TCFD report 2020







2020 Ecopetrol's TCFD report



Felipe Bayón **CEO Ecopetrol**

As part of our commitment to achieve net zero carbon emissions for scopes 1 and 2 by 2050 and to adapt to the energy transition, Ecopetrol¹ analyzed the recommendations issued by the Financial Stability Board's Task Force on Climate-Related Financial Disclosures (TCFD) and presents, for the first time, a report aimed at aligning the company's disclosures with their guidelines. We acknowledge the impact of climate change and our commitment to the Paris Agreement, particularly on the sustainability of our operations, and the increasing interest of our investors and other stakeholders on this matter. This report seeks to provide transparency on how we are advancing in the understanding, governance and management of climate-related risks and opportunities.

Ecopetrol has a long-standing commitment to contribute to the economic, social, and environmental development of the regions where it operates. Our behavior and performance are underpinned by a solid corporate governance and a business conduct based on values and ethical principles, with transparency at its core. The company has strengthened the disclosure of environmental, social and governance (ESG) issues following international standards including, the Sustainability Accounting Standards Board (SASB), Global Reporting Initiative (GRI), Dow Jones Sustainability Index (DJSI), World Economic Forum Stakeholder Capitalism Metrics (WEF's SCM) and CDP. We have also made specific commitments, such as joining the World Bank's initiative of Zero Routine Flaring by 2030 and the Oil and Gas Methane Partnership (OGMP), as part of the UN-led Climate and Clean Air Coalition (CCAC). In 2020 we advanced in our TESG strategy (Technology + ESG), to define how we currently do businesses, levered by technology to accelerate and escalate innovative solutions to current and future environmental, social, economic and governance challenges.

The unprecedented conditions experienced in 2020 tested the strength and resilience of Ecopetrol. Its Corporate Governance Model proved to be sufficiently robust and efficient to support the operation and the timely decisionmaking required during the crisis. To address the crisis resulting from the COVID-19 pandemic and the abrupt decline in oil prices, the Board of Directors and Senior Management of the company, following corporate governance best practices, made a series of decisions required to maintain resilience and competitiveness, strengthen the corporate culture, innovate in the company's operations, adopt the TESG strategy, and continue the path towards the energy transition, in the midst of the pandemic.

The Board of Directors continues to fulfill its role of guiding the corporate strategy so that Ecopetrol endures over time creating sustainable value for its stakeholders whilst securing a leading position in the energy transition. As part of our decarbonization plan in 2021 we announced our ambitious decarbonization targets, which contribute to the updated Colombia's Nationally Determined Contributions (NDC) to reduce 51% of greenhouse gas (GHG) emissions by 2030. The new targets imply that Ecopetrol will reduce

1 For the purpose of this report and unless the context otherwise requires, the terms "Ecopetrol", "we", "us", "our", "Ecopetrol Group", or the "Company" are used here to refer to Ecopetrol S.A. and its subsidiaries on a consolidated basis. The GHG emissions related data covers only Ecopetrol S.A, Refinería de Cartagena, and Cenit, however the 2019 baseline calculations include the emissions from all subsidiaries.

emissions by 25% in 2030 and will have net zero carbon emissions by 2050 for scopes 1 and 2. In terms of total emissions (scopes 1, 2 and 3), we plan a 50% reduction by 2050, compared to a 2019 baseline.

The implementation of the decarbonization roadmap has already yielded positive results. Ecopetrol has achieved a cumulative reduction of 8.4 million tons of CO2e from 2010 to 2020, by implementing programs to reduce fugitive emissions and venting, decrease gas flaring (52% since 2017), increase energy efficiency in its operations and the development of renewable energy projects to meet its own energy consumption.

In the short and medium term (2020-2030), Ecopetrol will start to implement hydrogen and CCUS pilots. The expectation is to increase the company's delivery in all of these fronts, including the incorporation of biomass initiatives and the development of solar, wind and geothermal energy projects. It also includes the implementation of a robust portfolio of Natural Climate Solutions (NCS) to compensate residual emissions. In the long term (2030-2050), Ecopetrol plans to gradually escalate initiatives related to hydrogen and carbon capture, utilization, and storage (CCUS)², as well as to store renewable sources of energy in batteries at scale, among other emergent technologies, as they become competitive.

In this report we discuss the involvement and oversight of the Board of Directors on climaterelated and other TESG issues, as well as the role of management in assessing and managing risks and opportunities. We describe Ecopetrol's TESG strategy and decarbonization roadmap to face the energy transition, the processes to identify risks and opportunities, the Integrated Risk Management System and the metrics and targets used to measure performance and track progress over time.

We also summarize different elements required to respond to the disclosures in the Taskforce's recommendations, by referencing and extracting information from already published reports (2020 Integrated Sustainable Management Report, Form 20-F presented to the Securities and Exchange Commission (SEC), SASB metrics report, and other publicly available information on Ecopetrol's website) and by presenting the latest developments that have not been disclosed yet but will become the basis for the Corporate Strategy currently in review.

By adopting the TCFD recommendations and while preparing this report, we acknowledge that this is a multi-year journey and, to this end, we have conducted an internal gap analysis to improve our disclosure in the upcoming years, as our intention is to continue publishing this report annually. We remain committed to increasing and aligning our disclosure to international standards and best practices; hence we maintain an ongoing dialogue with our stakeholders and we are open to receive feedback.

Felipe Ba **CEO Ecopetrol**



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Governance

Ecopetrol has a solid Corporate Governance System. The Board of Directors of Ecopetrol (the 'Board') defines and provides oversight of the strategy for Ecopetrol S.A. and its group of companies (Ecopetrol Group), in which TESG issues, including climatechange, are permanently reviewed and addressed.

At Ecopetrol, the Corporate Governance System is also an enabler of the TESG strategy, through practices, processes, and internal rules embedded in the system. These practices strengthen the decisionmaking process and build confidence for our stakeholders.

1.1

Board's oversight of climate-related risks and opportunities.

Ecopetrol's Board of Directors is responsible for guiding the company towards sustainable long-term value creation. As such, it oversees the design and performance of the corporate strategy that allows Ecopetrol to prevail over time and become a reference for best practices within the industry in Latin America. Ecopetrol's Board members have diverse skills, vast experience, and strong business qualifications that include technology and innovation, which are key to lead the implementation of the TESG strategy. In addition, the Board is regularly participating in relevant TESG related programs applicable to the industry and to the company.

The Board's structure comprises six Board Committees³ that support the Board's review of the company's strategy and expedites its decisionmaking process. Board Committees work together as a system that oversees matters related to climate change from their specialized lens. For instance, the Risk and Audit Committee oversees the risks related to the company and this entails matters related to ESG including climate change. This committee meets at least fifteen (15) times a

year and can be convened at any moment by the Board. In turn, the Corporate Governance and Sustainability Committee supports the Board in the analysis and decision-making process related to the adoption of best practices in corporate governance and sustainability, which include the company's TESG, sustainability and corporate responsibility agendas. This committee meets at least three (3) times a year and can be convened at any moment by the Board. The HSE Committee is another Board committee responsible for guiding the environmental strategy which is also directly related to health and safety issues. Finally, the Technology & Innovation Committee has enabled and reviewed ESG-related topics starting 2020. These last two committees meet at least twice a year and can be convened at any moment by the Board.

Other Board committees can also review topics on climate change as it is applicable to their subject matter, such as business, risk management and investments, for example. With this approach, Ecopetrol incorporates a crosscutting approach to climate-related matters.

Comprehensive oversight of climate-related risks and opportunities is provided by the Committees of the Board, as shown in Figure 1. More information on the company's Board of Directors and its Committees can be found in **2020 Integrated Sustainable Management Report (pg. 40)** and **20F annual report (Governance section).**

3 Board of Directors Audit and Risk Committee; Board of Directors Corporate Governance and Sustainability Committee; Board of Directors Business Committee; Board of Directors Compensation and Nomination Committee; Board of Directors HSE Committee; Board of Directors Technology and Innovation Committee.

Board of Directors and Board Committees



In order respond to the challenges derived from the energy transition, the Board of Directors and Senior Management meet several times per year (Figure 2) to review the strengths, challenges, opportunities and alternatives of the different business segments, the company's ability to adapt to challenges moving forward, and the steps to guide Ecopetrol into the future. The main topics that are currently being discussed are:

Energy	Transition
	Scenarios

As part of its strategy, Ecopetrol considers two scenarios and two sensitivities for Energy Transition: A Reference scenario, an Accelerated transition scenario, a Decelerated sensitivity and a 2°C sensitivity. These scenarios are constantly under review based on the dynamics of the energy market, technological advances, and regulatory frameworks (see Strategy section of this report).

TESG (Technology, Environment, Social, and Governance) strategy The strategy based on the ESG principles, is enabled by the implementation of technology. This strategy has three exceptional⁴ priorities: climate change (including decarbonization goals), water management, and regional development. Furthermore, it includes biodiversity, circular economy, HSE, and diversity and inclusion, among its 28 prioritized material issues classified using four distinct categories: Exceptional, Outstanding⁵, Differentiated⁶ and Compliance⁷ (see **SASB Report 2020** and **2020 Integrated Sustainable Management Report** pg. 24–25) for further detail.

Business Risk MapIt was updated in 2020 to include the risk of Inadequate
management in regards to climate change and water to
complement the already existing risk of the Unsuccessful
energy transition strategy (see 2020 Integrated Sustainable
Management Report pg. 64).

Net Zero Roadmap

This roadmap includes the main targets and high-level plan to reach net-zero emissions by 2050 (see Strategy section of this report).

6 Differentiated: Elements that help Ecopetrol stand out among other companies with State participation in Colombia and globally.

7 Compliance: Elements circumscribing management merely within the current regulations and requirements in matters of information disclosure.

⁴ Exceptional: Elements through which Ecopetrol seeks to excel and be recognized worldwide for the creation of best practices. 5 Outstanding: Implementing best-in class practices to ensure Ecopetrol's competitiveness.



1.2

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

Senior Management plays a fundamental role in the implementation of the strategy defined by the Board of Directors, integrating climate-related metrics, and defining short term actions. To describe the role of Management in addressing climate-related risks and opportunities, we present the three levels of higher management with specific functions and decision-making faculties on climate change: the Chief Executive Officer (CEO) level, the Executive Committee (ExCo) level, and the Management level.

The CEO level

The CEO is responsible for directing and managing the Company. He executes and oversees the implementation of all operations and activities falling within the corporate purpose, including climate change related matters. Ecopetrol's CEO is responsible for the Company's Balanced Scorecard (BSC) and communicating progress to the Board. In 2020, Ecopetrol included energy transition, decarbonization, GHG reduction, and the gas strategy in its BSC. The BSC is used as a tool to monitor performance of the Company's objectives, indicators and milestones, ultimately affecting Senior Management and employee's variable compensation.

The ExCo level

The ExCo in Ecopetrol is comprised of nine executives from the company's segments and key corporate roles of the company. It is responsible for supporting Ecopetrol's CEO in monitoring and approving where appropriate strategic matters at a company level, including topics related to the climate strategy and decarbonization plan.

During 2020 and the first semester of 2021, the ExCo revised and approved the following issues related to climate change: the energy transition scenarios, the revised decarbonization plan and updated GHG emissions reduction targets, and the TESG strategy. The ExCo also approves the Health, Safety and Environmental strategy for Ecopetrol.

To align the interests of management and the overall strategy of the company, climate change and water related metrics are now included in the variable compensation program of Senior Management. In 2021, 55% of the variable compensation is tied to TESG targets, which include metrics related to climate, water management, renewable energies, and gas strategy.

Management level

The responsibility for coordinating and managing climate-related issues in the corporate strategy is held by Ecopetrol's Executive Operating Vice President (COO), the Vice President (VP) of HSE (Health, Safety and Environmental) and the VP of Corporate Strategy and New Businesses.

- **COO:** Leads the execution of the initiatives related to the decarbonization roadmap as well as the targets for the improvement of fuels quality.
- **HSE VP:** Reviews the newly created Decarbonization and Sustainability Management strategy, including the design of the decarbonization plan and Net Zero Roadmap, development and promotion of the circular economy program, consolidation

of the low carbon project portfolio, implementation of NCS projects, and the design of climate variability and climate change analysis and adaptation plans, among others.

• VP of Corporate Strategy and New Businesses: Designs and implements the energy transition roadmap, provides analysis and defines the energy transition scenarios.

Other VPs that hold a key role are summarized below:

- **Corporate Compliance VP:** Updates and defines the business risk map, where climate change is addressed.
- **Corporate Finance VP (CFO):** Oversees the implementation of the carbon shadow price and its analyses, compiles TCFD and SASB metrics, leads portfolio and capital allocation, evaluates and analyzes the financial impact of climate-related risks and opportunities. In addition, its team oversees Investor Relations
- **Development and Production VP:** Implements adaptation plans and decarbonization projects in production facilities.
- **Commercial and Marketing VP:** Makes the business case for energy efficiency and

renewable energy projects to be included in the portfolio.

- Secretary General and Counsel to the CEO: Leads the Corporate Governance of the company including acting as Corporate Secretary the Board of Directors and Committees of the Board of Directors. It also oversees reporting governance (including the Integrated Sustainable Management Report, DJSI, CDP, among others) and TESG monitoring and analysis.
- **Sustainable Development VP:** Oversees all social issues and investments. Manages relations with local communities and local institutions.

Here we present an organizational structure that illustrates the different VPs and Management's main tasks related to climate **(Figure 3).**

Ecopetrol's governance structure related to climate change



Figure 3. Ecopetrol's organizational structure related to climate change

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Variable compensation and incentive structure responding to climate-related targets

The execution of the strategy and its corresponding multiannual plan are monitored through of the Management's Balanced Scorecard that reflects KPIs that measure progress of implementation. KPI Performance directly affects variable compensation of the Management team.

Since 2019, Ecopetrol established the targets associated with GHG reductions and fuels quality as key performance goals for Ecopetrol Group. Compliance with these and other targets also affects variable compensation of all employees of Ecopetrol Group.



Strategy

Ecopetrol has made significant progress in incorporating climate risk management and decarbonization as part of its operations and business strategy. The 2020+ strategy included energy transition as one of the main enablers to guarantee competitiveness and sustainability in the long term. As part of the development of this strategy, Ecopetrol built energy transition scenarios and established a clear action path to build resilience. The six prioritized fronts were: i) to define a decarbonization, energy efficiency and fuels quality strategy, ii) to secure the competitiveness of the traditional oil & gas business to avoid stranded assets, iii) to formulate an integral gas vision, iv) to capture opportunities in energy markets, v) to review the petrochemical business and vi) to explore diversification options in other businesses. Since 2018 to 2020 Ecopetrol has worked towards the implementations of these lines going through specific analysis and strategic plans.

Since 2020 Ecopetrol has updated the analysis of the Energy transition scenarios. As a result, it defined four lines of action to move forward (as an evolution of the previous six defined in 2018- see Figure 4):

Continue strengthening the competitiveness of the oil and gas business	Building resilience in the oil and gas portfolio and its assets to maximize its value in the different energy transition scenarios.
Diversification of the business portfolio into low-carbon businesses	Exploring new business opportunities in the electricity value chain, specifically in the energy transmission market, as well as other potential future low-carbon businesses such as green hydrogen, carbon capture, utilization and storage (CCUS), natural climate solutions, among others, while meeting Ecopetrol's growth, cash protection, and capital discipline criteria.
Achievement of decarbonization targets	Accelerating and prioritizing energy efficiencies and reductions in carbon emissions. Such targets are aligned with Ecopetrol's objectives of reducing its carbon emissions, as well as reducing the vulnerability of its operation and infrastructure to climate change. To achieve the decarbonization objectives, Ecopetrol launched its Net Zero Roadmap which focuses on four levers: a) permanent update and verification of the GHG inventory, b) review and optimization of high emission intensity portfolio and incorporation of a carbon shadow price as part of the valuation process of future projects; c) gradual incorporation of competitive low carbon technologies (e.g. energy efficiency, reduction of gas flaring and fugitive emissions and vents, renewable energies, biofuels) and emergent technologies (e.g. green hydrogen and CCUS), and d) implementation of NCS to abate residual emissions (for more information on the Net Zero Roadmap see Metrics and Targets section).
Achievement of sustainability through the TESG strategy	The TESG strategy places a strong focus on climate change (including decarbonization targets), water management, and regional development. It also identifies biodiversity, circular economy, health, safety, and environmental (HSE) practices, and diversity and inclusion, among 28 prioritized material issues, leveraging on technology as a key enabler.

Axes of Ecopetrol's energy transition



Figure 4. Ecopetrol's four lines of action for the energy transition

As part of the decarbonization line of action, the Company has been measuring and reducing its GHG emissions to align with the country's emission reduction targets. This action line has successfully embraced the transition towards a low carbon economy⁸ achieving a total accumulated reduction of 8,472,766 tons of CO2e for the 2010-2020 period, of which 1,756,163 tons of CO2e have already been verified by a third party. Despite the 2020 Covid-19 crisis, the company has continued to strengthen its approach to transition to a low carbon economy and to adapt to the challenges faced by the industry. In line with the Colombian Government's commitment to reduce 51% of the national emissions by 2030, on March 25th, 2021, Ecopetrol raised its ambition to contribute to the Sustainable Development Goals (SDGs) and the Paris Agreement. The Company announced its plan to achieve net zero carbon emissions by 2050 (scopes 1 & 2). For more details see the **Net Zero Roadmap.**

Based on these lines of action, Ecopetrol plans to be more resilient in the oil and gas sector, which will continue to be the company's core business, while gradually adapting to the energy transition. By 2030, Ecopetrol envisions to maintain its hydrocarbon business and expects to progressively add alternatives such as green hydrogen, CCUS, NCS, and other diversification opportunities to the portfolio.

The 2021-2023 Organic Business Plan aims to restore the growth path, increase competitiveness, cement the energy transition, and make progress towards implementing the TESG strategy as one of the strategic pillars of the operation. This plan reflects Ecopetrol's effective response to uncertain conditions seeking to guarantee financial sustainability while maintaining the promise of value creation in the medium and long term. This plan also responds to a decarbonization plan with an investment of USD \$600M.

As part of Ecopetrol's financial planning regarding climate-related risks and opportunities, the company has set a shadow price on carbon at USD \$ 20 per ton in 2021, USD \$ 30 per ton from 2025 and USD \$ 40 per ton from 2030 onwards, which will be used to assess current and future projects and investments and to promote additional mitigation efforts. It is important to highlight that this assessment process does not contemplate the use of Natural Climate Solutions to ensure that all efforts are made to abate operational emissions.

2.1

Climate-related risks and opportunities.

Ecopetrol has identified physical and transition climate-related risks and opportunities as well as the potential impacts and benefits in the short, medium and long term horizons as follows:

The short-term horizon is used to set the objectives of the Decarbonization Plan in accordance with the company's Strategic Plan 2021-2023, which is reviewed and updated annually. This horizon evaluates climate variability phenomena, which may put the Company's operation or facilities at risk.

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The medium-term horizon (2024 – 2030) is used to review and adjust emissions reduction and compensation goals, in accordance with the Company's Decarbonization Plan, the 2030 goals and, the Net-Zero Emissions Roadmap. This horizon is also used to review and update the risks for physical variables identified and evaluated in the Climate Variability and Adaptation Plans at the regional level.

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The long-term horizon (> 2030) is used to evaluate potential energy transition scenarios for the purpose of achieving GHG emissions reduction goals and evaluating actions to achieve net zero emissions by 2050. This horizon is aligned with Colombia's Carbon Neutrality Strategy (E2050). Likewise, this horizon helps the company review and update the variables physically related to climate risk, based on the variability and climate change scenarios reported in the national communications and global emissions trajectories⁹.

Physical Risks

Physical risks are related to Ecopetrol's exposure to the impacts of climate change and climate variability in Colombia that might affect water availability and increase exposure of our assets and operations to potential damages. These conditions could result, among others, in water shortages, floods, fires, storms, hurricanes, and rising sea levels that can change in frequency and intensity. Extreme weather events could result in damages to assets, negatively affecting operations, and the financial conditions of the company (Box 1).

Risks

- Water shortages
 Landslides
 - Flooding Fires

Potential impacts

- Operations interruptions
- Damage to pipeline infrastructure
- Shortage of energy supply and increase in energy prices
- Damage to assets and property
- Revenue loss

Ecopetrol's response

- Medium- and long-term regional adaptation plans:
 - Water management
 - Natural capital
 - Climate resilient infrastructure
 - Climate compatible operations
- · Specific response action plans

Box 1. Summary of physical risks, potential impacts, and responses

Transition Risks

Ecopetrol faces transition risks related to its capacity to implement measures to reduce and offset GHG emissions, regulatory risks related to new climate change regulations implemented in Colombia, such as the implementation of an emissions trading system (ETS) expected to take place in 2022, and more stringent sectoral regulations derived from the updated NDC. Additionally, Ecopetrol faces the risk of stranded assets in the Upstream segment, see Box 2.

9 National Communication offers countries the opportunity to contribute with technically sound studies and information that can be used for designing mitigation and adaptation measures, and project proposals that can and will help increase their resilience to the impacts of climate change. Colombia's latest communication can be found here http://www.cambioclimatico.gov.co/3ra-comunicacion-cambio-climatico. Global emissions trajectories are provided by the Intergovernmental Panel on Climate Change (IPCC).

	Risks	Potential impacts	Ecopetrol's response
Policy and legal	 Increased climate change regulation: Increased ambition of the Energy and Mines (E&M) sector due to updated Nationally Determined Contributions (NDC) Implementation of Emission Trading System (ETS) New regulation on reduction of routine flaring and fugitive emissions 	 Increased taxes Stranded assets Increased operating costs 	 Net Zero roadmap Participation in the construction of public policy documents with: Ministry of Environment and Sustainable Development (NDC alignment) Ministry of Mines and Energy (PIGCCme¹⁰)
Technology	 Opportunity cost of implementing new technologies too early when they are not cost efficient Loss of still competitiveness by late implementation of technology Lack of skills and capacities to operate and maintain the new technology 	 Decreased cash flow Loss of profits Loss of market share 	 Net Zero roadmap R&D of emerging technologies Implementation of competitive low carbon technologies Strategic partnerships
Market	 Changes in oil price Decline in global and local oil demand (peak oil demand) Changes in insurance policies Access to capital 	 Loss of profits Stranded assets Higher insurance premiums Higher cost of capital Changes in policy coverage /Uninsured assets 	 Energy transition scenarios Business diversification Update of the Corporate Insurance Program Stranded assets analysis and action plan Strengthening of ESG disclosure (TCFD, SASB, CDP, DJSI, WEF, GRI")
Reputation	 Stakeholder concern or negative feedback Growing activism and stigmatization of the Oil and Gas sector 	 Reduced talent retention and attraction Divestment Reduced revenue from issues with communities 	 Strengthening of ESG disclosure Implementation of Net Zero roadmap International initiatives and commitments (CCAC, WEF, ZRF¹²) Update of materiality matrix Stakeholder engagement
25X 2. Summu	, e. c. and and the star potential impacts, i		

The company is advancing in identifying climate-related risks and opportunities covering the three business segments of its value chain (Upstream, Midstream, and Downstream). For a thorough description of the climate-related risks please see **20 F annual report**- Risk factors section.

¹⁰ PIGCCme – Integral Climate Change Plan for the Mines and Energy sector.

¹¹ TCFD – Task Force on Climate Related Disclosures, SASB – Sustainability Accounting Standards Board, DJSI– Dow Jones Sustainability Index, WEF– World Economic Forum, GRI – Global Reporting Initiative.

¹² CCAC- Climate and Clean Air Coalition, WEF- World Economic Forum, ZRF- Zero Routine Flaring.

Opportunities

Ecopetrol identified multiple opportunities related to energy sourcing, resource efficiency, development of new products and services, accessing new markets, and increasing the company's overall resilience towards the energy transition. The opportunities identified in Box 3 respond to the four lines of action mentioned above.

	Ongoing Opportunities	Benefits
Energy source	 Use of renewable energy, such as solar, wind, and geothermal Gradual incorporation of emerging technologies (hydrogen) 	 Reduced operational costs Reduced exposure to future energy prices Reduced GHG emissions and decreased exposure and sensitivity to the cost of carbon
Lines of actior	e Competitiveness and decarbonization	
Resource efficiency	 Energy efficiency Efficient water management Circular economy model Reduction of flaring, fugitive emissions and vents Natural Climate Solutions (NCS) Competitiveness, decarbonization, and TESG 	 Reduced operating costs Additional revenue streams Reduced exposure to future energy prices Reduced exposure to GHG emissions Reduced exposure to regulatory risks Reduced biodiversity loss risks Optimization of natural resources use
Products, services, and markets	 Diversification in the Oil &Gas value chain (opportunities in the gas value chain, develop new petrochemical products, improve fuel quality, transportation logistics, and develop new circular business models) Electricity diversification (opportunities in the electricity value chain) Low emission business diversification (NCS, hydrogen, and CCUS) 	 Reduced operating and capital costs Reduce GHG emissions Improve risk profile Increased revenues through access to new business lines and markets Access to new financing sources (e.g., green bonds) Positive environmental and health impacts Improve in ESG ratings
Resilience	 Net zero roadmap Energy transition strategy Participation in global and sector specific initiatives (Zero Routine Flaring by 2030, the Oil and Gas Methane Partnership (OGMP), SASB, DJSI, WEF, CDP and GRI) 	 Reduced exposure to climate variability and climate change events Increase competitiveness in the energy transition Access new markets Lead the energy transition in the region Attract capital Reduce reputational risks

Increase portfolio resiliency

Lines of action: Competitiveness, diversification, decarbonization, and TESG

Box 3. Summary of ongoing opportunities and benefits

Below we expand on some of the categories of the opportunities and benefits identified by the company in its energy transition lines of action:

Products, services, and markets

Diversification of the portfolio towards low-emission businesses

As part of the diversification line of action and aligning with the current discussion of the Corporate Strategy, Ecopetrol is analyzing three types of opportunities in order to diversify and strengthen its portfolio: Diversification options within the Oil& Gas value chain, diversification in the electricity value chain and diversification in low emission businesses.



Diversification in the Oil & Gas value chain includes, but is not limited to, gas diversification, logistics and transportation opportunities, and petrochemicals among others. As part of the energy transition, the company has identified opportunities to make resilient its core business by taking advantage of the perspectives for gas as a transition fuel, the need of logistics and transport for other type of fuels and energetics and the growing demand for petrochemicals products. All the segments of the company (upstream, midstream and downstream) are assessing business cases to expand the footprint, and participation of this opportunities in the portfolio.

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Diversification in the electricity value chain includes the expansion of Ecopetrol to the electricity value chain in Colombia and the region including, generation and transmission, given the expected electrification increase in the energy matrix as a result of the energy transition. To this end, in January 2021 Ecopetrol announced its intention to acquire of the Nation's stake in ISA (51.4%) through a non-binding offer. ISA is a leading company in electricity transmission in Latin America. The acquisition would represent an important step for the diversification of Ecopetrol's portfolio, in addition to bringing growth opportunities to the company given the growing electricity demand¹³. In the future, Ecopetrol could analyze other organic and inorganic options depending on the result of the ongoing transaction and the evolution of the markets.

Diversification in low emission businesses, Ecopetrol is building a portfolio for incubating future business opportunities that could be important for value generation as they become competitive. This is the case for diversification opportunities in low carbon businesses where Ecopetrol acknowledge that the energy transition is opening opportunities in businesses related to the decarbonization. Considering that the demand for solutions and services in this line will increase in the next decades, the Company will focus its future analysis on the following opportunities: Hydrogen, and Carbon Capture Utilization and Storage (CCUS), and Natural Climate Solutions (NCS). Here, Ecopetrol could build a profitable segment given its competencies, the geographic position of its operations and markets and the characteristics of its assets. All options seek to ensure alignment with the post-COVID economic reactivation and would strengthen Ecopetrol in the long-term to withstand unexpected and fortuitous events.

13 On January 27, 2021, the Company announced its interest in acquiring 51.4% of the outstanding shares of ISA (Interconexión Eléctrica SA, currently owned by the Ministry of Finance and Public Credit (for more information see this announcement).

Resource efficiency

Energy efficiency

The Company has an energy efficiency program aimed at increasing energy efficiency by 3% in 2022 (using 2017 as the baseline), by 6% from 2023-2028, and over 6% from 2029-2035 by implementing projects in the Company's three business segments: Upstream, Midstream and Downstream. This will lead to a reduction in energy consumption and consequently a decrease in GHG emissions as part of the objectives of the decarbonization program (for more information, please refer to **2020 Integrated Sustainable Management Report**, Chapter 5: Environmental Dimension)

During 2020, the implementation and maintenance of energy efficiency initiatives generated benefits in the amount of around USD \$3.5 million, equivalent to the optimization of 3.1 MW and 684 GBTU and a reduction of 51,518 tCO2e (for more information on the energy efficiency initiatives please see **2020 Integrated Sustainable Management Report** – Energy.)

Resource efficiency

Decarbonization (for more information on the mitigation strategies and actions see Ecopetrol's website).

Reduction of routine flaring: Ecopetrol is part of the Zero Routine Flaring initiative led by the World Bank, which reflects the company's commitment to eliminate routine flaring by 2030. The goal for 2022 is to reduce 77% of gas flaring, which corresponds to a reduction from 45 MPCD to 10 MPCD, using 2017 as the baseline. By the end of 2020, we had already achieved a 52% reduction.

Reduction of fugitive emissions and vents: Ecopetrol joined the Oil & Gas Methane Partnership as part of the UN-led Climate and Clean Air Coalition (CCAC), which is committed to achieve a collective reduction goal of 45% by 2025 and between 60% to 75% reductions by 2030. As a result, Ecopetrol is also committed under the Oil and Gas Methane Partnership (OGMP) framework to measure 100% of operated assets at levels 4/5 by 2024 and 100% of non-operated assets by 2025. In the 2019 and 2020 leak detection campaigns 744 leaks were identified out of which 580 were closed as of December the 31st, 2020, in accordance with the plan.

Energy source

Renewable energy

In 2020, Ecopetrol increased its goal to incorporate 400 MWp by 2030 of non-conventional renewable energy sources to its electricity generation grid for its own consumption, increasing the share of these sources from 5% in 2019 to 21% in 2023. These renewable energy projects will lead to an estimated annual reduction of 318,000 tCO2e / year. In 2020, the construction of the San Fernando Solar Park began with a capacity of 61 MWp, in addition to the 21 MWp of the Castilla Solar Park that started operations in 2019.

Natural Climate Solutions: Ecopetrol prioritized the NCS with greater potential in the country in terms of potential carbon capture and co-benefits for local ecosystems and communities: i) avoided deforestation or REDD+ projects, ii) restoration of natural forest and iii) tree planting on agricultural lands (silvopastoral and agroforestry).

Impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.

2.2

Ecopetrol is working on quantifying the financial requirements and impacts of climate-related risks and opportunities. To date the company has estimated the financial impact and the estimated capital expenditure or costs to implement risk mitigation measures for two prioritized significant physical and transition risks.

- **Physical risk:** One of the most significant signs of climate change in Colombia is the intensification and greater frequency of the phenomenon known as "El Niño" and its opposite phase "La Niña". In the last decade, there have been five phenomena with important effects in different sectors. For Ecopetrol, the "El Niño" phenomenon has a greater impact due to potential water shortages, reducing the availability of water to operate. The estimated financial impact of this risk, if no measures are implemented, ranges from USD \$10M to USD \$150M in a 3-year period. The cost of the actions to mitigate the risk is estimated at USD \$4 M. This cost is related to preventive maintenance activities, tax monitoring, among others, derived from the action plans implemented to mitigate the effects of these phenomena.
- Policy and legal risk: In Colombia's National Emissions Inventory the Energy and Mines (E&M) sector accounts for 14% of total country emissions. The commitment for the E&M sector is to achieve 11.2MtCO2e of emission reductions by 2030, which corresponds to 29% of its projected emissions. Therefore, Ecopetrol identifies as a potential risk that the E&M sector may increase its ambition above its current contribution of 29% to 51% (Colombia's NDC by 2030), which would result in an additional pressure for Ecopetrol to increase its target in the same proportion. This would mean an additional amount of 2.4 MtCO2 by 2030. The estimated financial impact of this risk, if no measures are implemented, is USD \$ 96 M in the short term. The cost of the actions to mitigate the risk is estimated at USD \$12 M.

Regulatory changes related to climate could lead to increases in our costs and investments in the short term. Ecopetrol has already incurred in costs related to these regulations and it is expected that continuing compliance with this evolving regulatory landscape will bring additional costs and investments for the Company in the short term. For instance, since the implementation of the Carbon Tax in 2017, Ecopetrol has paid over USD \$16M (USD \$1M in 2020) in this tax.

Ecopetrol has also prioritized the quantification of the positive financial impacts of some of the opportunities arising from climate change.

For the definition of Ecopetrol's new goals by 2030 and 2050, a cost abatement curve was established, in which different current and emerging technologies are analyzed to establish their cost-effectiveness over time and define their potential emissions reduction contribution to the target. To define the goal by 2030,

Ecopetrol prioritized mature technological alternatives, such as energy efficiency, renewable energies, reduction of flares, fugitive emissions and vents, biomass power generation, among others. These alternatives will be complemented with natural-climate solutions to offset residual emissions and will contribute with around 30% of the total emissions reduction targets. In 2021, Ecopetrol also expects to consolidate the evaluation of opportunities associated with the hydrogen value chain and will seek to materialize partnerships with international initiatives and with governments to identify business opportunities. This will be disclossed in Ecopetrol's mainstream reports.

2.3

Scenario analysis.

Ecopetrol has been conducting energy transition scenarios analysis since 2018 as part of its strategic process. This exercise allows, to define actions to manage the risks and opportunities that the transition to a low carbon economy brings and to adapt the business strategy to ensure long-term value creation.

As mentioned above, for the 2020-2021 analysis, Ecopetrol considered two scenarios and two sensitivities for Energy Transition both for global and local perspectives (see Figure 5):

Reference scenario: Includes technology expectations (proved and the ones with the highest development investment), demand (observable and foreseeable trends), and regulatory patterns (the existent and the required to stimulate technology adoption). This represents the most likely scenario.

Decelerated sensitivity: considers a slower transition due to economy issues which translates into reprioritization of policies and regulations towards more economy driven measures vs emissions.



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Accelerated transition scenario:

highest energy efficiency, a higher adoption rate of electric vehicles (EVs), and penetration of renewable energy due to tighter regulation in terms of emissions and cost reduction, in parallel with greener consumption patterns and new technology developments.

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2°C sensitivity: considers radical changes in consumption, regulation, and technology to achieve decarbonization and global warming goal of 2°C or lower. For Colombia a 1.5°C sensitivity is considered. This sensitivity represents the actions required to meet the Country's NDC, and the Paris Agreement commitments.

Energy Transition Scenarios and Sensitivities

	Post-COVID Reference Scenario	Accelerated Transition Scenario	Delayed Transition Sensitivity	1.5° C sensitivity
Energy market dynamics	 Demand will be driven by GDP (2.5% per year) and population growth. 	 Slower demand growth driven by efficiencies in all sectors. 	 Delay in the adoption of electric vehicles generates a higher demand in fuel for 	 Emissions reduction need is of ~570 CO2Gt from 2018.
	 Peak oil demand will occur in 2043 (498 kb/d), while gas demand will grow until the end of the 2030 decade 	 Peak oil demand will occur in 2034. Gas is not needed as support fuel for renewables, due to 	 Gas demand in the industry sector 	 Fossil fuel consumption needs to be reduced by 70–90% by 2050.
	as a support for renewables.	advances in energy storage.	continues to grow due	 Double renewables installed capacity and
	 Electricity demand continue growing with electric transportation. 	 ~4x more electric vehicles than the reference case (2030). 	efficiency.	100% adoption of electric vehicles by 2050.
Technologic advances	 Renewable energy implementation accelerates as costs (opey and capey) 	 Faster implementation of renewable energies due to significant cost efficiencies. 	nplementation of ble energies due to at cost efficiencies.Lower installed solar and wind capacity by 2050 due to a lower cost efficiency than expected.Mass technease in hydrogen in 2050 due to sts Delayed hydrogen demand by 2050- Mass techn	 Mass adoption of CCUS technologies. Electric transportation.
	decrease.	 25% increase in hydrogen demand in 2050 due to 		 +90% of generated electricity comes from
	 Green hydrogen becomes competitive in 	Iower costs.		renewables.
2035, compared to blue and grey hydrogen.	technologies.	because of low efficiencies.	 Electrification and biofuels for aviation and maritime transportation. 	
Regulatory expectations	 Existing carbon taxes, policies and subsidies continue. 	 Increase recycling rates and reduced plastic used, due to investments and government regulations. Subsidies for hydrogen. 	 There are no incentives or subsidies for decarbonization or for low emissions fuels. 	 The government's commitment to carbon neutrality includes an array of subsidies for low emission technologies
		 Improved efficiencies and low emissions fuels due to subsidies. 		>100USD/ton.

Figure 5. Energy Transition scenarios and Sensitivities for Colombia



These scenarios are constantly under review based on the dynamics of the energy market, technological advances, and regulatory expectations.



In the global context, the reference scenario poses a scene where the electrification of industrial and transport sectors, and the expansion of renewable energies, continue to generate cost efficiencies faster than expected. At the same time, the demand for electric vehicles (EVs) increases, and the costs of batteries decreases. By 2030, renewable energies could represent >50% of the global generation mix, impacting the demand outlook for fossil fuels. Additionally, the recent crisis derived from the COVID-19 pandemic has intensified the changes in global energy demand. As an example, the fall in the global oil and gas demand seen in 2020 will have long term repercussions. Analysts estimate that the peak in oil demand could occur between 8 and 13 years earlier (between 2024 and 2029), and the peak will be lower (101-104 Mbd) compared to our previous perspectives. Additional factors that will impact the demand include the accelerated development of new technologies such as hydrogen, recycling, CCUS, and the appearance of trends in the behavior of investors, consumers, and governments.

In the Colombian context, for the reference scenario the energy transition has also accelerated, although to a lesser extent (between two and three years compared to 2018 projections). The peak in oil demand may have a delay of about a decade compared to the global peak. The country's primary energy demand is expected to recover rapidly after the COVID-19 crisis and grow at rates of 1.3% per year (compared to 0.3% of the global scenario) with a gradual transition to renewable energy and growth in the electrification of industry and transport. Oil demand will continue to grow particularly for the transportation sector until 2040, for gas the demand will grow driven by the industrial sector and as backup for renewables reaching the peak around 2038. GHG emissions will continue to grow significantly above the 1.5°C mainly caused by the industry and transportation sectors. Meeting the 1.5°C target will require drastic technological and consumer behavior changes that are hard to address and will have a higher cost for users and producers (Figure 5).

The four lines of action of the aforementioned energy transition analysis (see section 2. Strategy) are based on the previously described scenarios and sensitivities. The ongoing strategic review is incorporating the scenarios above and the roadmap for the energy transition and will include the analysis of the resilience of the Ecopetrol strategy, considering different scenarios. The impact of these scenarios on the long-term strategy are being analyzed and will be presented with the strategy.

Risk Management

As it has been described in the sections above, Ecopetrol has implemented a series of actions, strategies and roadmaps to strengthen and advance in the integration of climate-related management into its business plan. These guidelines have been designed by the Board of Directors, the Board of Director's Audit and Risk Committee and Senior Management (section 1.1 and 1.2), resulting in a fundamental change in how climate-related risks and opportunities are approached by the company. The evolution was seen mainly in climate topics being merely environmental, to becoming a crosscutting theme included in the business plan and the corporate strategy. Regarding risk management, Ecopetrol has made significant progress in three aspects. First, in including a new risk related to the inadequate management of climate and water, that is complementary to the existing risk regarding an unsuccessful energy transition strategy, in the business risk map. Second, in mapping climate-related risks and opportunities with their respective impacts and benefits (section 2.1). And third, including these risks in the company's Integrated Risk Management System.

Integrated Risk Management System.

The risk and opportunity management process associated with climate change is part of our Integrated Risk Management System (IRMS). Risk management, monitoring and assurance are carried out permanently to keep the risks within the defined tolerance and acceptance levels. This information is reported to the Executive Committee and to the Board of Directors' Audit Committee.

Under the leadership of the Corporate Vice-Presidency of Compliance, in 2020 Ecopetrol strengthened its Integrated Risk Management System based on the international technical standard ISO 31000. This establishes a set of principles, reference frame, and process that allow the organization to manage the effects of the uncertainty on meeting objectives, to maximize opportunities, and to assist in establishing strategies and making informed decisions (20F - Risk Management section).

Three of the most important tools within the risk management approach are:

The risk assessment methodology to define the risk levels based on the impact and probability of occurrence;
 The mitigation plans to reduce the exposure levels; and
 The monitoring of Key Risk Indicators (KRIs) to provide early signals of increased risk exposure.

The Integrated Risk Management System establishes the definition of risk as the effect of uncertainty on the fulfillment the company's objectives, considering the effect as the deviation positive, negative or both, compared to what is expected. Ecopetrol's risks can be classified as:

- Enterprise Risks: These are those risks that are directly associated with the business strategy plan of the Company and are systematically monitored by the Executive Committee. When defining the enterprise risks, the analysis of the internal and external environment is carried out to determine the topics and trends that could have potential or real impact on Ecopetrol's strategy (for a detailed description of the trends analyzed see the **Business and Emerging Risks** website). Emerging risks are selected from those trends, they are confirmed by the Executive Committee (ExCo) and are presented to the Audit and Risks Committee of the Board of Directors, which reviews and recommends their approval to the Board of Directors. Finally, they are included in the enterprise risks as a new risk or as a cause of an already existing enterprise risk. Further information can be found in Ecopetrol's **2020 Integrated Sustainable Management Report** pg. 64.
- Processes Risks: risks related to potential failures in the activities related to the core and support business processes that drive Ecopetrol to achieve its objectives.
- Operational Risks: risks related to the operational level and might occur in Ecopetrol's day-to-day activities and tasks.

3.1

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3.2 Inclusion of climate related risks in the business risk map

Ecopetrol's business risk map includes two relevant risks associated with climate change as follow: unsuccessful energy transition strategy (risk 2), and inadequate management of climate change and water (risk 15). The latter was included in 2020 as a result of revising and updating the existing enterprise risk map. As shown in Table 1, both risks respond to different causes including business, regulatory, stakeholder pressure, and operational. Four out of fifteen risks mapped, including risks 2 and 15, were selected to be managed in the medium term (3-5 years).

Risk	Description and impacts	Risk sources / components	Mitigation actions
2. Unsuccessful	Inability to develop Ecopetrol's	- Fuel quality goals.	Process controls:
Energy transition strategy	energy transition strategy, affected by oil price decrease and the pandemic. In the short- term a decrease in the demand for crude oil and fossil fuels and	 Asset competitiveness and avoiding stranded assets. 	Refining and Petrochemicals, Marketing, Resource and Reserve Management, Ecopetrol Project Development Environment, Exploration, Development Opportunity Management, Integrated Portfolio Management Strategic
	an increase in the consumption of renewable energies in	 Gas vision to increase its 	Planning and Alignment.
	Colombia is foreseen. There	participation in	Treatment actions:
 is a possible restriction on the implementation of projects to reduce emissions and offsets or additional carbon taxes. Impacts: *Breach of the company's GHG emission reduction goals, * Breach of climate change regulations, * Misalignment with the PIGCCme¹⁵ and with other national goals on climate change * Decrease in the rating in corporate responsibility reports *Postponement of strategic transformations of the company, * Financial impact associated with the non-monetization of a resource that is material in the portfolio and penalties in the valuation of the company by third parties. 	implementation of projects to reduce emissions and offsets or	the Ecopetrol's portfolio and production.	*Portfolio updating and strategy to close the gaps,
	additional carbon taxes.	 Taking advantage of markets in the 	*Preparation and implementation of portfolio
	Impacts:		analysis
	energy transition (Crudes in Asia and Refined products in Colombia).	*Monitoring of the implementation of projects and initiatives to reduce emissions,	
		*Implementation of actions to support the fulfillment of the GHG emissions reduction goal,	
	* Misalignment with the	- Petrochemicals position.	*Plan to ensure the quality of fuels,
	PIGCCme ¹⁵ and with other national goals on climate change		*Structuring and approval of the integrated gas strategy,
	* Decrease in the rating in corporate responsibility reports		*Definition and implementation of the operating model for gas issues,
	transformations of the company,		* Evaluation of marketer, Market monitoring,
	* Financial impact associated with the non-monetization of a		*Consolidation and automation of the import price projection model,
	resource that is material in the		*Review of the plastic resin marketing model,
		*Sketch of possible archetypes.	

Table 1. Business risks description and management for risks related to climate change and the energy transition¹⁴

14 For the full description of all the risk included in the business map see the Business and Emerging Risks website. 15 PIGCCme – Integral Climate Change Plan for the Mines and Energy sector

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Risk	Description and impacts	Risk sources / components	Mitigation actions	
15.Inadequate management of climate change and	Company's exposure to negative impacts on its value chain (business continuity, Environment, reputation, regulatory, financial), as well as the implementation of measures to reduce and offset carbon and methane emissions, adapting to variability and climate change, the normal climatological condition of the country that affects water availability and	Decarbonization, renewable energy,	Process controls: HSE Management System, Environment.	
		energy efficiency, nature-based solutions. - Climate change: El Niño and La Niña phenomena of climatic variability and times of extreme	Treatment actions:	
water			 solutions. Climate change: El Niño and La Niña phenomena of climatic variability and times of extreme *Follow up to the implementation of and initiatives to reduce emissions th contribute to the proposed goal for the compliance with the goal of reducin emissions in the medium and long to availability of resources. 	*Follow up to the implementation of projects and initiatives to reduce emissions that contribute to the proposed goal for 2020.
				*Implementation of actions to support compliance with the goal of reducing GHG emissions in the medium and long term and availability of resources.
	security in the regions, and other transition risks associated with climate	- Water	*Development of the integral water management roadmap.	
	Impacts:	 management: water required to operate and effluent management. * Guidelines for managing issues r climate change and water. * Systematic meetings with the leg management to review bills or reg may impact HSE issues and those 	* Guidelines for managing issues related to climate change and water.	
	*Breach of the Company's GHG emission reduction goals,		* Systematic meetings with the legal management to review bills or regulations that may impact HSE issues, and those related to	
	*Misalignment with the PIGCCme and other national goals on climate change matters,		climate change and water.	
		* Provide technical commer regulations that impact HSE water issues and send them engage with the authorities regulation.	* Provide technical comments on the identified regulations that impact HSE, climate change or	
*Decrease qualification in corporate sustainability reports or deviation from standards related to climate change and water (DJSI, CDP, MSCI),	*Decrease qualification in corporate sustainability reports or deviation from standards		water issues and send them to the areas that engage with the authorities that issued the regulation.	
		*Cost-effective technologies for decarbonization and water management.		
	*Detriment to the Company's reputation,		*Investment guidelines for low emission businesses	
*Stakeholder's affectation due to water requirements in		*Definition of a Carbon shadow price methodology		
	*Breach of regulations		*Application of the guidelines to calculate the show price to the exploration portals.	
	associated with climate change and water, *Impact on business continuity, *Impact on infrastructure *Potential financial implications (higher costs, financing restrictions, devaluation of the debt portfolio, shares, and ADR).		*Structuring and updating of portfolios for decarbonization and water management.	
*Impact on business continuity, *Impact on infrastructure *Potential financial implications (higher costs, financing restrictions, devaluation of the debt portfolio, shares, and ADR). * Impact on ecosystems.			* Definition and / or monitoring of the water management plan in the refineries	
			* Execution of Reconversion Plans to Clean Technologies and Dumping Management (PRTLGV in Spanish) in the refineries.	
		* Visibility of the material issue of climate change with emphasis on emissions reductions and water conservation in the perception surveys.		
			* Analysis and identification of initiatives to reduce the operational interruption risk associated with water management.	

In terms of physical risks, risk 15 includes monitoring the probability of occurrence of extreme climatic events from the monthly alerts issued by the Institute of Hydrology, Meteorology and Environmental Studies of Colombia (IDEAM), on the likelihood of having "El Niño" and "La Niña" events, and triggering an action plan at the company level in the event of a probability of occurrence greater than 80% of any climatic phenomenon.

Additionally, Ecopetrol has a Climate Variability and Change Adaptation Plan for each of the regions where it operates in Colombia. Physical risks are identified based on sensitivity and adaptive capacity criteria, considering different natural threats and the incidence of alterations in precipitation and temperature. Progress was made in 2020 by structuring a regional roadmap for the implementation of six regional adaptation plans, including measures associated with water resource management, conservation and preservation of natural capital, climate-resilient infrastructure, and climate-compatible operations (for more information see the company's actions on **vulnerability and adaptation to variability and climate change**).

On the transitional risk side, additional metrics and controls will be included in 2021 related to impacts derived from climate transition risks.

For risk 2 some of the medium-term management actions include increase in better fuel quality products; revising and implement the methodology to define stranded assets; implementing the gas strategy; growing the petrochemicals business, and diversifying the energy value chain to the electricity sector, as mentioned in Section 2.

A more comprehensive list of specific risk management actions can be found in Section 2.1 "opportunities" of this report and in the **2020 Integrated Sustainable Management Report**-Climate action chapter.

Business Risk Alignment with ESG and the TESG Strategy

We want to highlight that to build our TESG strategy, Ecopetrol updated its materiality matrix in 2020. In this exercise the company identified 28 material issues that may have a significant impact (positive or negative) in the company's ability to create value may significantly affect stakeholders. Out of the 28 identified issues, three were classified as exceptional, meaning that these are the elements through which Ecopetrol seeks to excel and be recognized globally. The exceptional issues were climate change, water management and regional development. Ecopetrol will continue to revise and update its materiality periodically and assess if new risks need to be included in the business risk map. Figure 7 shows how the risks are mapped in the social, socio-environmental, environmental, eco-efficient, economic and governance, socio-economic, and technological dimensions of the materiality matrix.

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Business Risks Alignment with TESG Strategy



Figure 7. Business Risk alignment with the TESG strategy (2020 Integrated Management Report)

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Metrics and Targets

Ecopetrol is making significant efforts to quantify, measure, and track the progress of its climate change, water, energy, and waste metrics. Recording these metrics has been fundamental for Ecopetrol to track progress towards its goals and comparing itself to industry peers and sector benchmarks. To strengthen its measuring processes and contribute to the management of risks and opportunities, this year Ecopetrol started to voluntarily report using SASB¹⁶ reporting metrics, to inform stakeholders of the most relevant metrics for its financial performance, in addition to other reporting efforts such as the CDP, the Dow Jones Sustainability Index (DJSI), and the Stakeholder Capitalism Metrics.

4.1 Ecopetrol's climate related targets.

On March 25, 2021, Ecopetrol announced its plan to achieve net-zero carbon emissions by 2050, in line with its commitment to mitigating climate change and to further the energy transition and the TESG agenda. By 2030, Ecopetrol seeks to reduce its CO2e emissions by 25% as compared to the 2019 baseline for scopes 1 and 2. In addition, Ecopetrol will seek to reduce 50% of its total emissions (Scopes 1, 2 and 3) associated with the company's value chain, which includes the use of its products, by 2050, as shown in Figure 8.



Figure 8. Ecopetrol's Emissions reduction path to achieve Net Zero by 2050

Ecopetrol presented its Net Zero Roadmap in 2021, as described in the Strategy Section, which is a high level plan to reach net zero emissions for scopes 1 and 2, making Ecopetrol the first oil and gas company in Latin America to make such a pledge. Additionally, Ecopetrol included for the first-time Scope 3 emissions in the 2050 target of reducing by 50% total emissions. Additionally, the company's first Scope 3 emissions estimate was made in 2020, establishing that these emissions were 118 MtCO2e in 2019.

¹⁶ The results present EG's material issues with a coverage greater than 80% of the SASB metrics, for the Extractives & Minerals Processing sector including the standards for Oil & Gas Exploration & Production, Oil & Gas Midstream applicable to the Transportation and Logistics segment, Oil & Gas Refining & Marketing applicable to the Refining segment, and the Resource Transformation sector including the Chemicals standard.

To achieve our netzero target, Ecopetrol has four levers, as depicted in Figure 9: (1) integration of low carbon technologies and energy efficiency, (2) natural climate solutions, (3) strategic portfolio review, and (4) update of the GHG emissions inventory. This plan includes short, medium- and long-term actions. Ecopetrol has already constructed abatement curves to assess investments needed in these new technologies. Ecopetrol estimates reductions between 5-6Mt CO2e by 2030 with the implementation of competitive solutions at a carbon a price lower than USD \$40/t CO2e, including solar PV and wind power, reduction of fugitive emissions, flaring and venting, switching fuel to biomass syngas, increasing energy efficiency, among others. Regarding NCS, Ecopetrol expects that they will contribute with around 30% of the goal by 2030 and can play an additional role afterward in relation to Ecopetrol's scope 3 emissions.

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Figure 9. Ecopetrol's Net Zero Roadmap

The development of the goals proposed is part of Ecopetrol Group's Corporate Strategy and energy transition roadmap. Progress on these goals is expected to be reported annually in line with the company's earnings results. Figure 10 shows Ecopetrol's targets related to decarbonization and the TESG strategy. The strategy and actions to accomplish these targets have been described in the Strategy Section.

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Figure 10. Ecopetrol's targets related to decarbonization and TESG

4.2

Metrics to assess climate-related risks and opportunities

We present the main metrics and their progress from 2015 to 2020 regarding emissions, water, energy, environment, waste management, and air quality (Table 2).

GHG Emissions*17	2015	2016	2017	2018	2019	2020
CO2e Emissions - Scope 1 (ktCO2e)	7.849	8.110	10.407	10.877	10.871	10.212
CO2e Emissions - Scope 2 (ktCO2e)	332	525	411	462	676	760

Table 2. Ecopetrol's environmental metrics

17 GHG emissions published in the Integrated Sustainable Management Report and SASB were reported during the GHG inventory update process, hence there could be variations on the data based on the date it was collected. During 2020-2021, the inventory update process continued, which includes (among other aspects) the validation and inclusion of new sources, the review and update of emission factors and the update of global warming potentials in accordance with the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC-AR5). For this reason, the historical data (2017-2019) was updated in the current report. In 2021, Ecopetrol's GHG inventory will once again be subject to third-party verification, which will include the period 2017-2020.

GHG Emissions ^{*17}	2015	2016	2017	2018	2019	2020
Reduction of Greenhouse Gas Emissions - Existing Projects (ktCO2e)	725	895	1.124	1.229	1.610	1.810
Reduction of Greenhouse Gas Emissions - New Projects (ktCO2e)	214	171	228	105	381	200
Greenhouse Emissions Intensity - Upstream (Kg CO2 eq / BI Produced)	26	28	26	27	27	28
Greenhouse Emissions Intensity - Downstream (Kg CO2 eq / Bl Loaded)	46	47	46	45	43	43

Air Quality*	2015	2016	2017	2018	2019	2020
NOx Emissions (Ton)	19	21	29	28	29	32
SOx Emissions (Ton)	17	21	27	26	26	23
VOC Emissions (Ton)	97	107	108	109	115	110

Water*	2015	2016	2017	2018	2019	2020
Reused Water / Total Water Required (%)	54,7	55,7	56,0	59,7	62,1	65,0
Water Reuse (m3)	1.061.514	89.286	-	52.483	1.159.113	3.135.473
Fresh Water Capture (hm3)	54	56	56	58	55	51

Energy*	2015	2016	2017	2018	2019	2020
Total Energy Consumption (GWh)	-	5.163	6.627	6.830	7.198	6.979
Self-generation of Energy (GWh)	-	4.158	4.334	4.734	5.183	4.745
Self-generation with Natural Gas (GWh)	-	-	2.838	2.704	2.829	3.543
Self-generation with Crude (GWh)	_	-		1.868	2.170	968
Self-generation with LPG (GWh)	_	-	162	161	179	206
Self-generation with Solar Energy (GWh)	_	-	-	-	6	28
Purchase of Energy (GWh)	-	1.005	2.293	2.096	2.016	2.234
Renewable Energy Capacity (MW)	-	_	43	43	64	21

Environment	2015	2016	2017	2018	2019	2020
Attacks (#) (accumulated Ecopetrol S.A includes pipelines)	168	48	63	105	72	99
Deferred Production (boed) (Accumulated)	6.214	3.219	2.954	291	1.050	156
Environment Incidents (#) (Accumulated. Does not include Physical Security)	1.968	1.382	1.482	1.529	1.280	1.209

17 GHG emissions published in the Integrated Sustainable Management Report and SASB were reported during the GHG inventory update process, hence there could be variations on the data based on the date it was collected. During 2020-2021, the inventory update process continued, which includes (among other aspects) the validation and inclusion of new sources, the review and update of emission factors and the update of global warming potentials in accordance with the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC-AR5). For this reason, the historical data (2017-2019) was updated in the current report. In 2021, Ecopetrol's GHG inventory will once again be subject to third-party verification, which will include the period 2017-2020.

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Waste Management	2015	2016	2017	2018	2019	2020
Amount of Non-Hazardous Waste (Ton)	29.670	49.165	103.627	178.294	211.506	157.700
Amount of Non-Hazardous Waste Used (Ton)	8.811	27.679	28.541	135.118	201.320	31.863
Amount of Hazardous Waste Used (Ton)	168	119	11	135	92	3.884

Fuel Quality (ppm)	2015	2016	2017	2018	2019	2020
Amount of Sulfur in Diesel – Barrancabermeja	22	21	21	10	10	9
Amount of Sulfur in Gasoline – Barrancabermeja	206	203	158	94	95	79
Amount of Sulfur in Diesel – Cartagena	44	32	29	13	6	6
Amount of Sulfur in Gasoline – Cartagena	-	103	104	55	44	40

* Data from Ecopetrol S.A, Refinería de Cartagena, Cenit, and ODC

For more detailed information on the metrics see:

2020 Integrated Sustainable Management Report (Environmental dimension: Comprehensive water management, Climate action, Waste generation and management and Energy)

Metrics report – SUSTAINABILITY ACCOUNTING STANDARDS BOARD (SASB) 2020: for metrics for Ecopetrol and its subsidiaries.

CDP climate report 2021

TCFD table of contents

The following table presents the relationship between the TCFD's specific recommendations and disclosures and the sections of this report. It also references for each disclosure the documents where more detailed information can be found.

Recommendation Disclosure		Ecopetrol's report	Detailed information ¹⁸		
Governance:	a. Describe the board's oversight	1.1 Board's oversight of	- 20F - Governance section		
Disclose the organization's governance around	of climate-related risks and opportunities.	climate-related risks and opportunities.	- ISMR 2020 - p. 40- 64 - CGR - p. 362 - SASB 2020		
climate related risks and opportunities.	 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.	- ISMR 2020 p. 40-64 - CGR – p.362		
Strategy:	a. Describe the climate-related risks	2.1 Climate-related risks	- 20F - Risk factors section.		
Disclose the actual and potential impacts of climate- related risks and	and opportunities the organization has identified over the short, medium, and long term.	and opportunities	 ISMR 2020 - Environmental Dimension, Energy Ecopetrol's website 		
opportunities on the organization's businesses, strategy, and financial planning where such information is	b. Describe the impact of climate related risks and opportunities on the organization's businesses, strategy, and financial planning.	2.2 Impact of climate related risks and opportunities on the organization's businesses, strategy, and financial planning	 20 F – Strategy and Risk factors 		
material.	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	 20F – Managing low carbon economy and climate change risks 		
Risk Management	a. Describe the organization's	3.1 Integrated Risk	- Ecopetrol's website		
Disclose how the organization identifies, assesses and manages	processes for identifying and assessing climate-related risks.	Management System	 ISMR 2020 - p. 64 20F - Risk Management 		
climate-related risks.	 Describe the organization's processes for managing climate- related risks. 	3.2 Inclusion of climate related risks in the business risk map	 Ecopetrol's website ISMR 2020- Climate Action chapter 		
	c. Describe how 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	 Ecopetrol's website ISMR 2020- Climate Action chapter 		
Metrics and Targets :	a. Disclose the metrics used by the	4.1 Metrics to assess	ISMR 2020- Environmental		
Disclose the metrics and targets used to assess and manage relevant climate-	organization to assess climate related risks and opportunities in line with its strategy and risk management process.	climate related risks and opportunities	dimension. SASB 2020		
related risks and opportunities where such information is material.	b. Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks.	4.1 Metrics to assess climate related risks and opportunities	ISMR 2020– Environmental dimension. SASB 2020		
	c. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets.	4.2 Ecopetrol's climate related targets	Ecopetrol's website		

18 20F - form 20-F presented to the Securities and Exchange Commission ISMR- Integrated Sustainable Management Report CGR- Corporate Governance Report SASB- Sustainability Accounting Standards Board Metrics Report

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Legal Disclosure

This document was prepared by Ecopetrol S.A. (the "Company" or "Ecopetrol") with the purpose of providing the market and interested parties certain financial and other information of the Company.

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