ecopetrol Group is presented.



Graphic 7. Progress in the annual cumulative reduction of GHG emissions (2020-2023)



GHG emissions reduction 2020 - 2023

Source: Ecopetrol's own elaboration, 2023.

4.2.2. Methane emissions management

In March 2023, Ecopetrol officially announced its commitment to reduce its methane emissions by 45% by 2025 and by 55% by 2030, compared to the 2019 baseline, in direct operations in the production segment.

In line with the commitments made in the OGMP 2.0 initiative (*Oil and Gas Methane Partnership*) and with the national regulation on methane emissions issued by the Ministry of Mines and Energy in 2022, progress has been made in the following activities:

- Detection and quantification of methane emissions, using different technologies such as infrared cameras and flow meters (*Bottom-Up* approach), as well as analysis of satellite images and flights with methane sensors (*Top-Down* approach), with which about 95% of the company's operations (around 1755 Km2) have been covered. During 2023, a Top-Down measurement campaign was carried out, covering 550 km2 of 48 operated assets and 5 non-operated assets (partners). Likewise, detection campaigns with a Bottom-Up approach have been carried out on the different assets of the company with OGI cameras.
- Updating and adjusting inventory based on bottom-up and top-down measurements made.
- Closure program for identified leaks, through which more than 1700 have been closed.
- Reduction of 13,558 tCH4 (~379,644 tCO2e) during the period 2020-2023, which contribute to the fulfillment of the reduction target.

It is important to mention that, at the end of 2023, the company joined the "Aim for Zero Methane Emissions by 2030" initiative launched by OGCI (*Oil and Gas Climate Initiative*) in 2022, which seeks to treat methane emissions with the same seriousness as industrial and process safety.

4.3. Strategic portfolio management

The strategic management of the portfolio obeys other mechanisms that help to manage GHG emissions more effectively. In this sense, the following have been prioritized, which are in distinct stages of development:



a. Internal Carbon Price: Ecopetrol established a methodology to carry out economic evaluations of investment opportunities of the Ecopetrol Group, considering the increase or reduction of the estimate of GHG emissions (CO2e) in the decision-making process, to optimize and mitigate the emissions generated in future projects from their inception. This methodology includes the definition of a price range for the emission of a tonne of CO2e reduced or released.

2023-2024	2025-2029	2030+
25 US\$/Ton CO2e	40 US\$/ Ton CO2e	50 US\$/ Ton CO2e

- b. Criteria for the incorporation and divestment of assets: the company is developing a *set* of criteria related to climate change, for their incorporation into the processes of incorporation or divestment of assets.
- c. Economic instruments associated with emissions: other mechanisms that seek to limit GHG emissions are evaluated, for example, the internal tax, which consists of the establishment of a tax related to the level of CO2e emissions for the company's projects. This mechanism is still in the early phase of validation.

One of the advantages of establishing these mechanisms is to prepare the company for higher carbon prices, implementation of regulations related to emissions trading or potential emission limits.

5. COMPENSATION COMPONENT

The offsetting component has been defined as a mechanism to support the fulfillment of the company's climate ambition, through the consolidation of a portfolio of Natural Climate Solutions (CNS), which arises from a previous exercise of prioritization of the roads with the greatest mitigation potential in Colombia to reduce GHG emissions that should, in addition, to generate social and environmental benefits for communities and for strategic ecosystems in the country.

As mentioned in the emissions reduction section, the GE established a maximum compensation limit of 30% of the total required to achieve the reduction goals set for 2030 and 2050⁶. To develop this component, the following guiding principles were established:

- Apply mitigation hierarchy: for GHG mitigation activities, non-emission (avoidance) and emission reduction must be prioritized over emissions offsetting. If the use of compensation is required, it will only apply to residual emissions.
- Action without harm: in the development of carbon projects, the negative effects that may be generated in the territory must be prevented, avoided or reduced, fully complying with social and environmental safeguards.
- Fair and equitable distribution of benefits: in the development of projects or purchase of carbon credits, there must be mechanisms that favor or guarantee a fair and equitable distribution of the benefits received, according to the participation of the various actors and for those communities where the projects are developed.
- **Comprehensiveness**: refers to the integrity and quality of carbon credits, ensuring that they are real, additional, permanent, quantifiable and verifiable, among others
- **Transparency**: the use of offsets must have clear rules for accounting, traceability, monitoring and reporting, to guarantee clear and accurate information for the market and the different stakeholders.
- **Double counting**: Carbon credits generated in projects whose reductions are also reflected in the inventory and/or in the accounting of GHG reductions of the EG or another company, may not be used for GHG offset activities or sale to third parties, unless the reductions of such projects are removed from the inventory and/or from the accounting of GHG reductions of the GE or the company that has generated the reductions.

⁶ This percentage may vary, once the guidelines for the oil and gas sector defined by the Science Based Targets Initiative (SBTi) have been issued, in which it is estimated that the range of compensation may be between 10% and 15% or in another direction required for the sector.

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• **Portfolio diversification**: to manage the risks associated with the use of compensation, it is important to diversify the organization's compensation portfolio, in terms of location, typology, jurisdiction, suppliers and sources of financing, among others.

5.1. Natural Climate Solutions Portfolio

In Colombia, deforestation is the main driver of biodiversity loss, it is estimated that between 2001 and 2022, about 3.3 million hectares have been deforested in the national territory. Likewise, 60% of total GHG emissions at the national level are associated with land use change due to the expansion of the agricultural frontier, illegal mining, indiscriminate logging and extensive cattle ranching. Therefore, the contribution to the conservation of the soil and its forests is increasingly imperative, not only because of the contribution to climate change mitigation, but also because of the direct impacts on local communities that depend on forests for their livelihoods.

To advance this need, in 2021, Ecopetrol carried out a study with *The Nature Conservancy* (TNC), with a focus on Natural Climate Solutions (CNS), which can generate up to 37% of the emissions reductions needed by 2030. The analysis considered 20 natural climate pathways with the potential to reduce GHG emissions in Colombia and used the following prioritization criteria: (i) high carbon storage or capture potential, (ii) government priorities in relation to its environmental objectives, including climate goals, (iii) availability and reliability of data and information, (iv) climate co-benefits, biodiversity, communities and local economies, and (v) cost-effectiveness in its implementation.

As a result of the analysis, focused solutions were prioritized in forests, through avoided deforestation (CEB), restoration of the natural forest (UBI), and planting of trees on agricultural lands (silvopastoral and agroforestry) (ATA). In Graphic 8 the natural pathways of the climate analyzed are presented.



Graphic 8. Analysis of Natural Climate Solutions

Based on the above, the Ecopetrol Group's Natural Climate Solutions portfolio was built, which uses different actions to enable project offerings, which include the development of methodologies, protocols, baselines and early investment in CNS projects. For its implementation, Ecopetrol has different strategic alliances with extensive experience for its development, which guarantees compliance with social and environmental safeguards. In the following link you can consult the progress in the <u>SNC portfolio</u>. Regarding the progress in the development of the portfolio of Natural Climate Solutions to offset residual emissions, there is currently an authorized offer of carbon certificates for ~1.0 MtCO2e.

5.2. Purchasing carbon credits

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With the aim of optimizing the management of the purchase of carbon credits and generating incremental value for the GE in its decarbonization plans, the Carbon Trading Table⁷ (MTC) was created in the Commercial and Marketing Vice Presidency (VCM), through which it seeks to achieve efficient management in the negotiation of carbon credits.

The commercialization of carbon credits through TCM must ensure the application of the requirements of the standard or certification program and the selected methodologies, in addition to ensuring compliance with social and environmental safeguards. For this purpose, a guideline has been defined that incorporates the guidelines and evaluation criteria for the purchase of carbon credits in the voluntary market and mitigate the associated risks.

6. ADAPTATION COMPONENT

The increase in the concentration of GHG emissions contributes to the increase in the global average temperature of the planet, which results in the modification of the temperature and precipitation patterns of the territories in future periods of time. This effect is known as **climate change**, which, consequently, will increasingly affect different systems (human, natural, productive).

In this sense, the Intergovernmental Panel on Climate Change (IPCC) has developed several future climate scenarios, which relate the increase in temperature with the growth of GHG emissions and incorporate the different objectives that have been proposed or defined by countries within the framework of their contributions to the Paris Agreement. This information is useful to evaluate how these systems will be affected in the event of any of the projected scenarios. In Figure 6, the IPCC scenarios are presented.



Figure 6. Climate scenarios based on IPCC

Source: Adapted and adjusted to the Spanish of OurWorldinData.org

With the increase in temperature and the modification of weather patterns, climate anomalies will increase and intensify, which occur in short periods of time, in a recurrent or cyclical manner, in each territory. The fluctuations that generate these anomalies are called **climate variability**.

⁷ The Carbon Trading Table, led by the Commercial and Marketing Vice Presidency (VCM), seeks to accompany and facilitate the processes of purchasing carbon credits in the GE's voluntary carbon market.

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In Colombia, due to its geographical location in the tropical strip of Ecuador, climatic variability events occur, which register values above or below normal and are defined under the following time scales:

- Seasonal scale corresponds to the fluctuation of the climate at the monthly level, in which the rainy seasons or dry seasons (less rain) occur.
- Intraseasonal scale corresponds to the oscillations of precipitation between the seasons indicated in the previous point and can determine weather conditions for weeks and even one to two months.
- Interannual scale, corresponds to the variations that occur in the climatological variables from year to year. The cycle associated with the phenomena of El Niño and its opposite phase La Niña (El Niño Southern Oscillation ENSO) is the one that has the most marked effect on the climate of different regions of the planet.
- Interdecadal scale, in which climate fluctuations are manifested at the level of decades, almost unnoticed due to their temporality.

In Colombia, the greatest sign of climate variability is the ENSO cycle, which, under El Niño conditions, normally presents precipitation deficit in the Caribbean, Andean, central and northern regions of the Pacific region. Under the influence of the La Niña phenomenon, the response is reversed, abundant rainfall in much of the country, with less influence in the Orinoquía and Amazon regions⁸. These phenomena of climate variability do not inhibit the rainy or drought seasons typical of the country.

Considering that these phenomena are increasingly frequent and intense due to climate change, human, natural and productive systems must **adapt** to this new climate dynamic, to avoid reaching disaster magnitude. Cycles of climate variability and their extremes are inevitable, but it is possible to reduce their negative impact by managing the risk associated with their extreme phases (El Niño and La Niña phenomena).

For this reason, Ecopetrol has developed an analysis of the physical risks associated with climate for both climate variability and change, which was developed, using as an input, the adaptation methodology of the Comprehensive Climate Change Management Plan for the Mining and Energy Sector (PIGCCME, 2018), for the hydrocarbons subsector, which considers an RCP 6.0 scenario.

This development was complemented by a high-level analysis under the following IPCC scenarios: (i) Aligned with the Paris Agreement target (SSP1/RCP 2.6), (ii) Peak emissions in 2040 (SSP2/RCP4.5), and (iii) 'Business as Usual' (SSP5/RCP8.5). Under these scenarios, seven (7) chronic (drought and heat stress) and acute (precipitation, coastal and river flooding, fires and winds) hazards were evaluated at 95 points associated with the main GE assets.

The results of the analysis should be subject to an additional analysis at the local scale, prioritizing the assets with the greatest exposure and vulnerability. Therefore, for the purposes of this document, the results developed under the PIGCCME methodology are taken.

6.1. Ecopetrol S.A. Climate Risk Analysis or Physical Climate Hazards

The IPCC has proposed the following scheme to address the analysis of climate risks. In which, the risk of climate-related impacts derives from the interaction of climate-related hazards or threats with the vulnerability and exposure of human, productive and natural systems. Changes in the climate system (left) and socioeconomic processes, including adaptation and mitigation (right), are drivers of hazards, exposure, and vulnerability. In Figure 7, the concepts related to climate risk suggested by the IPCC are presented.

^{8 (}IDEAM - UNAL, 2018)

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Figure 7. List of basic concepts of the Fifth Assessment Report (AR5), IPCC, 2018



Source: Extracted from IPCC, Impacts, Adaptation and Vulnerability Document, 2014

Based on the above Figure, the Ministry of Mines and Energy, in its methodological document on the adaptation component of the PIGCCme, defines climate risk in terms of threat, exposure and vulnerability, the latter defined in terms of sensitivity and adaptive capacity:

Risk = f (Hazard (Exposure), Vulnerability) Vulnerability = f (Sensitive, Adaptation capacity)

These variables are described below:

- **Threat:** latent danger that a physical event of natural origin, or accidentally caused or induced by human action, occurs with sufficient severity to cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision and environmental resources. In the framework of adaptation to climate change, the threats correspond to climate events that include climate change, climate variability and extreme weather events." (DNP, MADS, IDEAM, UNGRD, 2013, p. 25).
- **Exposure**: refers to the presence of people, livelihoods, environmental services and economic and social resources, cultural goods and infrastructure that, due to their location, can be affected by the manifestation of a threat.
- Vulnerability: it is composed by sensitivity and the ability to adapt.
 - **Sensitivity:** refers to the physical predisposition of human beings, infrastructure, or ecosystems to be affected by a hazard, due to the contextual and intrinsic conditions that enhance the effect of the hazard.
 - Adaptive capacity: is defined as the ability of a system and its parts to anticipate, absorb, accommodate, or recover from the effects of a disturbance in a timely and efficient manner. This includes the ability to preserve, restore or modify, and improve its basic functions and structures."

For the climate risk analysis, the following threatening events were considered:

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- **Floods:** These are water levels above normal due to the overflow of rivers due to torrential rains or rising tides above the usual level. Floods can be sudden or slow and in mountainous areas there can be torrential floods. (UNGRD, 2016).
- Water shortage (drought): Droughts are seasons of low water availability, reduced rainfall, low soil moisture, and decline in water bodies. Drought can generate water shortages for domestic, agricultural, industrial and energy consumption. (UNGRD, 2016).
- Mass removal or movements: These are displacements of the land, soil or rock that can occur in hillside areas. They are activated by rains, earthquakes and most of the time by human activity. (UNGRD, 2016).
- Forest fires: Forest fires are fires that spread uncontrollably, consuming plant material located in forest areas, with an environmental function and whose size is greater than 0.5 ha. (UNGRD, 2016).

The threat was assessed based on the **exposure of Ecopetrol's licensed areas** with respect to the occurrence of the greatest threat events at the regional level and the influence of climate variability scenarios (El Niño/La Niña phenomenon) and climate change (2011-2040 Scenario) in relation to the alteration of temperature (°C) and precipitation (%) variables.

The vulnerability was assessed based on the **sensitivity** that corresponds to the "susceptibility or predisposition of the threatened system and that may be affected". Accordingly, the susceptibility of Ecopetrol's operation to suffer damage depends on its strength or, on the contrary, on its weakness, as a productive system, to address the effects of the materialization of the threat.

The following indicators were used for sensitivity:

- Incidents by climatic variables (precipitation/drought) reported.
- Use of water resources for operation
- Production Participation
- Environmental Management System

The **ability** to adapt corresponds to the ability of the affected system to face and recover from an event that materializes the threat. For this exercise, the ability to adapt is associated with the availability of resources in general. The response capacity is given by the resources, tools and instruments available to Ecopetrol to address the materialization of threats, and has been defined under the following aspects:

- Strategy for the prevention and control of risks inherent to operations
- Legal restrictions on water resources
- Responsiveness to the control associated with the KRI Probability of Occurrence of Extreme Weather Events

As a result of the application of the above methodology, the following results were obtained at the general level (average of the climate risk for each threatening event in scenarios of climate variability and climate change).

It is important to note that efforts in climate risk management are directed at climate variability phenomena.

	"El Niño" phenomenon		"La Niña" phenomenon	
Region	Water shortages	Fire	Floods	Mass movements
Caribbean	Moderate	Moderate	Low	Low
Catatumbo	Low	Moderate	Low	Moderate
Central	Low	Moderate	Low	Moderate
Orient	Low	Moderate	Low	Low
Orinoquía	Moderate	High	Moderate	Moderate
South	Moderate	Moderate	Low	Moderate

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		Climate	change	
Region	Water shortages	Fire	Floods	Mass movements
Caribbean	High	High	Low	Low
Catatumbo	Low	Moderate	Low	Moderate
Central	Moderate	Moderate	Low	Moderate
Orient	Low	High	Low	Low
Orinoquía	Moderate	High	Low	Moderate
South	Moderate	Moderate	Low	Moderate

The results presented on the future behavior of the threatening event is a scenario, that is, it is not a prediction, nor a probabilistic estimate, but a description of a plausible behavior of the event under those conditions.

The information contained herein may be updated due to methodological changes, better available information or adjustments in the base information used.

For more information, see: Analysis of acute physical risks at the regional level.

6.2. Portfolio of adaptation measures

The adaptation measures are established to increase the resilience of Ecopetrol S.A.'s operations and infrastructure, related to climate variability and change. The climate risk determined in the previous paragraph for climate variability and change is a reference of the probabilities of occurrence of certain events, therefore, the behavior of extreme events must be observed at the local level, to establish adaptation measures that increase the response capacity of the different systems.

Therefore, at Ecopetrol S.A., a portfolio of indicative adaptation measures has been defined to facilitate the understanding and alignment of the implementation of measures with other actions available in other operational planning instruments (Environmental Management Plans, Environmental Impact Studies, Disaster Risk Management Plans, etc.). Emergency and Contingency Plans, among others). Similarly, the measures proposed are for reference, which may be expanded or modified according to the needs and dynamics of the operation.

The portfolio has defined the following categories:

 Water resource management
 Climate-resilient infrastructure

 Biodiversity and ecosystem services
 Weather-compatible operation

The above categories incorporate measures with different adaptation approaches:

Ecosystem-based adaptation (EbA):⁹ according to the Convention on Biological Diversity, EbA is understood as the "use of biodiversity and ecosystem services as part of a global adaptation strategy to help people adapt to the adverse effects of climate change".

Infrastructure-based adaptation (AOI).¹⁰ is an approach that seeks to increase the adaptive capacity of infrastructure works that play a determining role in economic development. Physical infrastructure has an impact on growth, the efficiency of the productive sector and social development, both because of its effects on connectivity and access to

⁹ (Ministerio de Ambiente y Desarrollo Sostenible. Colombia, 2018)

¹⁰ Ibid

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services for the population, and because of its decisive role in regional and local progress, and in national and international integration.

Community-based adaptation (CBA):¹¹ is an approach that seeks to increase the adaptive capacity of communities most vulnerable to the impacts of climate change and variability. These are community-led processes that are based on local priorities, needs, knowledge and capacities, which seek to empower people to face the impacts of climate change in the short and long term.

Technology-based adaptation (TbA)¹²: is based on the use of technologies to help reduce, estimate and prevent risks arising from climate risks.

Adaptation based on Traditional Knowledge (AbCT)¹³: it is based on knowledge and knowledge about the behavior of climatic variables and their effects on the dynamics of the territory. Based on this precept, Ecopetrol contextualizes the workers' knowledge of the dynamics of the operation and its relationship with incidents caused by climatic variables. Each category and indicative measures are developed below, which are aligned with Ecopetrol S.A.'s Environmental Strategy, the National Climate Change Policy (PNCC) and the Comprehensive Climate Change Management Plan - Mines and Energy Sector (PIGMME):

	Water resource management		
Objective	Reduce vulnerability to climate variability and change due to water shortages and	flooding.	
PNCC Strategic Line	Management and conservation of ecosystems and ecosystem services for low-o	arbon and	
	climate-resilient development		
PIGCCME Strategic	Climate Governance (Program for the Availability and Efficient Use of Water in the	Mining and	
Line	Energy Sector)		
Ecopetrol strategic	Integrated Water Management		
environmental pillar			
	Adaptation measures	Туре	
Water Saving and Effic	ient Use Programs	AbCT	
Prevention plans for o	btaining water from secondary sources	TbA	
Plan production and	development activities considering the climatic variable (occurrence of climate	AbCT	
variability phenomena	variability phenomena) to anticipate and take preventive actions for water shortages or floods.		
Develop a dynamic water management model that articulates supply needs with effluent management			
and environmental co	and environmental constraints and includes cost-effective alternatives in the event of an extreme EbA		
weather event (drought).			
Have a portfolio of alternatives for reuse, reuse and disposal that reduce pressure on water resources. EbA		EbA	
Monitoring plan for the main bodies of water, considering the information on climatic variables from IDEAM, which allows monitoring of levels and flows, especially in seasonal rainy or drought seasons.		TbA	
Maintenance and cl	eaning campaigns in priority water bodies for operation, to reduce the		
materialization of sus	pensions for the discharge of discharges in rainy seasons. (*) In the process of	AbCT	
application, modificat	tion or renewal of discharge permits, the need for periodic maintenance in the	ADCI	
receiving bodies of wa	ater must be included.		
	- Reduction of conflicts over the use of water resources		
Co benefits	- Optimization of operating conditions		
CO-Denenits	- Cost reduction		
	- Improvement in reputational image		

Biodiversity and ecosystem services

¹¹ Adapted from (Ministerio de Ambiente y Desarrollo Sostenible. Colombia, 2018)

¹² Transcribed from https://www.youtube.com/watch?v=YrqY2Jl36gw. Ministry of Environment and Sustainable Development. 2014.

¹³ Adapted from (Unión Internacional para la Conservación de la Naturaleza y de los Recursos Naturales. UICN, 2014)



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Objective	Reduce vulnerability in ecosystems strategic to operations through conservation, r and recovery	estoration
PNCC Strategic Line	NCC Strategic Line Management and conservation of ecosystems and ecosystem services for low-carbon and climate-resilient development	
PIGCCME Strategic Line	Climate Governance (Priority Territories Programme)	
Ecopetrol strategic environmental pillar	Mandatory compensation strategy and 1% investment Voluntary Compensation Strategies Environment Management Strategy	
	Adaptation measures	Туре
Identify strategic ecosystems for the protection of supply sources, to implement recovery, protection, Abe and/or conservation projects.		
Promote vegetation cover recovery projects that increase the capacity to retain and regulate water resources in flood events, in areas close to operations.		
Establish conservation agreements that contribute to the care of ecosystems from strategic supply sources for the operation.		
Identify and implement nature-based alternatives that contribute to the regulation of water resources to reduce vulnerability in drought, flood and fire events. In the following link you will find the toolbox and the portfolio of Nature-Based Solutions <u>https://as-aeu-</u> ecp-dev-sbn.azurewebsites.net/Gestionar-sbns/		Abe
Co-benefits - Carbon sink consolidation - Restoring green connectivity - Guarantee goods and services that are essential for the well-being of the population surrounding the operation		

	Climate-resilient infrastructure				
Objective	Reduce the vulnerability of Ecopetrol's facilities due to the impacts generated by extreme				
Objective	weather events				
PNCC Strategic Line	Development of low-carbon and climate-resilient infrastructure				
PIGCCME Strategic	Measure: Protocol for the safety of the pipeline and electric power transport netw	work in the			
Line	face of climatic risks				
	Adaptation measures	Туре			
Identify the facilities	where overflows and/or spills are caused by increased rainfall, to evaluate the				
adequacy of the stora	ge and conduction systems	AOI			
Implement engineerin	g works to reduce incidents of overflows and/or overflows in operational areas,				
caused by rainfall					
Perform maintenance on infrastructure that may be compromised by landslides or mass removal events,					
affecting the stability of	affecting the stability of the operation AOF				
Optimize the risk and i	ncident management tool, including events associated with climate variability that				
mostly affect infrast	ructure (flooding, mass removal, fires) to have reliable information for the	Abt			
development of clima	development of climate-related physical security plans.				
	- Reduction of operating costs due to the materialization of disasters				
Co benefits	- Preservation of company assets				
CO-Denenits	- Decrease in work incidents				
	- Improvement in product transport conditions				

Weather-compatible operation	
Objective	Expand and strengthen operational capacities to address the effects of climate variability and change
PNCC Strategic Line	Low-carbon and climate-resilient mining-energy development



Weather-compatible operation			
PIGCCME StrategicGeneration and Dissemination of Knowledge (Communication, awareness-raising and positioning strategy of the PIGCCME)			
Ecopetrol Strategic Line	HSE Culture		
	Adaptation measures	Туре	
Generate spaces for education and training to strengthen the conceptual bases on issues of variability and climate change			
Increase capacity in the understanding and assessment of climate information, including monitoring.			
Review of the official alert system for extreme events in scenarios of variability and climate change			
Actively participate in the Municipal Councils for Risk Management and Climate Change			
Include in Risk Management Plans and Emergency and Contingency Plans, scenarios and actions for climate variability and change events			
Provision of equipment for the attention of events caused in the environment			
Co-benefits	 Improved operational performance Reduction of incidents at the operational level Increasing workers' skills Improved preparedness to address climate variability and change 		

7. GOVERNANCE COMPONENT

The governance component at Ecopetrol addresses the means of implementation to achieve climate ambition and reduce the vulnerability of operations. In this regard, progress has been made in:

- Ownership of climate-related issues at distinct levels and areas of the organization
- Financial means for the implementation of mitigation and adaptation actions
- Disclosure of climate-related issues and metrics

7.1. Ownership of climate issues

Regarding the appropriation of the climate change issue at the organizational level, the Ecopetrol Group has a solid corporate governance model, which contributes to facilitating the understanding and supervision of climate-related issues.

In this regard, the Board of Directors of Ecopetrol S.A. defines and supervises the Strategy in which matters related to the SosTECnibility[®] pillar of the 2040 Strategy are periodically reviewed and addressed, which includes, among others, climate change and the energy transition.

This supervision is carried out through board committees, which guide the different issues. In the case of climate-related issues, the Board of Directors is supported by the following committees:

- Audit and Risk Committee: oversees business risks, including matters related to SosTECnibility® and the Business Risk Map, which incorporates risk associated with climate change, water and biodiversity.
- HSE Committee: is responsible for guiding, in addition to industrial and process health and safety issues, the environmental strategy, including climate change and water management, as well as the fulfilment of emission reduction targets, including methane emissions.
- Compensation, Nominating and Culture Committee: reviews and recommends to the Board of Directors the approval of issues related to variable compensation (CV), this includes the Ecopetrol Group's Balanced Management Board (TBG) and the Long-Term Incentive Plans (LTS). The TBG includes indicators related to climate aspects.

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Figure 8 identify the focus areas in which climate-related issues are managed.



Figure 8. Ecopetrol's governance structure related to climate change (in Spanish only)

Source: Taken from the TCFD 2022 report, Ecopetrol

However, all areas of the organization are involved in climate change management at the strategic, tactical or operational level.

For more information, see the chapter on the role of management in assessing and managing climate-related risks and opportunities, available at <u>TCFD 2022</u>.

7.2. Financial means for the implementation of mitigation and adaptation actions

To guarantee the resources to implement climate-related actions that lead to the fulfillment of the established objectives, the company defines and annually reviews an investment plan with a three-year term, which involves diversification into new low-emission businesses and includes investments in hydrogen production. renewable energies, carbon capture and electricity transmission. It also defines the resources that are mainly allocated to projects in decarbonization, integrated water management, fuel quality and investments associated with other topics such as research, circular economy, process health and safety and industrial.

For more information, consult the current Integrated Management Report, available at Integrated Management Report.

7.3. Disclosure of climate-related issues and metrics

Ecopetrol complies with the requirements of the different control entities and discloses climate-related information by applying the best practices and international standards. Currently, the company reports its progress under the following reporting frameworks. In Figure 9, the list of reporting frameworks for environmental and climate disclosure, among other issues, is presented.

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Figure 9. Climate Change-Related Reporting Frameworks



Source: Ecopetrol's own elaboration, 2024.

These frameworks respond to information related to:

- Governance
- Strategy
- Climate-related risks and opportunities
- Goals and metrics

All the information associated with the progress of the implementation of the PIGCCe is reported in the Integrated Management Report annually, as well as in the Ecopetrol S.A. Web portal and in the other reports associated with ESG (Environmental, Social and Governance) information.

Version history

Previous Document				
Version	Date [dd/mm/yyyy]	Document Code and Title	Changes	
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GSS Decarbonization Leader	GSS Manager	
91,235,575 from Bucaramanga	79,980,156 from Bogotá	

Electronically signed document, in accordance with the provisions of Decree 2364 of 2012, which regulates Article 7 of Law 527 of 1999, on electronic signatures and other provisions are issued.

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ANNEX - DEFINITIONS

Scope 1: Corresponds to direct issuances of assets operated by the company. (Combustion, fugitives and vents, and burning in teas).

Scope 2: Corresponds to indirect emissions generated by the purchase of energy from third parties.

Scope 3: Indirect emissions generated by the company's activities that occur at sources that are not under its operational control. For example, the use of products.

Threat: latent danger that a physical event of natural origin, or accidentally caused or induced by human action, occurs with sufficient severity to cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision and environmental resources. In the framework of adaptation to climate change, the threats correspond to climate events that include climate change, climate variability and extreme weather events." (DNP, MADS, IDEAM, UNGRD, 2013, p. 25).

Adaptive capacity: is defined as the ability of a system and its parts to anticipate, absorb, accommodate, or recover from the effects of a disturbance in a timely and efficient manner. This includes the ability to preserve, restore or modify, and improve its basic functions and structures."

Carbon neutrality: refers to reaching the point at which the GHG emissions generated by an activity, process, entity or individual are equal to those removed, fixed or offset, so that the net effect on the atmosphere is zero emissions.

Net zero emissions: condition in which anthropogenic GHG emissions are balanced by anthropogenic GHG removals over a specified period.

Carbon offsetting: investment in projects and measures that decrease or eliminate greenhouse gas emissions in other locations, to offset or balance greenhouse gas emissions, such as carbon dioxide (CO2), that are released into the atmosphere because of various human activities. The types of existing projects for offsetting are projects that avoid, reduce or remove emissions.

Nationally Determined Contribution (NDC): corresponds to each country's commitments under the Paris Agreement¹⁴, which include the climate-related goals, policies, and measures that the government intends to implement in response to climate change and as a contribution to global climate action. Within the framework of the Paris agreement, Article 6 is established¹⁵, which recognizes voluntary cooperation between countries for the implementation of their NDCs, to achieve greater ambition in their mitigation, adaptation and promotion of sustainable development measures.

Residual GHG emissions: correspond to those emissions that cannot be reduced through cost-effective reduction initiatives that can be maintained over time.

Exposure: is defined in the following paragraph: "A large part of the social impacts and the increase in economic losses associated with climate events are the result of an increase in exposure, that is, a greater presence of people, communities, natural resources and environmental services, infrastructure or economic, social or cultural assets in places that could be affected by the climate."

Source of greenhouse gases: corresponds to the process that releases a GHG into the atmosphere.

¹⁴ Paris Agreement: A legally binding international climate change treaty adopted by 196 Parties (countries) at COP21 (Conference of the Parties) in 2015 in Paris, France. In Colombia, it is approved by Law 1844 of 2017.

¹⁵ In the recent COPs, the need to define the rules for the transfer and accounting of emissions between countries, in a transparent way, has been established. This framework of rules may affect the voluntary carbon market. This definition process is ongoing in the different countries, including Colombia.

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Greenhouse Gases (GHG): are the gaseous components of the atmosphere, both natural and anthropogenic, that absorb and emit radiation, contributing to the earth's greenhouse effect. The main greenhouse gases are water vapor (H2O), carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), and ozone (O3).

Environmental Compliance Reports: these are instruments through which the holders of environmental licenses or beneficiaries of environmental management plans present the compliance and effectiveness of the commitments acquired before the competent environmental authority.

Greenhouse Gas Inventory: corresponds to the list of GHG sources and the GHG emissions quantified for a given period. The GHG inventory is also known as the carbon footprint.

Carbon mitigation hierarchy: establishes that for GHG mitigation activities, priority is given to avoiding GHG emissions, followed by the reduction and removal of emissions within the value chain of a product or organization, over offsetting emissions.

Climate change mitigation: it is the component through which strategies and actions are developed that generate adequate conditions to maintain and promote in a cost-effective way the reduction of greenhouse gas (GHG) emissions and carbon neutrality in the mining and energy sector.

Comprehensive Climate Change Management Plan 2050 (PIGCCme2050): is the policy guideline that contains the update of Resolution 40807 of 2018 with the vision of carbon neutrality by 2050.

Comprehensive Business Climate Change Management Plans: instrument through which companies formulate strategies and actions to manage climate change.

Risk: The result of the interaction between defined physical threats and an exposed system, considering the properties of the system in terms of its vulnerability to these threats.

Sensitivity: refers to the physical predisposition of human beings, infrastructure, or ecosystems to be affected by a hazard, due to the contextual and intrinsic conditions that enhance the effect of the hazard.

Greenhouse gas sink: process that removes a GHG from the atmosphere.

Vulnerability: it is composed by sensitivity and the ability to adapt.