

2022

TCFD REPORT





I am pleased to present our third report issued following Task Force on Climate-related Financial Disclosures (TCFD)

recommendations and reflects the efforts and commitment of the Ecopetrol Group to manage climate change-related risks and opportunities during 2022 and the first half of 2023.

This report presents our corporate governance model, the basis for addressing risks and maximizing climate opportunities associated with our business lines, as well as the headway in implementing our 2040 Strategy, which tackles global TESG (Sostenibilidad®) challenges and underlines our assurance to the country's energy security. It also discloses the processes we implement to identify, evaluate, and manage these risks and opportunities as well as the metrics and goals we employ for their monitoring.

In the Ecopetrol Group we continue to move forward in the decarbonization of our operations and the generation and use of more clean energy, without eroding the competitiveness of our hydrocarbon business line and, in particular, continuing to increase our gas supply. In this sense, and cognizant of the need to continue moving ahead in a just energy transition process, we are working steadily and resolutely to become a company that has net zero carbon emissions by 2050 (scopes 1

and 2), seeking to generate at least 1 million tons of low-carbon hydrogen (H2) by 2040 and 900 MW of renewable energy by 2025. These goals are framed within our strategic pillar, which aims to generate value through TESG.

Along these lines, we have allocated approximately 23% of the 2023 Investment Plan to diversify into new low-emission businesses, which includes investments in hydrogen production, renewable energies, carbon capture, gas and electricity transmission. Likewise, related to this plan we will allocate around 2.3 trillion COP to projects associated with decarbonization, integrated water management, fuel quality, and projects that leverage research and the circular economy.

International entities have acknowledged our efforts, reasserting the course we have charted for ourselves. In 2022, the CDP (Disclosure. Insight. Action.) merited Ecopetrol an A- rating for our achievements and leadership in developing our Climate Change program, positioning us as an industry benchmark regionally and globally. In addition, our TESG commitment is reflected through our performance in the Dow Jones Sustainability Index, where we improved our rating by eight (8) points over the previous year and were recognized as a member of the Sustainability Yearbook for the second consecutive year. We are also proud to be a member of the Taskforce on Nature-related Financial

Disclosures (TNFD) to contribute to the development of a framework for reporting risks and opportunities associated with natural capital.

Throughout this report we refer to complementary reporting systems that provide additional information, thoroughness and detail to provide greater transparency, including the 2022 Integrated Management Report, the 20-F Report filed with the U.S. Securities and Exchange Commission (SEC), the Annual Corporate Governance Report and the Sustainability Accounting Standards

Board metrics report (SASB), among others.

Finally, I would like to restate our firm commitment and dedication to finding concrete solutions that will not only benefit our business, but also the Nation and the global fight against the climate crisis. We will continue to fortify our relationships with all our stakeholders, while remaining focused on generating sustainable value as we continue towards an equitable and just energy transition.

Ricardo Roa
President / CEO

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01

GOVERNANCE





The Ecopetrol Group has a solid corporate governance model serving as a foundation on which to implement its transparency, governance, and control practices.

During 2022, this model served as the basis for updating the Ecopetrol Group's 2024 Strategy "Energy that Transforms" to tackle current and future challenges associated with climate change, decarbonization, and accelerated progress in technology and innovation.

1.1 Oversight by the Board of Directors of Ecopetrol S.A. of climate-related risks and opportunities

The Board of Directors of Ecopetrol S.A. (the "Board") defines and oversees the Corporate strategy concerning the TESG drivers of the Corporate 2040 Strategy is

constantly appraised and addressed, including climate change and energy transition.

The Board is responsible for guiding the Company in defining its strategic issues to create long-term value. In December 2021, the Board approved the 2040 Strategy seeking to generate sustainable growth within the energy transition framework by maximizing competitiveness in the oil and gas businesses and accelerating portfolio diversification. At the same time, it generates value through TESG for all stakeholders and promotes the decarbonization of current operations leveraging technology, innovation, and human talent to

maintain competitive returns. The Strategy section of this report provides greater detail of its focus.

Profile of the members of the Board of Directors

The members of the Board of Directors have diverse skills, experience, and solid business skills. The Succession Policy (Spanish version) and Competencies and Experience Matrix of the Board of Directors delimitate the requirements for the performance of its duties, classified into basic, complementary, and desirable. Among the complementary requirements related to climate change, the following stand out:

Additional requirements	As of June 30, 2023
Health, safety and/or environment	3 Board members
Energy industry and/or energy transition	8 Board members
Sustainability	4 Board members
Technology and/or innovation	4 Board members

For further information, consult the [2022 Annual Corporate Governance Report](#) (Chapter 4. *Operation of the Board of Directors and its Committees*, pp. 26-50) and the [Board of Directors' website section](#).

The Board continues to broaden its understanding and expertise of climate change and energy transition, including the participation of certain Board members in 2022 in:

- The 7th Directors' League (Liga de Directores) training program "Conscious challenges for business transformation towards a higher purpose" organized by the Universidad de los Andes and the Center for Corporate Governance Studies, whose agenda included: (i) Climate change and energy transition as a framework for purpose; (ii) New business models: Profitability and ESG (Environmental, Social and Corporate Governance); (iii) Building sustainable system value (supply chain, company, and consumer).
- The CERAWEEK conference organized by S&P Global, addressed issues related to economic growth and energy transition, decarbonization of operations, corporate strategies, and development of indicators associated with environmental factors, among others.

Board Committees

During 2022, the presentations made at the Board of Directors' meetings and those of its support committees addressed general topics and challenges associated with the Ecopetrol Group's strategy in the face of climate change and energy transition in its course of business, including:

- i. The Audit and Risk Committee** oversees business risks, including issues related to TESG and the Enterprise Risk Map, which incorporates the risk associated with climate change and water resources (18 sessions in 2022).
- ii. The Corporate Governance and Sustainability Committee** supports the analysis and decision-making related to the "Generating Value through TESG" pillar of the 2040 Strategy, and in 2022 studied industry trends related to technological, environmental, social, and governance issues, as well as corporate responsibility, human rights and corporate governance matters (9 meetings in 2022).
- iii. The HSE Committee** is responsible for guiding the environmental strategy including climate change and water management, in addition to industrial and process health and safety issues. In 2022, it reviewed the roadmaps for water neutrality, climate change, integrated water management, and industrial safety, as well as the methane reduction target (3 meetings in 2022).
- iv. During the year, the Technology and Innovation Committee** studied issues related to TESG and analyzed the technological components that will contribute to the generation of long-term value for increasingly responsible, safe, and efficient operations, in tune with the environment (3 meetings in 2022).

v. The Business Committee assesses the allocation of resources for projects and considers risk management in business opportunities and their value generation and strategic relevance. During 2022, it analyzed diversification into the low-emission solutions business, including industrial projects to generate low-carbon hydrogen (18 meetings in 2022).

vi. The Remuneration, Appointments, and Culture Committee reviews and recommends to the Board of Directors issues for its approval related to variable remuneration (VR), including the Ecopetrol Group Balanced Management Scorecard (TBG for its Spanish acronym) and the Long-Term Incentive Plans (LTIP). In 2022 the Committee reviewed the results of the

2021 TBG and recommended to the Board the approval of the 2023-2025 TBG (7 meetings in 2022), which includes climate-related indicators. For more information on the VR and incentive structure that includes climate-related objectives, see section 1.2 "Variable Remuneration" of this Report.

For more information on the Board of Directors and its Committees, refer to the [Integrated Management Report 2022](#) (*Governance* chapter pp. 69-88) and the [Form 20-F Annual Report Filing](#) (*Corporate Governance section* pp. 205-227).

The main climate change-related subjects addressed by the Board during 2022 and the first semester of 2023 are summarized below:

Main issues related to climate change addressed by the Board of Directors in the last year

2022

- | | | |
|---|--|--|
| <p>1. February</p> <ul style="list-style-type: none"> The Board reviewed the results of the Balanced Management Scorecard (BSC) of the Ecopetrol Group (EG), which includes indicators to measure achievements in Energy Transition, Climate Change, and Water Management, among others. The Board approved the presentation of the Integrated Management Report (IMR) and its annexes at the ordinary | <p>General Shareholders' Meeting in 2022.</p> <p>2. March</p> <ul style="list-style-type: none"> The Board discussed the corporate responsibility (CR) and T ESG reporting ecosystem in which Ecopetrol participates, through which ESG (Environmental, Social, and Corporate Governance) issues are evaluated, and the ongoing actions to address the growing demand for non-financial information. | <ul style="list-style-type: none"> The Board evaluated the water neutrality roadmap (the balance between water required to operate and actions that reduce its direct water footprint, seeking to replenish at least 100% of water consumption in operations through offset projects), the different strategic alternatives to achieve the goals and the reduction curves projected in the roadmap. |
|---|--|--|

- 3. July**

 - The Board reviewed the outcome of performance and compliance of the Ecopetrol Group's BSC HSE indicators in the first semester of 2022 and the success factors that permitted the attaining of positive results, as well as reviewing the greenhouse gas reduction indicator.
- 4. August**

 - The Board reviewed the opportunities and challenges in the 2040 strategy, in particular, the business lines that will enable the energy transition.
- 5. October**

 - The Board followed up on the Ecopetrol Group's BSC indicators, climate change, integrated water management and industrial safety roadmaps, and the methane reduction target.
- 6. November**

 - The Board reviewed the preliminary 2023 - 2025 BSC proposal for the Ecopetrol Group (EG), framed within the 2040 Strategy, which includes indicators that measure TESG topics.
- 7. December**

 - The Board continued to monitor Ecopetrol's participation in the non-financial information reporting and disclosure ecosystem in order to ensure its TESG activities are known by the market and its various stakeholders, highlighting the Company's leadership in energy transition and corporate citizenship.
 - The Board approved the Ecopetrol Group's 2023 - 2025 BSC, which includes indicators for measuring decarbonization and water management.

2023

- 1. February**

The Board discussed the results of the 2022 Balanced Management Scorecard for year end.
- 2. March**

The Board reviewed the performance of the BSC indicators for Water Neutrality, TRIF (Total Recordable Injury Frequency) and Process Safety, GHG emissions (I), and the methane emissions reduction target.
- 3. April**

The Board of Directors reviewed the 2040 Strategy's background and progress aimed at achieving a just energy transition, specifically progress in the Low Emission Solutions business line.

1.2 Management's role in assessing and managing climate-related risks and opportunities.

To achieve an effective energy transition, the Ecopetrol Group has defined the 2040 Strategy "Energy that Transforms" based on four pillars - competitive returns, growth, TESG, and cutting-edge knowledge - and has reorganized its business into three (3) business lines: hydrocarbons, low emissions and transmission and toll roads (for further details on the scope of each business line, refer to the Integrated Management Report 2022, page 23).

The Company's Senior Management plays a key role in the execution of the 2040 Strategy defined by the Board of Directors, especially in the "Generate value through TESG" pillar, by evaluating indicators related to climate change and defining the short and medium-term

action plan focused on accelerating and prioritizing the decarbonization of operations through the implementation of energy efficiency projects and initiatives, reduction of fugitive emissions, venting and flaring, incorporation of renewable energies, hydrogen, CCUS (carbon capture, use and storage) and NCS (natural climate solutions), among others.

The Ecopetrol Group, as a diversified energy group, participates in all links of the hydrocarbon chain and linear infrastructure, both in energy transmission and road concessions, while it continues to diversify into businesses that allow it to find new alternatives towards the energy transition. In 2022, the Low Emission Solutions business line was created, with a project portfolio that includes: natural gas, LPG, biogas, hydrogen, carbon capture, use, and storage, renewable energies and energy management, among others. Together with the acquisition of ISA in 2021, the Ecopetrol Group’s operations have evolved to three core business lines (hydrocarbons, transmission, roads and telecommunications and low emissions solutions). Below is a graphical representation of the main corporate bodies and their duties and responsibilities regarding climate-related issues.

(See Figure 1 only available in spanish):

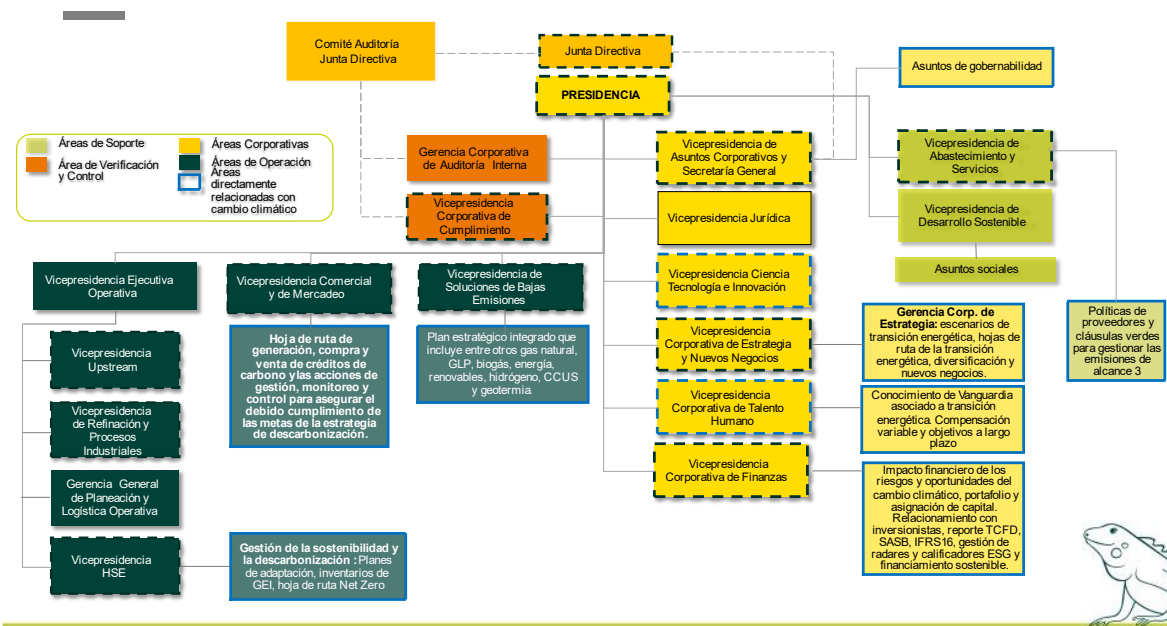


Figure 1. Ecopetrol governance structure related to climate change

The President (CEO)

The President is responsible for directing and managing the Company. He executes and oversees the implementation of all operations and activities comprised within the corporate purpose, including climate change related matters. The Ecopetrol Group’s CEO is responsible for the Company’s Balanced Scorecard (BSC) and communicating progress to the Board of Directors.

The Executive Committee (ExCo)

The Executive Committee has eight members, including the President of Ecopetrol and first-level vice presidents.¹ The purpose of the Executive Committee is to monitor the fulfillment of the Ecopetrol Group's strategy, the short and long-term business plan, and strategic and cross-cutting issues for the three business lines. Each line includes goals for the reduction of greenhouse gas emissions, defined in the Strategy. The Committee is also responsible for outlining certain strategic or tactical plans under internal regulations, including the Decarbonization Plan, which defines how the company's climate ambition will be achieved.

The ExCo also has the competence to be aware of and monitor risks defined in the Enterprise Risk Map, which include climate-change and energy transition related risks. Within this framework, the Corporate Vice-Presidency of Compliance periodically presents all business risks that have been generally reviewed by the ExCo.

Senior Management

The following is a detailed description of the duties carried out by the vice presidencies with the greatest impact on climate change management in Ecopetrol S.A.:

- **Operational Executive Vice-Presidency:** directs the Company's operations in the Hydrocarbons business line and is responsible for the execution of initiatives concerning the Decarbonization Plan and the implementation of the Net-Zero Emissions Roadmap, as well as achieving objectives to improve fuel quality.
- **Low Emissions Solutions Vice-Presidency:** leads the Company's energy transition and management of the Low Emissions business line. It centers on supporting the conceptualization, incubation and maturation of opportunities through the direction, guidance and monitoring of the integrated strategic plan that includes, among others, natural gas, LPG, biogas, energy, renewables, hydrogen, CCUS, and geothermal.
- **Corporate Strategy and New Businesses Vice-Presidency:** designs the corporate strategy by defining new energy transition scenarios, in line with industry and trends and the Group's ambitions. In addition, it focuses on potential new developments for each business line, considering diversification, fit and opportunity, also coordinates with the National Government the regulatory changes required to maintain the competitiveness of its businesses and enable the investments associated with the energy transition.
- **HSE Vice-Presidency:** heads Sustainability and Decarbonization Management, guiding the issues of climate change, circular economy and biodiversity, leading the implementation of the Decarbonization Plan, and defining the emission reduction and offset goals. It also performs the requisite analysis and follow-up to ensure compliance with the goals, administers the Atmospheric Emissions Management System (SIGEA), defines the overall guidelines for the management of emission offsets and establishes

¹ Executive Vice President of Operations, Corporate Vice President of Finance and Sustainable Value, Corporate Vice President of Strategy and New Business, Legal Vice President, Vice President of Corporate Affairs and General Secretary, Commercial and Marketing Vice President and Low Emissions Solutions Vice President.

the actions to adapt to climate change in order to reduce vulnerability and manage climate-related risks.

- **Upstream Vice-Presidency:** recommends, matures, executes and follows up the implementation of projects related to climate change, decarbonization, integral water management, and energy efficiency, among others, in operations - from exploration to the production fields in the Upstream segment of the Hydrocarbons business line - in line with the Business Group's strategy.
- **Downstream Vice-Presidency:** responsible for energy efficiency in the Downstream segment of the Hydrocarbons business line, as well as for decarbonization initiatives including reduction of methane and GHG emissions, CO2 storage and low-emission H2 production initiative, integrated water management aligned with the EG's water neutrality strategy, solid waste and circular economy in its operations.

The company's organizational structure includes additional vice presidencies that also play key roles in climate change management:

- **Vice-Presidency of Corporate Affairs and General Secretariat:** ensures the definition and updating of the Ecopetrol Group's material issues, the management of reports and benchmarks (including the IIG, the DJSI and CDP Climate Change and Water, among others), their coordination and publication; the monitoring and analysis of the "Generate value through TEGS" pillar of 2040 Strategy and the roadmaps of the material elements.
- **Corporate Vice-Presidency of Compliance:** responsible for directing the policies, guidelines, procedures, and administration of the Integrated Risk Management System, which includes the management of business risks, such as issues associated with climate change, water, biodiversity and energy transition.
- **Sales and Marketing Vice-Presidency:** ensures the efficient commercialization and management of carbon credits, adding value to the Ecopetrol Group in its decarbonization roadmap, particularly concerning the GHG emissions offset strategy. Participates in estimating and verifying the Product Carbon Footprint (PCF) of the portfolio and leads the commercialization of the carbon offset crude oil and products of the company. Additionally, it monitors, evaluates, and carries out EG's incursion into emerging markets with products that have a better environmental performance, such as second-generation biofuels and asphalts with recycled materials.
- **Corporate Vice-Presidency of Finance and Sustainable Value:** heads portfolio management and capital allocation. It evaluates and analyzes the financial impact of climate-related risks and opportunities and sustainable financing alternatives, as well as the relationship with investors such as *Climate Action 100+* and *Net Zero Asset Managers Initiative*, risk rating agencies, and ESG radars (e.g. MSCI, Sustainalytics, among others). It is responsible for the coordination and publication of reports (TCFD and SASB) and models, plans the strategic roadmap from a financial standpoint, and monitors the

financial execution of the sustainability roadmap and its commitment to sustainable value.

- **Science, Technology and Innovation Vice-Presidency:** accelerates access, adoption, development and application of knowledge and cutting-edge technologies to address the main challenges of the Ecopetrol Group in its current and future businesses, as well as those needed to meet the TESG objectives, throughout the full cycle of research and technological development, applied innovation, digital reinvention, and the swift arrangement of Science, Technology and Innovation (CT+I) ecosystems.
- **Sourcing and Services Vice-Presidency:** oversees decarbonization, waste and materials, water, and biodiversity in the supply and services chain, and incorporates sustainable criteria in the selection and assessment of suppliers.
- **Human Talent Vice-Presidency:** attracts, develops, and retains high-performing human talent that leverages the energy transition and ensures the incorporation of cutting-edge skills and knowledge to successfully address the energy transition.

Education on climate change-related issues

The Human Resources Vice-Presidency prepares the information required by the 2040 Strategy to educate and train Ecopetrol Group employees in the basic concepts of climate change, circular economy, energy transition, and decarbonization.

The Ecopetrol Group continues to strengthen energy transition learning within the transversal skills required by its workforce in preparation for 2040. In 2022, 7,209 workers (6,918 Ecopetrol workers and 291 from subsidiaries) completed more than 26,000 workshops on topics such as energy transition, water management, renewable energy, energy efficiency, and circular economy, among others. We have 13 employees enrolled in master's degree programs in

energy transition at the best universities worldwide.

From January to June 2023, there was a 46% increase in the number of people who completed our Energy Transition training with the French Petroleum Institute IFP School, reaching more than 6,900 workers of the Ecopetrol Group.

In June 2022, the Hydrogen Forum organized by Universidad Ecopetrol was held, whose purpose was to strengthen the implementation of the Hydrogen Strategic Plan of

the Ecopetrol Group, seeking technological, financial, legal, governmental, competencies and operational risks synergies through sharing internal and external experiences, with the participation of more than 290 in-person attendees, 1,100 remote connections and 31 speakers. During the year, four E+ talks were held on topics related to energy transition, with more than 3,900 participants.

In the first half of 2023, 2,202 workers successfully

completed content on complement the Energy lessons learned. Over 350 in- energy transition topics and Transition Plan focused on person attendees, 2,566 three E+ talks were also decarbonization, aligned remote connections, 50 offered to the workforce on with the 2024 Sustainability speakers, and 41 the same topic. The "Energy goals of the Ecopetrol Group; organizations participated in Transition Forum" was held, focused on successful best the event. organized by Universidad practices, financial Ecopetrol, seeking to structures, and international

Variable remuneration and incentive structure responsive to climate-related objectives

The Company has two (2) components within its remuneration structure associated with the achievement of business results:

(i) Short-term variable remuneration (VR): applicable to the entire team of direct employees and based on the Company's achievement of strategic objectives defined in the Management Balanced Scorecard: BSC EG.

Each year, at the yearend, the VR of each employee is calculated based on their individual target, which equals a percentage of their annual monetary income, and is multiplied by the achievement of business results (including the effect of HSE or environmental events) and reflects the individual performance of each employee.

For 2022, the BSC EG included the applicable

topics of the Financial Plan and reflected the strategic challenges and the Group's culture statement, prioritized as follows:

- Life first - HSE (10%)
- Growth with the Energy Transition (35%)
- Competitive Returns (30%)
- Decarbonization (10%)
- Cutting-Edge Knowledge (15%)

The EG 2022 BSC included climate change related targets with a focus on:

- Accelerate and prioritize the decarbonization of operations through the implementation of energy efficiency projects and initiatives; reduction of fugitive emissions, venting and flaring; incorporating renewable energies,

hydrogen, CCUS and NCS, with a GHG reduction goal that measures the cumulative reduction of emissions in the Ecopetrol Group as CO2 equivalent, in line with the long-term challenges of net-zero CO2e emissions by 2050 (scopes 1 and 2) and zero routine gas flaring by 2030.

- Gas as the backbone of the energy transition to contribute towards the country's autonomy and leverage the competitive supply of this energy source, which is critical for local industry and residential consumption.
- Diversification towards low-emission businesses and optimization of the current portfolio.

- Science, technology and innovation as a strategic ecosystems orchestrator at the national and global level, with technology and innovation as catalysts for TESG and the challenges posed by the energy transition.
- The climate change related indicators and milestones included in the EG 2022 BSC weighed 30% (see Table 1), aligned with the actions that the Company has been implementing to achieve its targets and contribute to the mitigation of climate change related impacts. These results were part of the 2022 VR payout.

Table 1. Indicators/milestones related to climate change that are part of the EG 2022 BSC

Focus		Indicator/Milestone	Unit	Weight	Target 2022	Real 2022	Compliance (Real/Plan)
Grow with the Energy Transition	Diversification to Low Emission Businesses	Gas and hydrogen	%	3.5%	100	97	91%
		Incorporation of renewable energies	MW	1.5%	185	197	106%
		EBITDA Transmission and Toll Roads	MM COP	10%	8,419	8,556	102%
Decarbonization		Reduction in GHG	tCO ₂ e	10%	262,761	416,672	156%
Knowledge		CT+i model implementation	%	2.5%	100	66	66%
		CT+i value generated	M USD	2.5%	361.94	595.67	165%

The 2023 performance-based variable remuneration plan, includes EG’s BSC climate change related targets, centering on: i) accelerating and prioritizing the decarbonization of operations, through GHG reduction and water management efficiency; ii) growth with the energy transition through the **Development of Energy Solutions**: Hydrogen (H2), Carbon Capture and Storage (CCUS); **Growth in Transmission and Toll Roads**: Infrastructure for the energy transition; and **Growth in Gas**: New Gas & LPG offer; iii) Science, technology and innovation as an enabler of TESG and to surpass the challenges posed by the energy transition.

The climate change related indicators and milestones included in the EG’s 2023 BSC are 40% of the total BSC (see Table 2).

Table 2. Climate change related indicators/milestones included in the EG’s 2023 BSC

Focus		Indicator/Milestone	Unit	Weight	Target 2022
Grow with the Energy Transition	Low Emission Businesses	Develop hydrogen energy solutions (H2) Carbon Capture, Use and Storage (CCUS)	%	10%	100
	Transmission and Toll Roads	Growth in Transmission and Toll Roads: infrastructure for the energy transition	%	5%	100
	Energy Security	Growth in Gas: new Gas an LPG offer	%	10%	100
Decarbonization		GHG emission reduction	tCO ₂ e	5%	416.672
		GHG Gap Reduction Strategy 2030	%	2%	100
		Water management efficiency	%	3%	100
Knowledge		CT+i value generation	M USD	5%	595.67

(ii) Long-Term Incentives (LTI): long-term incentives are associated with the achievement of strategic objectives that guarantee the sustainability of the Company and encourage cohesiveness among the upper and middle management team with the shareholders’ interest in the medium and long term.

The LTIs are part of the remuneration structure for the CEO/President, Vice Presidents, equivalent positions and other roles in the middle and upper management according to their level of responsibility and measured under performance criteria. The value assigned to the LTI is based on an individual target which corresponds to a part of the annual monetary income and is

recognized in proportion to their achievement of the corporate and individual results for each employee.

The LTI plans are valid for three (3) years, and each year a new version of the plan is launched with objectives aligned with the 2040 strategy and the targets for the three years.

The strategic goals of the plans are presented below, which are categorized into three main themes: (i) financial competitiveness; (ii) production and reserves, and (iii) decarbonization of operations and diversification into low-emission businesses (see Figure 2).

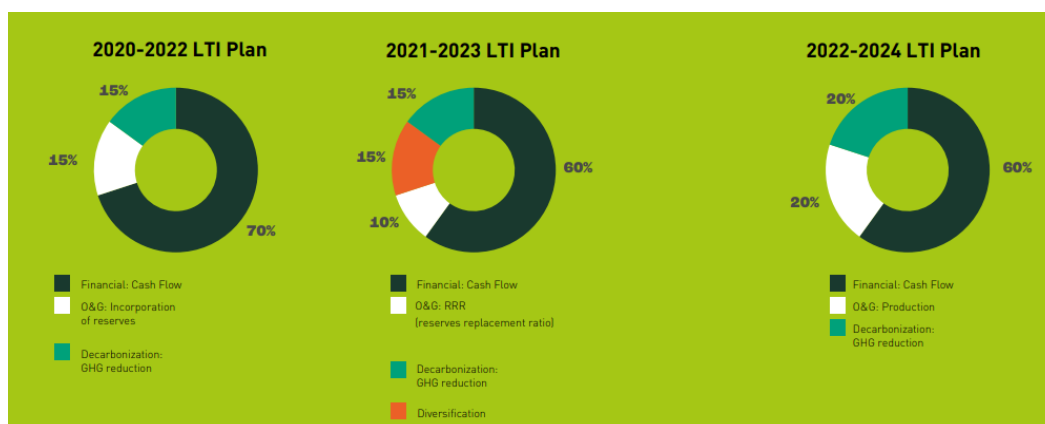


Figure 2. Current Long-Term Incentive Plan (LTIP)

The achievement of the Company's financial target is a condition for the payout of the benefit and the final LTI calculation reflects the results of the individual goals of each employee, their performance, and the fulfillment of the defined indicators, including those climate-related.

02

STRATEGY





The long-term strategy (2040) of the Ecopetrol Group, called "Energy that Transforms", fully addresses current environmental, social, and governance challenges, maintaining its focus on generating sustainable value for all its stakeholders.

Through this strategy,

Ecopetrol seeks to become a leading company in the Americas in the diversification of energy sources and to enable the growth of the company with the Energy Transition by maximizing the value and competitiveness of the oil businesses, accelerating the diversification of the portfolio, without neglecting the generation of value through TSEG, ensuring the decarbonization of operations and leveraging on Technology, Innovation and Human Talent to maintain Competitive Returns. The 2040 Strategy defined four (4) drivers: (i) grow with the energy transition; (ii) generate value through TSEG; (iii) cutting-edge knowledge; and (iv) competitive returns (see Figure 3).

Figure 3. Evolution of the Ecopetrol Group Strategy

Through the implementation of this strategy, the Ecopetrol Group seeks to contribute to Colombia's energy security and economic development, focused on a gradual, fair and equitable energy transition. This transition reflects the following components:

- i. Energy supply: to provide, maintain, and affordably transport energy, safeguarding energy for current users and reaching new users.
- ii. Economics and finance: maintain competitive returns and contribute to the economy with a diversified energy matrix.
- iii. Environment: climate action and decarbonization on our operations, environmental protection, and the preservation of biodiversity.
- iv. Society: strengthen the connection therewith and mutual contributions, impacting the generation of value to society while building and co-creating a more sustainable future while complying with its commitments.

The aforementioned components are integrated into the specific actions of the Ecopetrol Group's 2040 Strategy:

(i) **Continue strengthening value of the current portfolio, greater price volatility, to the competitiveness of as well as resilience in the continue to provide the oil and gas business: face of various energy competitive returns that Guarantee the capture of the transition scenarios and positively impact the**

economic development of Colombia. In particular, further gas development in the Colombian Caribbean is expected and a focus on enhanced recovery to maintain the value of current assets.

(ii) Diversification of the business portfolio into low-emission business lines which encompasses three dimensions proposed:

- a) **Diversification of the traditional business:** Includes goals related to the diversification of the hydrocarbon business line, which includes the Upstream (oil and gas exploration and production), Midstream (transportation), and Downstream (refining and petrochemicals) segments.
- b) **Diversification in the electricity and**

infrastructure market: The strategic objective seeks to leverage ISA's value and boost its growth, principally by increasing its portfolio and expanding into new territories.

c) **Diversification into sustainable businesses:** In this area, three options are currently being analyzed: hydrogen (H2), carbon capture, use and storage (CCUS), and Natural Climate Solutions (NCS). The priority is to focus on maturing these three emerging businesses.

(iii) Achievement of decarbonization objectives leveraged on the T ESG strategy: Achievement of the decarbonization objectives: Accelerate and prioritize energy

efficiency and the reduction of GHG emissions through the following actions: a) constant updating and continuous verification of the GHG inventory; b) identification, development and implementation of initiatives to reduce emissions in operations through energy efficiency, renewable energies and reduction of flaring, fugitive emissions and venting; c) advance in the development of emerging technologies by implementing green and blue hydrogen and CCUS pilots; and, d) develop and consolidate an NCS offset portfolio. More detailed information on this topic and decarbonization targets is provided in Section 4 “Metrics and Targets” of this document.

Capital allocation in T ESG-focused initiatives and projects

In 2022, the Ecopetrol Group allocated USD 295 million to the development of decarbonization projects, efficient water management in operations, energy efficiency, fuel quality and hydrogen, representing an increase of more than 200% over the investments made in the previous year, mainly in projects to reduce greenhouse gas (GHG) emissions and operational efficiency in water management.

Investments of close to USD 70 million were provided towards decarbonization projects, mainly in the development of solar farms, studies for the implementation of other renewable energy sources, studies for the capture and use of CO₂, and investments in projects to reduce direct fugitive emissions and natural gas venting, which will enable the Group to meet its goal of being carbon neutral by 2050.

Regarding efficient water management in operations, investments of over USD 150 million were allocated to projects for reusing production and captured water, thus moving ahead toward meeting our targets.

Additionally, more than USD 7 million were invested in studies for the development of green and blue hydrogen to be implemented in the Barrancabermeja and Cartagena refineries, as well as investments in mobility initiatives using H2.

Investment execution - first semester 2023

During the first half of 2023, the Ecopetrol Group invested over USD 170 million in integrated water management, energy efficiency, renewable energy, hydrogen, CCUS, fuel quality and circular economy projects, consistent with its investment plan.

There has been noteworthy progress in the management and efficient use of water in the operations, with investments of approximately USD 60 million in projects to reduce fresh water withdrawal and the reduction of discharges through the reuse of this resource, mainly in the Castilla field and the Barrancabermeja refinery. The development of these projects will allow progress in meeting the goals established by the water neutrality strategy through water injection projects in upstream assets, as well as wastewater treatment in downstream assets.

solar farms, with investments of over USD 20 million that, once completed, will incorporate at least 70 MW into the Company's energy matrix.

The refineries have invested more than USD 20 million in fuel quality projects to ensure compliance with the diesel and gasoline quality parameters established by the National Government.

In renewable energies, there have been advancements in the construction of the La Cira Infantas and the Cartagena refinery

Likewise, during this period, investments in hydrogen and CCUS have continued, with over USD 3 million allocated to developing ground transportation projects using hydrogen, studies for the production of green hydrogen in the refineries, and evaluating projects for the capture, use and storage of CO2.

2.1 Climate-related risks and opportunities

The Ecopetrol Group continues to strengthen its integrated process, which allows it to identify, evaluate and manage climate-related risks and opportunities. The following time frames and actions have therefore been established:

- **Short-term (0-3 years):** (i) Review and update energy transition scenarios to identify opportunities and/or gaps that impact the fulfillment of the agreed long-term goals; (ii) establish and achieve the annual target and intermediate GHG emission reduction targets and identify and implement cost-effective reduction opportunities, in line with the Decarbonization Plan; and, (iii) identify the short-term risks and determine mitigation actions, controls and Key Risk Indicators (KRI) within the framework of the annual risk management cycle.

- **Medium-term (4-10 years)** review the GHG emissions reduction and offset targets to 2030, in line with the Company's Decarbonization Plan. This time horizon allows for the identification of emerging risks that may impact the company in the next five (5) years.
- **(LP) Long-term (> 10 years)** review market trends, changes in policies and regulations, and the development of emerging technologies that may impact the Company's climate ambition and the long-term 2040 Strategy.

Currently, Ecopetrol has identified physical risks, transition risks and opportunities at the Group level presented below, and is working to classify these risks in the different segments and time horizons following the aforementioned scenario update:

Physical Risks

Physical risks concern the Company's exposure and vulnerability to the impacts of climate variability and change in Colombia, which could affect the availability of water and increase the exposure of assets and operations to potential damage.

For the Ecopetrol Group, risks classified as acute are those caused by extreme climatic events whose frequency and intensity have been growing due to the gradual increase in global temperature. In Colombia this is reflected in the occurrence of the meteorological phenomenon “El Niño” and its opposite weather pattern “La Niña”, emphasizing that the occurrence of these phenomena does not suppress seasonal events; in other words, El Niño does not nullify the rainy seasons, nor does La Niña reverse the dry or less rainy seasons. The

resulting conditions are, among others, water shortages, floods, fires, storms, hurricanes, and rising sea levels that can change in frequency and intensity. Extreme weather events could cause damage to assets, negatively affecting the Company's operations and financial condition.

Alternatively, the risks classified as chronic are those that result from medium and long-term changes in climate conditions, including the rise in sea levels, global warming, or droughts. Therefore, the acute risks associated with climate variability events are the most relevant, and as such short-term financial and strategic effects and impacts are considered (see Section 2.2 “Impact of climate-related risks and opportunities on the organization's business, strategy and financial planning” of this report).

Transition Risks

Transition risks pose a challenge for the Company in quantification of financial impact, for the long-term financial planning and establish a resilience plan for business

sustainability. Ecopetrol Group identified financial and strategic risks and highlighted the actions for its management and administration.

Regulatory Risk

The regulatory scenario related to energy transition and climate change involves

regulatory changes that may directly affect the Company in the short and medium term. Currently, the regulatory framework is not

binding on the business sector, including the Ecopetrol Group. However, the Company is committed to contributing significantly to national and sector goals, which in the future may be reflected through mandatory requirements.

The following current local regulatory changes have been identified as potentially having a financial or strategic impact on the Company:

- (i) New mitigation and adaptation associated information requests within the application or amendment requirements of current and future licenses.
- (ii) Greater demands associated with the regulation regarding fugitive emissions venting and flaring detection and repair.
- (iii) Disclosures of information on environmental and social issues required by the Superintendence of Finance of Colombia.
- (iv) Limits on the use of offsets to meet decarbonization targets.
- (v) Restriction of 50% to apply the Carbon Tax Non-causation mechanism.
- (vi) New requirements to validate and verify reduction projects and their registry in the National Registry of GHG Emission Reductions (RENARE).

Regarding emerging regulatory changes, the following have been identified at the **local level**:

- Implementation of the National Program of Tradable GHG Emissions Quotas (PNCTE), similar to an Emissions Trading System, which would assign emission rights. This program is in the design and development phase of the regulatory framework and its enactment is expected in 2025 with full enforceability by 2030. Adherence of the Company to the

program would have a significant financial impact, and a realigning of the Company's current climate ambition would consequently be necessary.

Possible restrictions on the voluntary offset of GHG emissions for exploration, production, and refining activities to encourage and accelerate reduction actions in the company's value chain.

At the **international level**, the International Sustainability and Climate Standards have been defined as a new financial reporting framework.

Legal risk

Negative reactions and lawsuits against the climate action of the Ecopetrol Group may potentially affect the Company's operations and financial condition. However, the Group has a structure that allows for ongoing interaction with its stakeholders, which allows it to address requirements promptly. Likewise, issues related to climate change are publicly disclosed on the website and in the Integrated Sustainable Management Report, which is publicly available.

Risk of trapped assets

Under its energy transition scenarios, the Ecopetrol Group has developed a strategy aimed at identifying assets trapped in its hydrocarbons business line. Based on fuel demand projections, a risk of trapped assets has been identified, for which a methodology has been proposed that allows, in the case of the Upstream segment, to measure market factors, sustainability, and technical capacity for the assets. It consists of weighing the following factors: (i) equilibrium price at which the asset continues to be profitable; (ii) time to recover the investment; (iii) CO2 intensity of the asset; and, (iv) certainty in the development of the project, considering the

context and technical capacity. As a result of the analysis, segment mitigation plans are being implemented for assets identified as trapped assets risk.

Regarding the Midstream and Downstream segments, the defined methodology measures the risk of trapped assets in terms of the number of years the asset is capable of generating financial benefits for the Company - a greater number of years suggests a lower trapped asset risk. This methodology will be repeated each year, taking into account market factors and asset-specific factors that could make them more prone to becoming trapped.

Market risk

The energy transition has focused the market towards a preference for low-carbon products, which may imply for the Ecopetrol Group a risk of not meeting market demand if it lags in developing such products. Therefore, the Company constantly monitors and analyzes the market evolution, trends, and behavior related to the performance and best practices of the oil, gas, and refining industry, in addition to the use of low-carbon products, and energy use for electrification. To manage this risk, Ecopetrol has been advancing in improving the quality of its fuels and in developing renewable fuels such as biodiesel, renewable diesel and jet fuel (for more information, see the [Integrated Management Report 2022](#), pages 256-263).

Reputational risk

For the Ecopetrol Group, the reputational risk stems from the impossibility of responding promptly to pressure from investors and other stakeholders to establish ambitious goals on climate change, which could substantially affect the Company's image and brand. Therefore,

within the framework of the business risk "Inadequate response to environmental challenges associated with climate change, water and biodiversity", mitigation measures and Key Risk Indicators (KRI) are established to reduce and monitor the company's exposure to impacts associated with climate change, water and biodiversity commitments, obligations and expectations. For this reason, constant benchmarking is carried out against the performance of its peers, to challenge the Company's climate strategy and endorse an ambition that contributes with the Paris Agreement objectives and global Oil & Gas industry initiatives.

More information on the risks associated with climate change is available in the [Form 20-F Annual Report Filing](#) (Section "Risk Factors" pp. 145-181, and Section 5.3.2 "Managing low carbon economy and climate change risk" pp. 178).

Technology risk

The path to energy transition depends on successfully selecting, developing, and deploying new technologies and capabilities needed to operate, and their upkeep and improvement. In this context, the Company may see its profitability affected if it fails to prepare and adapt.

Based on the above description, in 2022 Ecopetrol carried out a prioritization of risks to establish their financial impact. This first analysis considered the market and regulatory risks most likely to materialize and were evaluated under the three scenarios of the World Energy Outlook 2022 of the International Energy Agency (IEA): (i) Net Zero Emissions (NZE), (ii) Announced Pledges Scenario (APS), and (iii) Stated Policies Scenario (STEPS).

In the market risk, the impact on the value of assets in the upstream segment and their resilience to different hydrocarbon demand expectations was analyzed. In the APS and STEPS scenarios, the oil business shows resilience to volatility. However, this exercise cannot be considered as absolute, as the IEA scenarios do not consider the dynamics of local energy demand, especially in the natural gas market.

Regarding regulatory risk, two routes were evaluated: i) quantification of the impact on costs due to the change in carbon prices and ii) quantification of the financial repercussions derived from higher abatement costs, associated with limitations on the use of offsets, which allowed us to analyze the effects on cash flow and possible capital allocation needs to enable the entry of new abatement opportunities to achieve decarbonization goals.

Opportunities associated with climate change

In the process of identifying, evaluating and responding to climate-related opportunities, the Ecopetrol Group monitors and evaluates the energy market and the business environment. Since 2022, we have been working on the identification of changes in the environment, through the definition of Energy Transition Scenarios that guide the long-term strategic analysis of Ecopetrol Group (2040). This exercise prioritized the variables to monitor in each scenario, and that during 2023 and 2024, will result in the definition of lines of action, which include the opportunities and implications for the Company and a roadmap to perform an in-depth analysis of the opportunities. The steps of the process are:

- (i) The Ecopetrol Group's Energy Transition Scenarios are updated with current global and local trends (see Section 2.3 "Scenario Analysis").
- (ii) The Ecopetrol Group identifies and analyzes the driver that shows a positive trend or outlook in the updated scenarios for the short, medium and long term. With this analysis, a group of potential opportunities is identified.
- (iii) The Ecopetrol Group calculates the size of the market or opportunity, establishing the competencies or competitive scenario concerning the Company and the potential business and drafts a business plan to evaluate its viability.
- (iv) Finally, the roadmap is built to develop feasible opportunities.

The Ecopetrol Group identified different opportunities related to energy supply, resource efficiency, development of new products and services, access to new markets and build-up of the Company's general resilience vis-a-vis the energy transition. The opportunities identified are presented in greater detail below:

Table 3. Main identified opportunities

Type	Opportunity	Timeframe	Status
Diversifying traditional business activities	Low-emission energy logistics and transportation opportunities	MT	Under construction
	More sustainable petrochemical products	ST	In progress
	Clean fuels	ST	In progress
	Gas as a transition fuel	ST	In progress
	Analysis of new alternatives for Upstream, Midstream and Downstream segments	MT-LT	Under construction
Diversifying to sustainable businesses	Hydrogen	ST	In progress
	CCUS Carbon capture, use and storage	MT-LP	Under construction
	NCS Natural Climate Solutions	MT	In progress
Energy efficiency	Energy efficiency program: operational control, incorporate new technology advancements and improvement of the Energy Intensity Index (EII).	ST	In progress
Renewable energy	Self-generation through solar, wind and small hydroelectric power plants, among others.	ST	In progress

Diversifying traditional business activities

As part of the energy transition, the Ecopetrol Group has identified opportunities to increase the resiliency of its hydrocarbons business, taking advantage of gas as a transition fuel, the need for logistics and transportation for other types of fuels and energy, and the growing demand for more sustainable petrochemical products. The Upstream, Midstream and Downstream, segments are evaluating increasing their share in these opportunities within their service portfolio. As part of this commitment, Cenit foresees in its 2022-2040 Strategy a 10% increase in revenues from the diversification of businesses and international growth potential.

Diversifying into sustainable businesses

Considering that the demand for solutions and services in this area will increase in the coming decades, the Group defines within its "Grow with the energy transition" pillar the

EBITDA generation potential of the following sustainable or low-emission businesses lines: Energy Transmission and toll roads and Low- Emission solutions (mainly natural gas, hydrogen, CCUS and NCS).

As part of ISA's business, during 2023 it is expected to execute investments for an approximate amount of 1,400 MUSD (~4,400 MUSD for the period 2023 - 2025), of which, about 1,200 MUSD will be to build 9,657 kilometers of energy transportation by 2025. Regarding the Low Emissions Solutions business line, during 2022, the execution of the Low Carbon Hydrogen Strategic Plan began, with the pilot production of green hydrogen under industrial conditions, which will serve as a benchmark for the long-term development of industrial-scale projects (two mega-projects, each with the electrolysis generation potential of 60 MW, to produce 9 thousand tons/year) that will launch operations between 2025 and 2026. Regarding endorsing sustainable hydrogen mobility, Ecopetrol began the construction of two hydrogen generation and refueling stations: one for mass passenger transportation in Bogota in the Integrated Public Transportation System (SITP) of 165 kW, that will produce 22 tons/year of hydrogen, and a mobility park to promote innovation and entrepreneurship in Cartagena with a capacity of 50 kW of electrolysis, generating 7 tons/year of hydrogen, for the refueling of buses and light vehicles.

The above achievements are consistent with the three (3) timeframes defined in the roadmap: the first (2022- 2030), focuses on intensifying the use of hydrogen within its own operations through industrial scale projects and the use of sustainable mobility applications; the second (2030-2040), contemplates opportunities by expanding the hydrogen business into maritime and air mobility and seeks to capture and achieve

significant results in the decarbonization of operations; and, in the third horizon (from 2040), the Company will focus on promoting the widespread adoption of hydrogen.

In the NCS portfolio, the Ecopetrol Group continues to consolidate existing and implement new projects, with a reduction potential of between 2 and 4 MtCO₂e by 2030. For more information on these projects and alliances, please refer to [this](#) website section.

Finally, regarding to carbon capture, use and storage solutions (CCUS), in 2022, the design of the roadmap and work plan for the subsurface characterization of the technological EOR-CO₂ alternatives (enhanced oil recovery), dedicated geological storage and in depressurized reservoirs was initiated. Six (6) pre-feasibility studies were carried out with different consulting firms (SLB, HATCH, SPROULE, BEICIP), to estimate CO₂ storage capacity and incremental production potential with enhanced recovery. In line with this plan, a USD 13 M investment in the Downstream segment focused on TESC and decarbonization through CCUS was defined as of 2021.

- **Energy efficiency**

Between 2018 and 2022, the cumulative energy demand optimization equal to 44.7 MW in electrical energy was achieved through the execution of an energy efficiency program (5.5% of operating demand at the close of 2022), with savings of COP 158 billion and 138 thousand tons of CO₂e avoided. This optimization of electric energy consumption was attained mainly by incorporating good operational control

practices in the transport and refining segments and by implementing technology improvements with a high impact on improving electric energy demand in exploration and production, such as:

- i) Reduced losses in power transmission lines in the Orinoquia Regional Vice-Presidency.
- ii) Technology upgrades in the water disposal and injection process at Campo Rubiales with projects such as the installation of new horizontal pumping systems, improvements in hydraulic networks, and nanotechnology in water disposal and injection in wells.
- iii) In the Downstream segment, evaluations were conducted to identify new opportunities to improve energy performance at the Barrancabermeja and Cartagena refineries using the ISO50001 methodology, and a technical and economic feasibility study was accomplished for previously identified initiatives at both refineries.

In 2022, the optimization of 16.8 MW in electric energy demand was obtained, with savings of COP 52.1 billion and 36.6 thousand tons of CO₂e avoided. For more information, please refer to [Integrated Management Report 2022](#) (“Roadmap for the Use of

Alternative Energy and Sources”, pp. 249-255).

- **Renewable Energy**

The Ecopetrol Group ratified its goal of incorporating 400 MW of non-conventional renewable energy sources by 2023 and 900 MW by 2025 into its power generation network for its own consumption. At the end of 2022, a total of 208 MW from non-conventional renewable energy sources was operational: **i)** 26 MW from the Brisas Solar Ecopark, which came into operation in December; **ii)** 65 MW from the long-term purchase contract of a solar photovoltaic source of the Guayepo project; and **iii)** the acquisition of the Cantayús Small Hydroelectric Power Plant (SHP) for 4.3 MW for the Cisneros Station; and **iv)** the acquisition of the Cantayús Small Hydroelectric Power Plant (SHP) for 4.3 MW for Cenit's Cisneros Station in the department of Antioquia. These were additional to the facilities already operating by yearend 2021. In 4Q22, wind measurements began in San Francisco (Huila) and Araguaey (Casanare), which will be conducted over 18 months at different heights up to a maximum of 150 meters. Based on the results, the first aeolic initiatives in the interior of Colombia will be developed.

2.2 Impact of climate-related risks and opportunities on the Company’s business, strategy and financial planning

The Company is aware of the challenges of establishing a financial and strategic impact to address the aforementioned risks and opportunities, and how these are reflected in the Company's strategy and financial planning in the short, medium and long-term. Therefore, the Ecopetrol Group has moved forward with the analysis of the more significant risks and opportunities and those with a higher probability of occurrence, without this implying the absence of future analyses of other climate-related risks, considering that this exercise requires the availability of information and analysis regarding probable climate scenarios.

The following is an indicative estimate of the financial benefits of the prioritized climate-related opportunities aligned with the 2040 Strategy (see Table 4).

Table 4. Main financial benefits of climate-related opportunities (indicative)

Opportunity	Description	Probability	Magnitude of Impact	Estimated EG EBITDA Contribution in 2040
Products and services	Take advantage of the projections of gas as a transition fuel, the logistics and transportation needs for other types of fuels and energies, and the growing demand for petrochemical products with lower emissions.	Very likely	Medium	Between USD 1.0 - 1.8 billion
Products and services	Development of low-carbon hydrogen projects (blue, green, and white).	Very likely	Medium	Between USD 300 - 700 million
Products and services	Development of carbon capture, use, and storage (CCUS) projects.	Likely	Medium	~ Approx. USD 4 million (shadow price)
Products and services	Implementation of Natural Climate Solutions (NCS) projects	Likely	Medium - Low	Between USD 200 - 300 million
Access to new markets	Expand transmission and toll road business (ISA)	Very likely	Medium	Between USD 3 - 4 billion

The following is an estimate of the financial impact of the prioritized climate-related business risks (see Table 5), which is derived from the analysis of the economic dimension of the Risk Assessment Matrix (RAM), which considers a range between medium and very high (USD10 million to USD150 million).

Table 5. Estimated main financial impacts of climate-related risks (indicative)*

Risk category	Description	Probability	Magnitude of impact	Estimated financial impact
Acute physical risk	Climate variability phenomena have the greatest impact on Ecopetrol's infrastructure and operations. The "El Niño" phenomenon is characterized by: (i) lack of rainfall, which can drastically decrease the flows of surface water bodies, affecting both the use of fresh water and wastewater discharges due to a reduction in dilution potential in the receptor bodies; (ii) increased temperatures, which causes heat waves and could have a direct impact on the health of our workers and cause an increase in epidemics and diseases; and (iii) the potential negative impact on energy supply due to the decrease in the level of the water bodies that supply the country's hydroelectric generation system.	Likely	High in the economic dimension	> USD 80 million (over 3 years)
Reputational risk	Failure to achieve the 2030 GHG emissions reduction target due to limits in the accepted share of offsets. Currently, Ecopetrol estimates that about 30% of the reduction by 2030 will be leveraged by offsetting through Natural Climate Solutions projects. This percentage could be diminished according to the guidelines established by SBTi or other similar initiatives. If the accepted percentage decreases, other abatement technologies will be required, which will increase operating costs.	Likely	High in the economic dimension	> USD 252 million (as of 2030)

Risk category	Description	Probability	Magnitude of impact	Estimated financial impact
Technological risk	Failure to achieve competitiveness and resilience of the Oil & Gas business and the Company's assets concerning the energy transition in terms of costs, production and commercialization of hydrocarbons and profitable products, which comply with regulations and market requirements, due to limited access to technology.	Likely	High in the economic dimension	Between USD 350 - 400 million (over 3 years)

* Indicative information as of July 31, 2023

In 2023, Ecopetrol is moving forward in the development of an analytical initiative for the modeling of climate risks and their financial implications, based on the results of the prioritization exercise of physical, market and regulatory risks, developed under IEA and IPCC scenarios.

2.3 Scenario Analysis

The Ecopetrol Group performs two types of climate-related analysis. The first seeks to adapt the business strategy to the energy transition, while the second focuses on climate scenarios to identify the level of risk.

The Energy Transition Scenario analysis aims to adequately adapt the Ecopetrol Group's business strategy to a transition to a low-carbon economy and ensure the creation of long-term value. This analysis is performed periodically and pursues a reflection of the

latest scenario updates provided by various sources. During 2022, an analysis was carried in this process out through an in-depth planning exercise on Ecopetrol's business lines. For the construction of the benchmark scenario, both the insights of the International Energy Agency (IEA)'s APS scenario (Announced Pledges Scenario) and the opinions of energy experts under different transition perspectives were considered. The key results of this analysis are presented below:

- Six fronts were prioritized to increase corporate resilience:
 1. Define a strategy for decarbonization, energy efficiency and fuel quality.
 2. Ensure the competitiveness of the traditional oil and gas business to avoid stranded assets.
 3. Formulate a comprehensive vision for gas.
 4. Capture opportunities in the energy markets.
 5. Review the petrochemical business.

6. Explore diversification options into other businesses.

- Additionally, within the framework of the 2040 "Energy that Transforms" Strategy, trends and sensitivities were translated into business scenarios, as shown below:

Energy Transition Scenarios	Description
Benchmark Scenario	It considers the same trends identified in the Energy Transition Benchmark Scenario, which is also the baseline scenario for the Company's 2040 Strategy.
High Price Scenario	Associated with Decelerating Sensitivity trends in terms of energy transition. Seeks to reflect a business scenario in which the current trend is maintained and climate targets are not met by 2030 or 2050.
Stress Test Scenario:	Reflects the trends of the Accelerated Transition Scenario and some developments of the Sensitivity to a 2°C Scenario.

For more information on the assumptions used to build these scenarios and sensitivities, please refer to the [TCFD 2020](#) report.

To define the 2040 Strategy, the aforementioned scenarios were used, applying some sensitivity variables thereto. These sensitivities include i) Ecopetrol's GHG emissions projection; ii) national energy demand; and iii) global energy demand. The scenario analysis resulted in a long-term strategy focused on growing with the energy transition, with a solid decarbonization roadmap and TESG strategy.

Additionally, to have a more detailed analysis of physical risks, an assessment was carried out covering 95 points associated with the main assets of the Ecopetrol Group, based on IPCC scenarios for 7 physical risks related to chronic hazards (drought and thermal stress) and acute hazards (precipitation, coastal flooding, river flooding, fires and winds), using CERVEST's EarthScan platform: (i) scenario aligned with the objective of the Paris Agreement (SSP1 - RCP 2.6); (ii) peak emissions scenario in 2040 (SSP2 - RCP 4.5); and (iii) Business as Usual scenario (SSP5 -

RCP 8.5). Under a Business-as-Usual scenario and a horizon to 2100, the greatest threats across the entire asset portfolio correspond to the increase in maximum temperatures and the duration of heat waves. This is one of the most significant risks in terms of worker safety and operational disruptions. However, it is not expected to have a direct impact on infrastructure. In addition, six locations have a substantially increased risk of coastal flooding, while more moderate river flooding is expected at four locations. The remaining climate hazards are not expected to increase substantially across the asset portfolio.

In addition to the above analysis, since 2019, Ecopetrol has conducted a regional-level analysis using the RCP 6.0 scenario in line with the Comprehensive Climate Change Management Plan of the Mines and Energy sector and the Third National Communication on Climate Change. Based on the above, the Company formulated regional adaptation plans that incorporate measures relating to water management, strategic ecosystems, resilient infrastructure and climate-compatible

operations. For more information, please refer to the [“Vulnerability and adaptation to climate variability and climate change”](#) section of the corporate website.

03

Risk Management



Risk management in Ecopetrol is supported by the Integrated Risk Management System (SRI for its Spanish acronym), based on COSO 2013, COSO ERM 2017, and ISO 31000:2018 standards, and is governed by the provisions of internal regulations, as well as included in the corporate bylaws, comprehensive policy, Good Governance Code, manuals, handbooks and internal instructions established for this purpose. This system encompasses the set of principles, reference framework, and processes that allow the Company to manage the effects of uncertainty on the achievement of objectives, maximizing opportunities, and facilitating decision-making.

At Ecopetrol, comprehensive risk management seeks to outline the general guidelines for risk management (identification, assessment, mitigation, monitoring and disclosure), and to establish a culture that encourages informed decision-making, considering possible events that may have a positive or negative impact on the Company's objectives.

The process of identifying, evaluating, and responding to climate-related risks is part of Ecopetrol's SRI. Its management, monitoring and review are performed continuously to maintain risks within the

defined tolerance and acceptance thresholds. According to the Integrated Risk Management System (SRI), Ecopetrol's risks are managed in three different levels described below (see Figure 4):

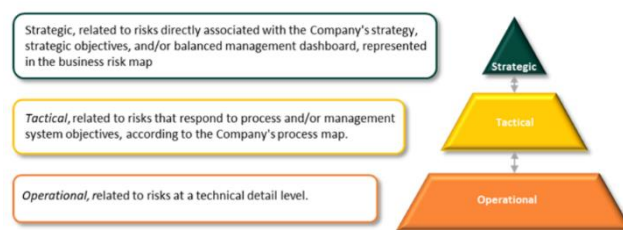


Figure 4. Risk levels in Ecopetrol

For more information on Integrated Risk Management, refer to the section [Risk Management at Ecopetrol](#) on the corporate website or the [Integrated Management Report 2022](#) (Chapter 4. “Corporate Responsibility and TESG” pp. 160- 168).

3.1 Inclusion of the climate-related risks in the business risk map

The Business Risk Map is constructed and updated collectively based on an analysis of the internal and external environment, considering market trends, specific risks of the Ecopetrol Group companies, management standards, industry risks, and those issues that are normally subject to analysis and review of the sustainability indexes and radars. Its construction resulted in topics and trends that feed the updating of risks, reviewed by the Audit and Risk Committee of the Board of Directors and recommended their approval to the Board of Directors.

The Ecopetrol Group's Business Risk Map for 2022 incorporated two (2) relevant risks associated with climate change: i) "Inadequate management of climate change and water"; and ii) "Asset competitiveness in relation to energy transition".

Information on the aforementioned risks is provided below.

Inadequate Climate Change and Water Management:

This risk includes elements associated with decarbonization (reduction of fugitive emissions, venting, and flaring, renewable energy, energy efficiency, NCS); water management (water required to operate and wastewater management); and climate variability and regulatory changes climate change related and water.

Asset competitiveness concerning energy transition:

This risk anticipates elements associated with the resilience of the Oil & Gas business in the face of the energy transition, stranded assets and fuel quality.

For further information on the risks described above, please refer to the description of Business Risks #2 and #15 on

Ecopetrol's website under [Risk Management at Ecopetrol](#).

During the first half of 2023, the Business Risk Map was reviewed and updated, which was approved by Ecopetrol's Board of Directors in August 2023. As part of this update, additional components and scopes associated with biodiversity and ecosystem services were adjusted and included, defining the risk as "Inadequate response to challenges associated with climate change, water and biodiversity".

Additionally, the topics associated with the competitiveness of assets in the face of the energy transition of the Oil & Gas businesses were incorporated in the business risks called "unsuccessful protection and incorporation of reserves" and "Inadequate response to challenges associated with climate change, water and biodiversity".

Below is the updated Business Risk Map for 2023. (Figure 5 – Available in spanish version).



Figure 5. Business Risk Map 2023

For more information, see the description of business risks on Ecopetrol's website [Technical Description of Business Risks 2023](#).

3.2 Alignment of business risks with TESG matters and the “Generate Value through TESG” pillar of the 2040 Strategy

In line with the definitions and objectives contained in the 2040 Strategy’s pillar "Generate value through TESG" and expressed in the materiality analysis exercise executed by Ecopetrol in 2020, the Figure below shows the direct relationship of business risks with the social, environmental, economic and governance dimensions.

For more information regarding the materiality analysis, please refer to the [Integrated Management Report 2022](#) pp. 168 -169.

3.3 Identification of Emerging Risks at Ecopetrol

For Ecopetrol, Emerging Risks are defined as those risks that could have a long-term impact on the company (3-5 or more years) or in some cases may have begun to have an impact on the organization.

In 2022, Ecopetrol identified 14 trends categorized into: social, environmental, economic, technological and geopolitical; based on the assessment of these trends, 20

emerging risks were identified, which were then evaluated for their potential impact and the timeframe in which each of these could emerge.

The identification and evaluation of climate change related emerging risks and Ecopetrol's energy transition are presented graphically below (see Figure 6):

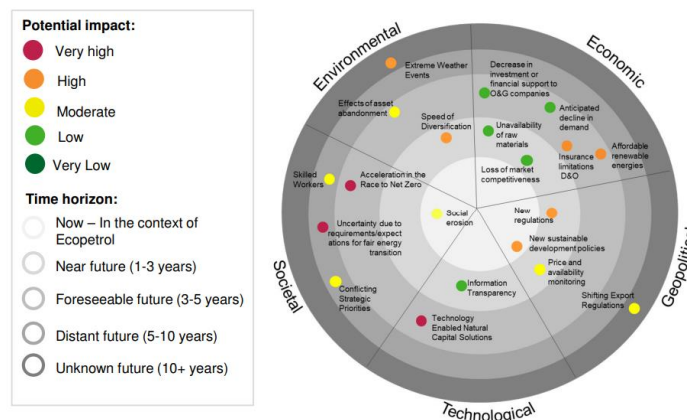


Figure 6. Evaluation of emerging risks

The following describes Ecopetrol's main emerging risks:

Table 6. Description of Ecopetrol's emerging risks.

Risk	Description
Hastening the race to net-zero emissions	The risk of climate change and sustainability and the acceleration of reliable and cost-effective green alternatives may affect the Ecopetrol Group's energy diversification portfolio, strategic priorities and lead to an increase in expenditures associated with green initiatives and a reduction in the demand for core products.
Technology-enabled natural capital solutions	The risk that the Ecopetrol Group does not adequately adapt its technological capabilities and strategies (e.g., environmental monitoring solutions, Big Data analytics, remote sensing, robotics and drones, artificial intelligence, natural climate-based solutions, among others) to effectively enable, address, assess and report on the reduction of its impact, identifying risks, dependencies and opportunities concerning biodiversity and nature (e.g. pollution, habitat loss, deforestation, restoration, conservation, bio-economy, GHG emissions, among others).

For more information on Emerging Risks, please visit Ecopetrol's website at the following link. [Emerging Risks 2022.](#)

04

METRICS AND TARGETS



To adequately manage climate-related risks and opportunities, Ecopetrol reports its goals and metrics using consistent, credible and comparable data. To this end, it has implemented reporting frameworks, such as SASB, CDP climate change and water, and DJSI, among others, which allow the Company to disclose its climate-related performance and ambition in a relevant and transparent manner.

4.1 Climate-related targets and opportunities

To establish goals and evaluate climate-related risks and opportunities, Ecopetrol has established metrics that are permanently updated and monitored. To ensure data quality and traceability, the company has a software solution in SAP that integrates metrics associated with GHG emissions inventory, criteria pollutants and VOCs, water and waste.

Metrics associated with GHG emissions

Data related to the GHG inventory of assets operated by Ecopetrol S.A. include emissions from the Refinería de Cartagena refinery. Regarding the emission inventories of the subsidiaries of the Ecopetrol Group, progress is being made in defining mechanisms to integrate and consolidate their reporting. Therefore, the data is reported in a segmented manner.

Table 7 presents the metrics related to GHG emissions for the period 2019 – 2022².

Table 7. Ecopetrol Group GHG Emissions Inventory Metrics.

GHG Emissions of Ecopetrol S.A. ³	2019	2020	2021	2022
CO ₂ e emissions - Scope 1 (ktCO ₂ e)	14,502	13,305	13,256	13,159
CO ₂ e emissions - Scope 2 (ktCO ₂ e)	670	866	583	500
CO ₂ e emissions – Scope 3 (ktCO ₂ e)	144,497	139,702	137,794	146,726
<i>Use of product sold</i>	137,253	133,320	129,923	138,387
<i>Purchase of goods and services</i>	5,538	4,929	6,518	6,949
<i>Investments</i>	1,417	1,014	928	853
<i>Other categories</i>	288	439	423	537
Reduction of GHG emission – New projects (ktCO ₂ e)	381	200	293	416
GHG emissions intensity - Upstream (Kg CO ₂ e/BOE Produced)	41.23	43.40	42.96	41.74
GHG emissions intensity - Downstream (Kg CO ₂ e/BOE throughput)	41.95	41.59	39.68	39.98
Upstream Segment Subsidiaries⁴				
Emissiones de CO ₂ e - Alcance 1 (ktCO ₂ e)	363	286	260	250
CO ₂ e emissions - Scope 2 (ktCO ₂ e)	15	19	25	28

2 As recommended by ISO 14064-1 and the GHG Protocol, the base year emissions may need to be recalculated as companies undergo significant structural changes such as acquisitions, divestments, and mergers. as well as significant changes in the emissions estimation methodology. This recalculation is performed not only for the base year but also for the historical series, in order to maintain consistency in the reported data. Accordingly, emissions for the base year (2019) and the historical series have been recalculated, taking into account the following: i) The bottom-up and top-down methane measurements made in the production segment; ii) the reversion of the Nare asset in the Upstream segment.

3 The GHG emissions inventory is prepared under the ISO 14064-1 methodology, and specifically following the guidelines of the GHG

Protocol Corporate Standard (scope 1), GHG Protocol Scope 2 Guidance (scope 2), Corporate Value Chain (scope 3) and Accounting and Reporting Standard (scope 3). It is structured under the operational control approach. The information differs from that available to the public through the Integrated Management Report because at the close of this report there is no final information for the last two months of the year. The information disclosed here as well as the information available on the website corresponds to updated information.

4 The Upstream segment reflects Hocol's information, which structures the GHG inventory under an operational control approach and consolidates the information using the global warming potentials values of AR5. Currently, internal verification is being carried out to provide an external verification for the last quarter of the year.

GHG Emissions of Ecopetrol S.A³	2019	2020	2021	2022
CO ₂ e emissions – Scope 3 (ktCO ₂ e)	4,236	6,129	6,670	6,478
<i>Use of product sold</i>	4,161	6,076	6,610	6,413
<i>Purchase of goods and services</i>	48	42	42	50
<i>Investments</i>	25	9	17	15
<i>Other categories</i>	2	2	1	1
GHG emissions intensity - Upstream (Kg CO ₂ e/BOE Produced)	55.16	17.33	14.50	14.34
Midstream Segment Subsidiaries⁵				
CO ₂ e emissions - Scope 1 (ktCO ₂ e)	556	512	450	444
CO ₂ e emissions - Scope 2 (ktCO ₂ e)	246	196	124	125
Downstream Segment Subsidiaries⁶				
CO ₂ e emissions - Scope 1 (ktCO ₂ e)	96	96	93	94
CO ₂ e emissions - Scope 2 (ktCO ₂ e)	23	29	19	16
GHG emissions intensity - Downstream (Kg CO ₂ e/BOE throughput)	0.16	0.16	0.14	0.15
Transmission And Toll Roads Segment Subsidiaries⁷				
CO ₂ e emissions - Scope 1 (ktCO ₂ e)	27	31	32	31
CO ₂ e emissions - Scope 2 (ktCO ₂ e)	13	13	9	10
CO ₂ e emissions – Scope 3 (ktCO ₂ e)	36	28	61	29

In 2021, Ecopetrol's GHG emissions inventory was verified by Ruby Canyon Engineering under ISO 14064-1:2006. This firm validated the methodology used and recognized that the GHG emissions reported by Ecopetrol are accurate, consistent, transparent and without notable discrepancies for the 2017-2020 period. Ecopetrol established a biannual verification frequency for this purpose. Additionally, in the second half of 2023, the third-party verification of the GHG emissions inventory for 2021 and 2022 will be carried out following the NTC ISO 14064-1:2020 standard.

⁵ The Midstream segment includes Cenit, Ocesa, ODL, OBC and ODC. The inventory of each of the companies is carried out under an operational control approach. These companies have carbon neutrality certification that includes the verification of their GHG emissions inventory.

⁶ The Downstream segment includes Esentia, which structures its GHG inventory under an operational control approach under the ISO 14064-1 standard. The 2019-2021 historical series has been verified by ICONTEC. The 2022 inventory will be verified in September 2023. Scope 3 GHG emissions are currently under review.

⁷ The transmission and toll roads segment includes ISA and its companies, which structure its GHG inventory under the GHG Protocol methodology.

Other environmental metrics

Concerning other environmental metrics, Table 8 shows the data associated with Ecopetrol S.A.'s criteria pollutants and VOCs.

Table 8. Other Ecopetrol S.A. metrics climate change related

Criteria pollutants and VOC	2019	2020	2021	2022
NOx Emissions (Ton)	27.95	28.55	28.43	29.63
SOx Emissions (Ton)	16.65	13.26	14.45	15.32
CO Emissions (Ton)	11.30	11.67	11.58	11.61
Particulate Matter Emissions (Ton)	1.61	1.42	1.39	1.58
VOC Emissions (Ton)	127.85	125.97	116.94	124.64

* Assets operated by Ecopetrol S.A. (includes Cartagena Refinery)

In addition, the metrics published in the Integrated Management Report were subject to third-party verification by the firm EY, following the International Standard ISAE3000.

For more information and details of the metrics, please consult:

- [Integrated Management Report 2022](#): Environment chapter, Sections “Climate action”, “Water neutrality”, “Use of alternative energy and sources”, “Fuel quality”, “Clean air for the environment”, “Integrated waste management”, “Biodiversity and ecosystem services”, and “Circular economy”.
- [Sustainability Accounting Standards Board \(SASB\) 2022 Metrics Report](#): (for metrics of Ecopetrol and its subsidiaries).
- [Quarterly Results](#)

4.1 Climate-related targets

The Ecopetrol Business Group upholds its commitment to [achieve net-zero carbon emissions by 2050](#). This plan includes the absolute goal of reducing by 50% of its scope 1, 2 and 3 emissions by 2050 and 25% of its scope 1 and 2 emissions by 2030 with 2019 as the baseline year. In this way, the business group contributes to Colombia's commitment to reduce by 51% of GHG emissions by 2030, in line with the targets as an advocate of the Paris Agreement.

To determine this target, the base year 2019 GHG emissions of the Company were estimated, including emissions generated by the assets operated by Ecopetrol S.A., the Refinería de Cartagena refinery, the transportation segment (CENIT, ODL, Bicentenario, ODC and OCENSA), Hocol, Esenttia, ISA and an estimate of assets with partners.

Following the best practices to construct GHG inventories, the Ecopetrol Group updated the emissions of the base year and the historical series considering, among others, the following: (i) direct measurements of methane emissions using bottom-up and top-down technologies and construction of own emission factors which augmented these emission estimates in the

assets of Ecopetrol S.A.⁸; (ii) acquisition and divestment of production assets; (iii) inclusion of emissions from ISA and its subsidiaries; (iv) addition of emissions from subsidiaries located in the United States (Permian and America) and Brazil; and (v) updating of global warming potentials and emission factors.

In light of the above, in 2022 Ecopetrol recalculated its historical series for 2019-2022.



Figure 7. Emission reduction targets

To achieve the 2030 target, Ecopetrol is implementing projects and initiatives in energy efficiency, reduction of fugitive emissions, venting, and flaring and renewable energies, which are below USD 50/tCO₂e (equivalent to the established internal carbon price).

4.2 Climate-related targets

In 2022 the Ecopetrol Group achieved an emissions reduction of 416,672 tCO₂e. The emissions reduction achieved exceeds by 59% the target established for the year of

To leverage compliance with the target, it is estimated that up to 30% of emissions will be offset by Natural Climate Solutions projects, a share that could decrease under the guidelines established for the Oil & Gas sector endorsed by the Science-Based Target Initiative (SBTi) or other applicable guidelines⁹.

For their part, the Midstream companies Esenttia and ISA and their companies achieved carbon neutral certification following their decarbonization strategy, which includes emission reduction goals.

For further details of the targets set by the Ecopetrol Business Group, please consult:

1. [Sustainability Accounting Standards Board \(SASB\) 2022 Metrics Report](#) (for the metrics of Ecopetrol and its subsidiaries).
2. [Cenit Sustainability Report 2022](#).
3. [Ocesa Sustainable Management Report 2022](#). (available only in Spanish)
4. [ISA Integrated Management Report 2022](#).

⁸ The bottom-up and top-down methane measurements performed in the production segment, as part of the Company's plan to improve the detection, quantification and sealing of fugitive emissions and venting encompassed 95% of the Company's facilities. With these measurements, emission factors were adjusted and constructed accordingly to modify the methodology for estimating emissions, representing a emissions increase of around 2.7 million tons of CO₂e/year.

⁹ In March 2022, the Science Based Target (SBTi) initiative published a Fossil Fuels Policy, which includes the following assumptions: (i) paused validation of fossil fuel sector targets; (ii) will not accept new commitments from companies or subsidiaries according to defined categories, and (iii) eliminated previous commitments from oil and gas companies effective immediately. The updated guidance is expected to be published by the end of 2023. Once published, Ecopetrol will review its ambition and alignment with SBTi.

262,761 tCO₂e. Consequently, between 2020 and 2022¹⁰ a cumulative reduction of 910,113 tons of CO₂e was achieved. By 2023, the emissions reduction target is set at 407,040 tCO₂e and between 2020 and 2024, a cumulative reduction of 1.6 million tCO₂e is expected. The annual target is an indicator included in the Group's BSC.

Furthermore, the initiatives associated with renewable energies, energy efficiency and routine flaring in the power plants have specific targets included in the Roadmaps available in the Integrated Management Report 2022.

In flaring, Ecopetrol S.A. has committed to reducing routine flaring to zero by 2030, in line with the global Zero Routine Flaring initiative led by the World Bank.¹¹ In June 2023, the Company presented the second report to this organization, for the first time disaggregating the figure into total flaring and routine flaring. For 2022, total flaring and routine flaring were reported at 285 and 189 million standard cubic meters, respectively. In 2022, more than 150 thousand tons of CO₂e were reduced through the implementation of process optimization projects and the use of gas for self-generation or sale.

In March 2023, Ecopetrol S.A. [committed to reducing its methane emissions](#) by 45% by 2025 and 55% by 2030 with respect to the 2019 baseline, in the direct operations of the production segment through the detection, measurement and mitigation of fugitive emissions and the reduction of venting in tanks and wells. This is in line with the recent regulation issued by the Ministry of Mines and Energy on the reduction of flaring and venting in hydrocarbon exploration and production activities and with voluntary commitments acquired by the EG as a participant in the Climate and Clean Air

Coalition (CCAC)¹² and the Oil and Gas Methane Partnership - OGMP 2.0.

The methane emissions reduction plan has encouraged the Company to close 1,743 leaks detected through detection and measurement campaigns carried out in the direct operations of the Upstream segment, relating to 12,117 tons of methane (339,265 tCO₂e). Likewise, as part of the commitment to report methane emissions, by 2022, 100% of the assets operated in levels L3 and L4 were reported to OGMP 2.0, and six direct assets of level L5. In non-operated assets, 28 assets were reported at levels L2 and L4, according to progress in their direct measurement of methane emissions.

Regarding scope 3 emissions, Ecopetrol will continue in the analysis of emission reduction alternatives and their associated costs, as well as bring them into line with the company's Strategic Plan to define a possible target for 2035 or 2040, including in these efforts both the supply chain and customers. In 2022, Ecopetrol reviewed different alternatives to reduce emissions by i) increasing the share of lower-emission hydrocarbons that replace crude oil; ii) diversifying its product portfolio to include low-emission businesses that replace

¹⁰ Includes reductions achieved by Ecopetrol S.A., the Midstream (transport) segment (CENIT, ODL, Bicentenario, ODC and OCENSA), Hocol and Esenttia.

¹¹ Zero Routine Flaring, a World Bank initiative launched in 2015 with the support of the Global Gas Flaring Reduction Partnership (GGFRP), which seeks to eliminate routine gas flaring in fields as soon as possible and by 2030 at the latest.

¹² Climate and Clean Air Coalition (CCAC), a United Nations-led initiative to assess methane sources and implement cost-effective methane abatement technologies and practices.

hydrocarbons; and iii) incorporating carbon sinks, either its own or those of third parties.

In the supply chain, Ecopetrol advanced in the inclusion of decarbonization clauses in prioritized contracts to encourage the estimating of GHG emissions, implement mitigation and offset measures and craft a decarbonization plan. The clauses have been included with 3% of the suppliers, equal to 23% of the Company's expenditures. The 2022 information will be used to recalculate the historical series.

The supplier engagement strategy involves educational programs involving suppliers. During 2022, 278 suppliers representing 1,478 contracts, participated in several climate-change-related meetings, including i) the first TSEG Congress for the supply chain; ii) supplier summits dedicated to climate change and water (160 suppliers participated); iii) supplier conference on decarbonization for the transportation sector (90 suppliers participated); and iv) supplier summit related to GHG offsetting (220 suppliers participated). To complement the meetings, Ecopetrol initiated individual conversations with prioritized suppliers to apply the decarbonization cycle to each contract ensuring the estimating, reduction and offsetting of emissions and their verification. Suppliers were prioritized based on the following criteria:

- Size of the procurement category, taking into account the amount of scope 3 emissions.

- Ecopetrol's ability to manage the decarbonization cycle in the category.
- Market interest in adhering to Ecopetrol's decarbonization strategy.
- Level of effort to achieve decarbonization targets.

Ecopetrol made a commitment to be water neutral by 2045 by reducing by 66% freshwater withdrawal for industrial use in its operations, eliminating discharges to freshwater bodies, and offsetting of 34% of the remaining water consumption; it also instituted the Water Neutrality Roadmap.

Based on the portfolio of SOx emission reduction projects at the Refinería de Barrancabermeja refinery and the portfolio of decarbonization initiatives, during 2022 Ecopetrol established the following emission reduction targets for the main criteria pollutants for the period 2023-2025:

- Reduce <https://www.ecopetrol.com.co/wps/portal/Home/en/news/detail/Noticias-2021/water-neutrality> by 3,100 tons, NOx emissions by 305 tons and Sox emissions by 60 tons in 2023.
- Expected reductions of 4,293 tons of VOC emissions, 711 tons of NOx emissions and 2,044 tons of SOx between 2024- 2025.

For more information on these targets, please refer to the **Integrated Management Report 2022** ("Environment" Chapter, pp. 170-285).

Progress in Taskforce on Nature-related Financial Disclosures initiative

The Taskforce on Nature-Related Financial Disclosures (TNFD) is a market-led global initiative whose mission is to develop and deliver a framework for reporting, managing and disclosing nature-related risks and opportunities, to support a shift in global financial flows toward positive nature outcomes. This initiative began in 2019 led by the organizations

Global Canopy, the United Nations Development Program (UNDP), the United Nations Environment Program Finance Initiative (UNEP FI) and the World Wide Fund for Nature (WWF).

By participating in TNFD, with natural capital and production area called Ecopetrol can be an demonstrate its innovator in the hydrocarbon commitment to the delivery Middle Magdalena Valley in industry worldwide, of transparent and timely Colombia, with the support contributing to our vision of a information, aligned with of Deloitte. The second megadiverse and emerging international standards. focused on applying a socio-ecological resilience tool in country, and currently the As part of the feedback to the core area of the Mid-Magdalena Valley, in only company in the hydrocarbon industry part of the TNFD versions, Ecopetrol carried out two LEAP (Locate, Evaluate, Analyze and Prepare) methodology in conjunction with the Alexander von Humboldt Biological Resources Research Institute. The main participation will strengthen the “Value Generation through T ESG” pillar of the 2040 Strategy, to better manage risks and opportunities associated conventional hydrocarbon results obtained are described below.

As part of the feedback to the TNFD versions, Ecopetrol carried out two LEAP (Locate, Evaluate, Analyze and Prepare) methodology implementation pilots, one local and one regional. The first focused on a conventional hydrocarbon

production area called Ecopetrol can be an demonstrate its innovator in the hydrocarbon commitment to the delivery Middle Magdalena Valley in industry worldwide, of transparent and timely Colombia, with the support contributing to our vision of a information, aligned with of Deloitte. The second megadiverse and emerging international standards. focused on applying a socio-ecological resilience tool in country, and currently the As part of the feedback to the core area of the Mid-Magdalena Valley, in only company in the hydrocarbon industry part of the TNFD versions, Ecopetrol carried out two LEAP (Locate, Evaluate, Analyze and Prepare) methodology in conjunction with the Alexander von Humboldt Biological Resources Research Institute. The main participation will strengthen the “Value Generation through T ESG” pillar of the 2040 Strategy, to better manage risks and opportunities associated conventional hydrocarbon results obtained are described below.

Pilot 1. Local outreach - Production Area Yariguí - Cantagallo

The pilot for the Yariguí-Cantagallo field in the Mid-Magdalena region of Colombia (Figure 8) was designed applying version 0.3 of the TNFD framework, adjusted to what is considered a type one pilot (desktop test)¹³, allowing an assessment of how the framework could be applied, as well as the data and analysis available to address the constituents of the LEAP approach. This exercise derived from preliminary activities developed with Deloitte¹⁴ and the analyses of the Biodiversity and Ecosystem Services team of Ecopetrol's Sustainability and Decarbonization Management.

¹³ Assessment exercise of how the framework could be applied, based on comparison with current and past experience. This could take the form of an internal consultation process and/or review output work through the beta framework and assesses the company's current understanding and available data and analysis to address the components of the LEAP approach and draft disclosure recommendations.

¹⁴ The work performed by Deloitte included only the contractual scope defined among Ecopetrol and Deloitte; and the latter is solely responsible to Ecopetrol, as established in said contract.

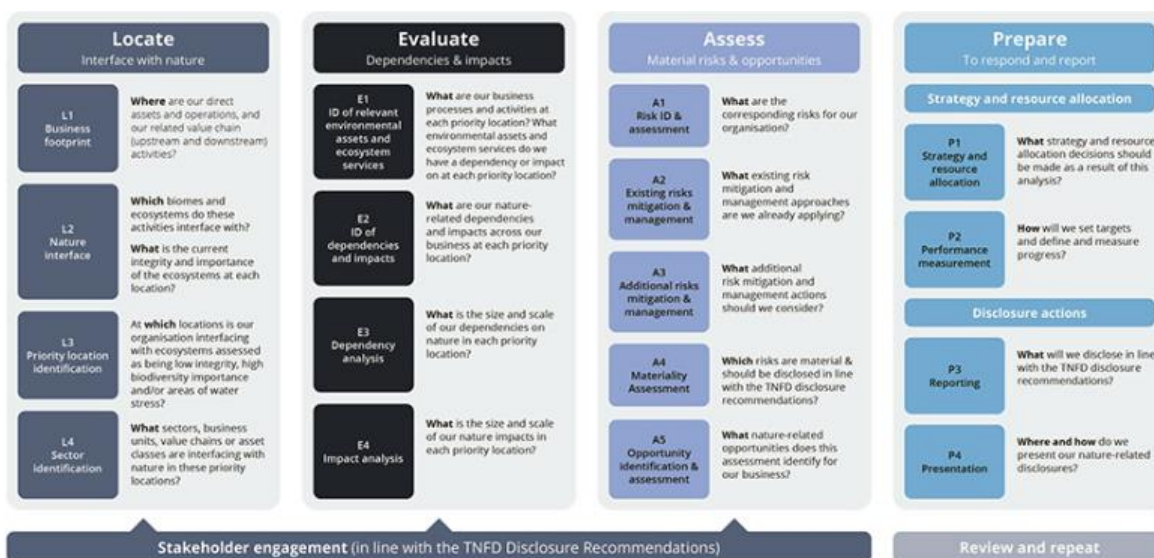


Figure 8. Location Pilot 1 - Local

The objectives of the local pilot were:

- Evaluate the relevance and feasibility of the LEAP methodology to provide feedback to TNFD on its potential application in the country and the industry.
- Provide recommendations for implementing the framework in all operations.
- Identify the opportunities available to Ecopetrol S.A. in applying internal and public tools to evaluate risks and opportunities following the LEAP framework.

The pilot identified the most relevant dependencies and impacts and prioritized these according to the ENCORE tool¹⁵. An assessment of risks and opportunities was also realized, which considered the company's current risk management practices according to the LEAP framework (Figure 9).



Source: Task Force on Nature-related Financial Disclosures

Figure 9. LEAP Methodology

The commercial operations to be considered were defined by analyzing Ecopetrol's direct operational sites against the criteria and conducting working meetings with asset managers to have a preliminary identification of available and relevant information.

The nature aspects considered were defined in a work session with asset managers, identifying biomes, natural assets and relevant ecosystem services. In turn, issues and

¹⁵ Exploring Natural Capital Opportunities, Risks and Exposure (<https://encorenature.org/en>)

outstanding data were identified using information from ENCORE, IBAT¹⁶, Global Forest Watch¹⁷, Water Risk Filter¹⁸ and information from Ecopetrol (“Plan de Manejo Ambiental Integral del campo Cantagallo Yariguía y alrededores, 2013”), as presented in Figure 10.

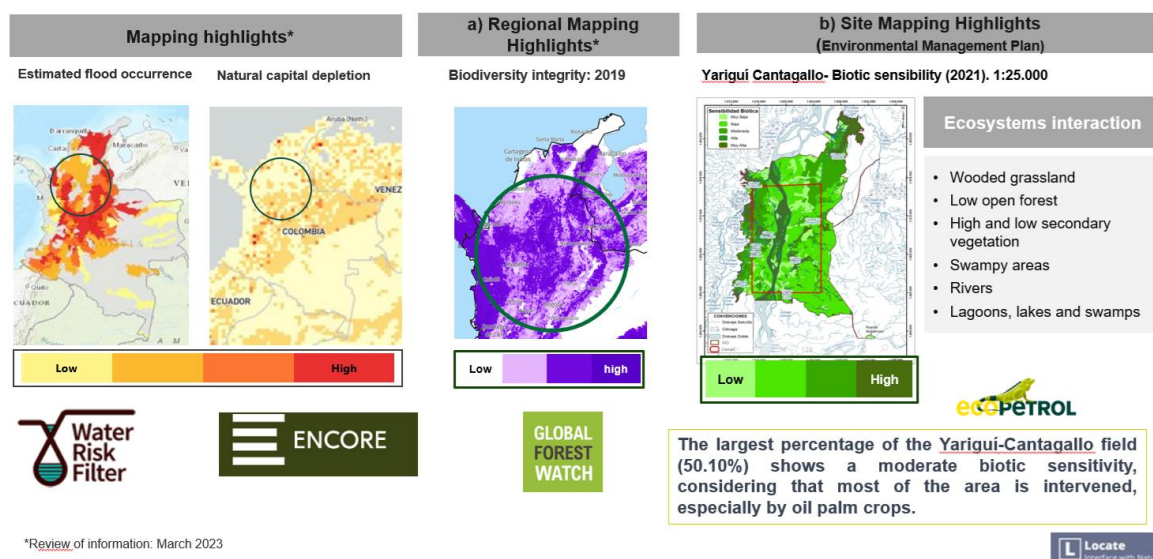


Figure 10. Phase L2 Interface with Nature

Pilot 2. Regional outreach - Implementation of the Social-Ecological Resilience tool

The regional pilot focused on one of the applied case studies of the socio-ecological resilience tool, providing a more robust framework in response to different queries posed in TNFD's LEAP methodology. This tool was developed within the framework of the "Fibers: Essence and Territory" (Fibras: Esencia y Territorio) agreement, carried out jointly with the Alexander von Humboldt Biological Resources Research Institute (Instituto de Investigación de Recursos Biológicos Alexander von Humboldt). It is based on a dynamic model that simulates the processes of a socio-ecological system in response to the impacts generated by productive activities. It generates time series and indicators that help establish intervention limits in the territories without altering their equilibrium.

The tool has contributed to the LEAP framework in four of Ecopetrol’s core areas: Mid-Magdalena Valley, Tillavá, Piedemonte Casanare and Meta (Figure 11). The information presented to the TNFD centered on the Mid-Magdalena Medio area.

¹⁶ Integrated Biodiversity Assessment Tool (<https://www.ibat-alliance.org/>)

¹⁷ Global Forest Watch offers the latest data, technology and tools for monitoring and empowering people everywhere to better protect forests (<https://www.globalforestwatch.org/>)

¹⁸ Free online tool that allows companies and investors to explore, assess and respond to water risks (<https://riskfilter.org/water/home>).

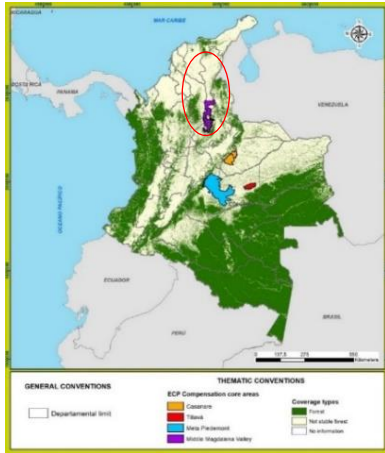


Figure 11 Assessed Areas

The objectives of the regional pilot were:

- Contribute to the development of a case study linking the TNFD beta framework with the social-ecological resilience tool designed in the *Fibras* agreement.
- Generate information for the stages of the TNFD LEAP framework, aimed at characterizing the central area through the localization phase, identifying dependencies, opportunities and interactions between the company and the ecosystems in the evaluation and analysis phase.
- Identify gaps related to metrics, indicators and methodologies to identify dependencies and opportunities (business-nature).
- Provide general recommendations to implement the TNFD beta framework and guide a roadmap for identifying nature-related risks.

The application of the resilience assessment in the TNFD framework covered some stages of the LEAP phase (L2, E1, E2 and A1). The assessment started when the framework was in its second version and was completed a few days before submitting version 0.4, as can be seen in Figure 12.

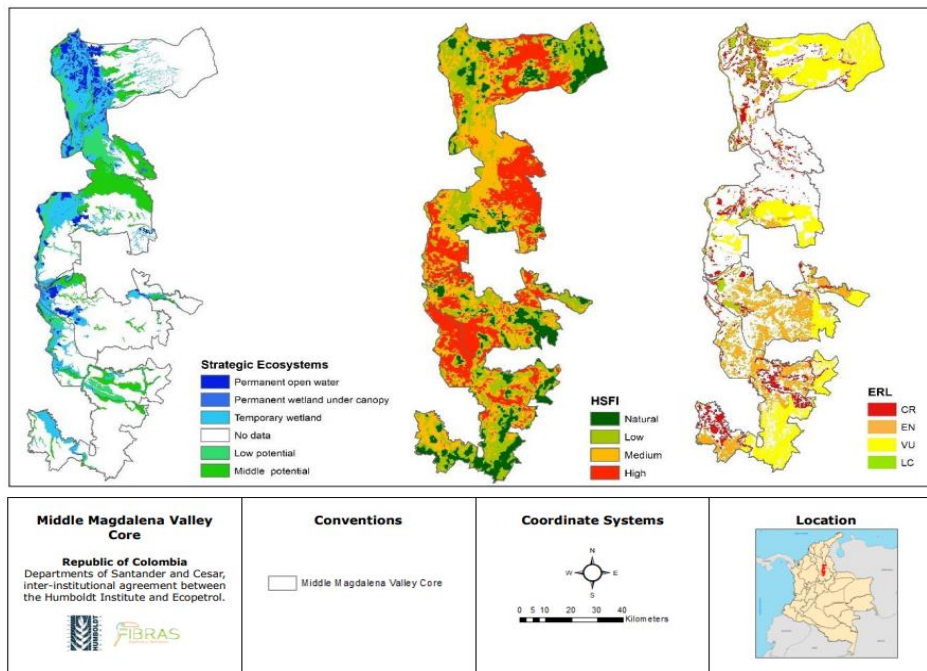


Figure 12. Characterization of the core Middle Magdalena Valley based on the presence of strategic ecosystems (Humboldt Institute, IDEAM 2015; Humboldt Institute, 2018), Human Spatial Footprint Index (HSFI) categories (Correa Ayram et al., 2018) and Ecosystem Red.

Pilots conclusions and general recommendations:

- The results illustrated the applicability of the LEAP framework and evidenced the relationship between the oil and gas sector and the water-related ecosystem services.
- The need to complement the analyses with specific tools adapted to the business contexts was identified. These additional tools will allow a more detailed analysis of Ecopetrol's operational areas and will facilitate the identification of risk and opportunity management actions aligned with the company's specific work areas.
- It would be advisable for the TNFD framework to include a step in the assessment phase to understand the dynamics of the socio-ecological system being evaluated. It is also recommended to include the socio-ecosystemic context in the assessment, in order to improve the understanding of impact and dependency variables.
- It is important to consider social aspects in the TNFD framework, as they are closely related to the reliance on social license and are essential to take advantage of opportunities in the territories.
- It is recommended to include an analysis of the temporal dynamics of the variables that will be evaluated, which would allow an understanding of the changing trend in the sustainability metrics proposed for different periods.
- It is considered important to use national data sources in the LEAP stages to obtain detailed and updated analyses. While the need for global information to make comparisons is understood, it is recommended to discuss the scope of global databases and to recognize the importance of national layers for decision-making at subnational scales.
- It is suggested that the section on scenarios included in version 4.0 of the TNFD framework incorporate social issues and that the metrics used in the LEAP phase be modeled under different scenarios to facilitate action planning. It is also important to consider the scalability between global archetypes and regional or local scenarios that have been made explicit in the use of scenarios in the IPBES assessment.

05

TCFD TABLE OF CONTENTS

The following table (see Table 9) presents the relationship between specific TCFD recommendations and disclosures and the sections of this report. It also refers to documents where more detailed information can be found.

Table 9. Table of contents of the TCFD

Recommendation	Disclosure	Ecopetrol Group Report	Detailed information ¹⁹
Governance: Disclose the organization's governance regarding climate-related risks and opportunities.	a) Describe the Board's oversight of climate-related risks and opportunities.	1.1 Board's oversight of climate-related risks and opportunities.	IMR 2022- Message to Stakeholders: pp. 4-5, Governance structure: pp. 121, Board of Directors: p. 121-131. 20-F 2022- 7. Corporate Governance System: p. 205, 7. 3 Board of Directors: p. 201. ACGR 2022 – Operation of the Board of Directors and its Committees: pp. 26-49. 2020 CDP Climate – Chp.1. Governance, pp.2.
	b) Describe management's role in assessing and managing climate-related risks and opportunities.	1.2 Management's role in assessing and managing climate-related risks and opportunities.	IMR 2022 - Duties of the Board of Directors and Senior Management in the oversight and management of impacts impact management and decision-making process: p. 131, Board Members: pp. 123-129, Risk Management System: pp. 160-162. 20-F 2022 - 7.3.2 Board Committees: p. 218-219, 7.6 Remuneration of Directors and Management: p. 225.

¹⁹ 20F - form 20-F filed with the Securities and Exchange Commission
 IMR- Integrated Management Report
 ACGR-Annual Corporate Governance Report
 SASB- Report on Sustainability Accounting Standards Board Metrics

			<p>ACGR 2022 - Operation of the Board of Directors and its Committees: pp. 26-49, Senior Management Selection, Development and Remuneration pp. 50-53, Control Environment pp. 56-67.</p>
<p>Strategy: Disclose the current and potential impact of climate-related risks and opportunities on the organization's business, strategy and financial planning, where such information is material.</p>	<p>a) Describe the climate-related risks and opportunities identified by the organization in the short, medium and long term.</p>	<p>2.1 Climate-related risks and opportunities.</p>	<p>IMR 2022 - 2040 Strategy: pp. 26-29, TESG: pp. 114-120, Environmental strategy: p. 170-174, Climate change: pp. 180-183, Integral water management: pp. 201-207, Biodiversity: pp. 220-235, Circular economy: pp. 236-248, Use of alternative energies and sources: pp. 249-255, Fuel quality: pp. 256-263, Air quality: pp. 263-264.</p> <p>20F 2022 - 2.1.1 2040 Strategy: Energy that Transforms: p. 5, 3.11 Technology, Environment, Social and Governance (TESG): p. 84-89, 5.2 Risk Factors: pp. 148-190.</p> <p>Ecopetrol website: Risk management.</p>
	<p>b) Describe the impact of climate-related risks and opportunities on the organization's business, strategy and financial planning.</p>	<p>2.2 Impact of climate-related risks and opportunities on the organization's business, strategy and financial planning.</p>	<p>IMR 2022 – Investments and environmental expenses: pp. 175, Climate change: pp. 180-183, Integral water management: pp. 201-207, Circular economy: pp. 236-248, Use of alternative energies and sources: pp. 249-255, Fuel quality: pp. 256-263, Air quality: pp. 264-271.</p> <p>SASB 2022 - EM-EP-420a.3 (1) Amount invested in renewable energies; (2) revenues generated by the sale of renewable energies: p. 78, EM-EP-420a.4 Analysis of how the price and demand for hydrocarbons or climate regulation influence the capital investment strategy for exploration, acquisition and development of assets: p. 79.</p> <p>20-F 2022 - 2.1.2. 2022 –2040 Strategy: Energy that Transforms: p. 5.</p> <p>2022-2024 Investment Plan, p. 6.</p>

			Ecopetrol website: Risk Management.
	c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	2.3 Scenario analysis.	2021 CDP Climate - C3. Business Strategy (C3.2).
Risk Management Disclose how the organization identifies, assesses, and manages climate-related risks and opportunities.	a) Describe the organization's processes for identifying and assessing climate-related risks.	3.1 Integrated Risk Management System.	IMR 2022 – Risk Management System pp. 160-162. SASB 2022 - EM-EP-320a.2 Analysis of management systems used to integrate a culture of safety throughout the exploration and production life cycle.: p. 68: EM-EP-540a.2 Description of the management systems used to identify and mitigate catastrophic and ultimate risks.: p. 95-96. 20-F 2022 - 5.3. Risk Management: p. 176-181.
	b) Describe the organization's processes for managing climate-related risks.	3.2 Inclusion of climate-related risks in the business risk map.	IMR 2022 –Risk Management System: pp. 160-162. 20-F - 5.3. Risk Management: p. 171, 5.3.2 Managing Low Carbon Economy and Climate Change Risks: p. 176-181. 2021 CDP Climate - C2. Risks and opportunities (C2.1).
	c) Describe how the processes for identifying, assessing and managing climate-related risks are integrated into the organization's overall risk management.	3.2 Inclusion of climate-related risks in the business risk map. 3.3 Aligning business risks with ESG (Environmental, Social and Governance) issues and TESG strategy.	IMR 2022- Risk culture: p. 168-169. 2021 CDP Climate - C2. Risks and opportunities (C2.2).
Metrics and Targets:	a) Disclose the metrics used by the organization to	4.2 Metrics for assessing climate-	IMR 2022 – Investments and environmental expenses: pp.

<p>Disclose metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.</p>	<p>assess climate-related risks and opportunities in line with its strategy and risk management process.</p>	<p>related risks and opportunities.</p>	<p>175, Climate change: pp. 180-183, Integral water management: pp. 201-207, Biodiversity: pp. 220-235, Circular economy: p. 236-248, Use of alternative energies and sources: pp. 249-256, Fuel quality: p. 256-263, Air quality: pp. 264-271-, Comprehensive waste management: pp. 272-285.</p> <p>SASB 2022 - Air quality EM-EP-120a.1: p. 27, Water management EM-EP-140a.1, 140a.2, 140a.3, 140a.4: pp. 32-35.</p> <p>Ecopetrol website: 2Q23 Quarterly results – TESG Dashboard.</p>
	<p>b) Disclose Scope 1, Scope 2 and, Scope 3, if applicable, GHG emissions and related risks.</p>	<p>4.2 Metrics for assessing climate-related risks and opportunities.</p>	<p>IMR 2022 – Direct and indirect GHG emissions scopes 1,2 and 3: p. 192.</p> <p>SASB 2022 – GHG Emissions EM-EP-110a.1: pp. 19-21.</p>
	<p>c) Describe the targets used by the organization to manage climate-related risks and opportunities and performance as compared to its targets.</p>	<p>4.1 Ecopetrol's climate-related targets.</p>	<p>IMR 2022 - Environmental strategy targets: p. 170, Climate change: p. 180, Integral water management: p. 201, Biodiversity: p. 220, Circular economy: p. 236, Use of alternative energies and sources: p. 249, Fuel quality: p. 256, Air quality: p. 264.</p> <p>SASB 2022 - Discussions on short- and long-term strategy and/or plan to manage emissions EM-EP-110a.3: p. 524-25.</p> <p>2021 CDP Climate - C4. Targets and performance.</p> <p>Ecopetrol website: Greenhouse Gas Mitigation, 2Q23 Quarterly Results - TESG Dashboard.</p>

5.1 Glossary

ANDI: National Business Association of Colombia for its Spanish acronym.

BSC: Balanced Management Scorecard.

BSC: Management's Balanced Scorecard.

CCAC: Climate & Clean Air Coalition.

CCUS: Carbon Capture, Utilization and Storage.

CEO: Chief Executive Officer.

CFO: Chief Financial Officer.

CH4: Methane.

CO2: Carbon dioxide.

DJSI: Dow Jones Sustainability Index.

EBITDA: Earnings before interest, taxes, depreciation, and amortization.

ECCN: Colombia Carbon Neutrality Strategy for its Spanish acronym.

EII: Salomon Energy Intensity Index.

ELC: Entity Level Control.

ESG: Environmental, Social and Governance.

ExCo: Executive Committee.

GGFR: Global Gas Flaring Reduction Partnership.

GHG: Greenhouse gas.

GRI: Global Reporting Initiative.

HSE: Health, Security and Environment.

IDEAM: Colombian Institute of Hydrology, Meteorology and Environmental Studies.

IEA: International Energy Agency.

IMR: Integrated Management Report.

IPCC: Intergovernmental Panel on Climate Change for its Spanish acronym.

IRMS: Integrated Risk Management System.

ISA: Interconexión Eléctrica S.A. E.S.P.

ISO 3100: International risk management norm.

KRI: Key Risk Indicator.

LDAR: Leak Detection and Repair.

LPG: Liquefied Petroleum Gas.

LTi: Long-Term Incentives.

MHCP: Colombian Ministry of Finance and Public Credit for its Spanish acronym.

MS_WEF: Measuring Stakeholder Capitalism-World Economic Forum.

NCRE: Non-conventional renewable energy sources.

NCS: Natural Climate Solutions.

NCS: Natural Climate Solutions.

NDC: Nationally Determined Contribution.

NOX: Nitrogen oxides.

NPV: Net Present Value.

OGMP: Oil & Gas Methane Partnership.

PID: Integrated Development Plan for its Spanish acronym.

PIGCCme: Colombia's Comprehensive Climate Change Management Plan for the Energy and Mining Sector for its Spanish acronym.

PNCTE: National Program of Tradable GHG Emissions Quotas for its Spanish acronym.

PVS: Wildlife Project for its Spanish acronym.

RAM: Risk Assessment Matrix.

RCP: Representative Concentration Pathways.

RENARE: National Registry of GHG Emission Reductions for its Spanish acronym.

SASB: Sustainability Accounting Standards Board.

SBTi: Science-based targets.

SEC: Securities and Exchange Commission.

SFC: Financial Superintendence of Colombia for its Spanish acronym.

SHP: Small Hydroelectric power plant.

SIGEA: Atmospheric Emissions Management System.

SOX: Sulfur oxides.

SRI: Integrated Risk Management System.

TCFD: Task Force on Climate-Related Financial Disclosures.

TCNCC: Third National Climate Change Communication.

TESG: Technology Environmental Social and Governance.

TNC: The Nature Conservancy.

VOC: Volatile Organic Compounds.

VRU: Vice-Presidency of Compliance.

VTH: Vice-Presidency of Human Resources.

WCS: Wildlife Conservation Society.

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