Water Management at Ecopetrol Water Discharge Compliance in the Middle Magdalena Region

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ECOPETROL

Introduction

Water is an essential resource for the realization and continuity of Ecopetrol's operations, enshrined in the Generating Value through TESG pillar of the Company's 2040 Strategy, "Energy that Transforms".

Likewise, Ecopetrol recognizes it as an essential resource and a fundamental right that guarantees the well-being, health, and development of all forms of life on the planet. For this reason, water is a material issue in Ecopetrol's sustainability agenda, with management emphasizing maintaining a balance between the water our operations require and the actions we take to conserve it, underscoring sustainability and water security in the territories where we operate.

To accomplish this objective, Ecopetrol has established guidelines within the strategic pillar titled "Water Neutrality" of our Environmental Strategy, which guides efforts towards maximizing the efficient use of water, the progressive reduction of impacts on water bodies stemming from catchments and discharges, contributing to water security in basins through conservation and restoration actions, and improving the conditions of equity regarding access to drinking water and sanitation in the territories where the Company operates.

To this effect, Ecopetrol specified in the 2040 Strategy its ambition to be a water-neutral Company by 2045 - understood as the balance between the water required by the Company for its operations, its actions to reduce the direct water footprint, and its actions to improve the water security of the basins. Accordingly, Ecopetrol has committed to reducing, by 2045, the fresh water extracted for industrial use by 66% (versus 2019), achieving zero discharges, and replenishing 34% of the residual water consumption. This will be achieved by supporting water and sanitation projects for communities, reusing production water for agricultural irrigation, constructing municipal wastewater treatment plants (WWTPs), and conserving and restoring ecosystems, among others.

Objective

This document outlines Ecopetrol's actions in the Middle Magdalena region, particularly its water discharge management, the progress it has made in this area, and its key results and achievements over the past five years.

Scope

This report focuses on the Middle Magdalena region, where a large share of the water neutrality roadmap's efforts are concentrated. Below is a summary of the roadmap's advancements, emphasizing the management of water discharges in this region and highlighting Ecopetrol's commitment to protecting and caring for water resources in this territory, which is so important to the Company and to Colombia.

Governance

- Senior Management

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

- Corporate Governance and Sustainability Committee: assists the Board of Directors in matters related to good corporate governance and the sustainability agenda.
- Territorial Transformation and HSE Committee: monitors and manages risks associated with occupational health and industrial and process safety for workers and contractors. In addition, it monitors environmental performance and contributions to territorial development.
- Audit and Risk Committee: responsible for supervising the handling and effectiveness of the Internal Control System, ensuring timely risk management and the effectiveness of the controls implemented, among other duties.

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

In this way, the Board members can focus on key topics, such as business risks and the Company's impacts on the economy, the environment, and people, among others.

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

Senior Management

The Strategic Committee is the highest-level body, led by the Company's president, and serves as a forum for articulating the Ecopetrol Group's strategy. Its main value lies in ensuring alignment between strategic pillars and long-term corporate decisions. In this space, fundamental strategic issues are reviewed, monitored, and approved, including decarbonization objectives, investments in clean technologies, and environmental management across the Ecopetrol Group.

In turn, the Business Line Committees — Hydrocarbons, Transition Energies, and Transmission and Roads — perform supervisory and strategic alignment functions within their respective operational areas. These committees monitor progress on the specific environmental objectives of each line, promote the exchange of good practices and ensure coherence between operations and the corporate environmental strategy. Their role is essential for the effective implementation of the environmental strategy in daily operations.

- Senior Management Compensation

Total compensation at Ecopetrol includes fixed salary, short- and long-term variable compensation, and benefits. Short-term incentives are linked to Balanced Scorecard results and aligned with the 2040 Strategy. In 2024, 20% were climate-related metrics, including reduction of GHG emissions (5%), energy efficiency (5%), renewable energy (5%), and contribution to sustainability (5%), which captures the return of TESG initiatives on climate change, water, sustainable territories, and innovation. Individual performance agreements for vice presidents and equivalent roles may include climate KPIs aligned with their responsibilities. 100% of C-suite positions have climate-related incentives. The Long-Term Incentive Plans (2022-2024, 2023-2025, 2024-2026) include low-emission business decarbonization and diversification targets, with an average weighting of 23% for climate-related targets.

- Material Elements and Roadmaps

In 2020, Ecopetrol updated its materiality analysis, which serves as the basis for its TESG strategy. This exercise identified 28 elements that significantly impact the Company's ability to generate value in the

short-, medium-, and long-term, and/or that significantly influenced its stakeholders' decisions.

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

In 2021, the Company defined roadmaps for the material issues of Integrated Water Management, Climate Change, and Biodiversity, establishing goals, management indicators, and short-, medium-, and long-term milestones. The Water Neutrality Roadmap, whose commitments remain in force at the time of publication of this document, includes:

- Achieve Water Neutrality by 2045

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

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

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

In 2022, the Board of Directors, through its HSE Committee, was updated on the structuring, goals, and strategic options of the Integrated Water Management roadmap. In 2023, it received a report on the management and progress of this initiative.

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

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

During 2023, Ecopetrol carried out two (2) pilots to implement new methodologies proposed by the Taskforce on Nature-related Financial Disclosures (TNFD) to manage risks and opportunities associated with nature. It also evaluated changes in surface water availability in the short-, medium-, and long-term (2025-2050) across its areas of influence, considering different climate change scenarios, land-use changes, hydroelectric expansion, and population growth.

In 2024, the HSE Committee of the Board of Directors was again briefed on progress toward the Company's commitment to water neutrality.

Continuing the TNFD pilots, in the first half of 2025, Ecopetrol identified and evaluated the impacts and dependencies associated with nature across ten hydrocarbon assets and two refineries, using the LEAP methodology. As a result, the Company preliminarily identified seven (7) dependencies and five (5) impacts derived from its operation. These results are expected to be disclosed to the market and stakeholders by the end of 2025 and included in the Integrated Risk Management System across the

different risk layers.

- Risk Management

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

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

The Company has included in this map the risk of "inadequate response to challenges related to climate change, water, and biodiversity in the face of market and stakeholder expectations", which emphasizes management, monitoring, and mitigation mechanisms, including updating the assessment of risks associated with water in Pareto assets to identify dependencies and opportunities. To anticipate and plan actions to reduce exposure or dependence, this region's assets most at risk of conditions that may affect the continued performance of water catchments and/or discharges were identified. These conditions may eventually affect operational continuity and have a financial impact on the business.

Regarding tactical risk, Ecopetrol's Internal Control System includes self-control as a fundamental pillar, promoting transparent and effective performance that facilitates the achievement of organizational objectives.

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In the self-control and supervision sphere, certifications and self-evaluations are conducted periodically, along with assessments on the effectiveness of the controls.

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

At the operational level, Ecopetrol identifies potential physical (water quantity and quality), regulatory, and reputational risks, using its own indicators or global methodologies, such as the World Resources Institute's (WRI) Aqueduct Water Global Risk Atlas. These reflect the external conditions of the territories where Ecopetrol operates, including reputational risk management and the review of water-related complaints and claims, among others. The Company also assesses changes in surface water availability in the short-, medium-, and long-term (2025-2050) within its area of influence, considering different

climate change scenarios[1], land-use changes, hydroelectric power expansion, and population growth.

To address these risks, Ecopetrol has established partnerships with national institutes to promote knowledge and strengthen decision-making on land use and water resources within its areas of influence, such as the Middle Magdalena Valley. It has also sponsored the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM, for its Spanish acronym) to implement and operate a meteorological radar in Barrancabermeja, enabling the identification of natural hydrometeorological phenomena and improving risk management across its operations.

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- Policies and Procedures

Ecopetrol S.A. has implemented an HSE Management System to provide the necessary elements for the Company to manage risks to protect life and promote environmental care adequately. The mandatory basic requirements of the HSE Management System are based on the international standards ISO 14001:2015 and ISO 45001:2018 and are certified to ensure compliance with national legislation.

Ecopetrol S.A.'s Environmental Strategy is implemented within the framework of said system, seeking to establish guidelines for environmental protection, and is integrated and coordinated with Ecopetrol S.A.'s TESG and Corporate Responsibility Strategies. It also aims to advance corporate goals within the energy transition framework.

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

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

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

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

[1] Por example, GISS-E2-R, MPI-ESM-MR, MRI-CGCM3, and the Third National Communication on Climate Change. (*Tercera Comunicación Nacional de Cambio Climático*)

The following strategic options underpin the water-neutral roadmap:

✓ **Risks associated with water**

Water neutrality reduces water dependence, protecting current and future operational continuity amid physical, regulatory, and reputational constraints that may limit the use and exploitation of water resources. Within the framework of the Business Risk "Inadequate response to challenges associated with climate change, water and biodiversity", the analysis of risks associated with water, treatment actions, and KPIs is carried out in territories with the highest water risk.

✓ **Water management efficiency**

Seeks to reduce, to the greatest extent possible, the use of fresh water for industrial purposes and the volume and load of discharges. Reducing the catchment in the Pareto assets (Barrancabermeja and Cartagena refineries) will be achieved in the medium term by maximizing the reuse of captured water and, in the long term, by using alternative sources such as municipal wastewater and seawater. The reduction of discharges into Pareto assets is sought by recirculating industrial wastewater at the Barrancabermeja Refinery, and eliminating the Castilla discharge by scaling up water reuse in other productive sectors through industrial symbiosis, leveraging innovation and technology to enable cost-effective alternatives to water polishing.

✓ **Improving water security in the territories**

Takes into account actions that produce volume or water-quality benefits in the hydrographic subzones where catchments and/or discharges occur. The methodology for quantifying the contribution to water volume of mandatory and strategic investments that improve water security is defined in the Colombian Technical Standard NTC 676 of 2025 for projects including access to safe water or basic sanitation, and conservation and/or restoration efforts in ecosystems (includes nature-based solutions (NBS) and ecoreserves), among others.

✓ **Cross-cutting enablers**

Key elements to leverage water neutrality goals include internal management actions, such as quantifying and verifying the water footprint and managing the supply chain; relations with interest groups and local authorities; outreach to stakeholders; and general coordination with the Science, Technology, and Innovation and Financial Sustainability roadmaps.

Wastewater discharges

Discharge of wastewater is one of the alternatives under Colombian regulations for wastewater management and requires an explicit permit from the competent environmental authority. To obtain such a permit, studies are conducted during the planning stage of projects and operations to define the quantity, quality, and temporal conditions, and to ensure that discharges do not significantly impact the quality of receiving water bodies. Likewise, environmental management measures are proposed to prevent, mitigate, correct, or offset the remaining impacts, and provide a Risk Management Plan including actions to be taken in the event of contingencies or unforeseen events that may affect the normal operating conditions of the discharge system. The discharge permit application is assessed by the competent environmental authority, which may grant or deny it.

Once the authorizations are granted, legal compliance with these conditions and management measures is monitored. In all cases, before its disposal in surface water bodies, marine waters, or on the ground, the wastewater is treated to reduce concentrations of substances of environmental interest and to comply with the maximum permissible limits established in Colombian regulations. Periodic

monitoring of water quality at the project's water sources within its area of influence is also carried out.

Discharges from production in the Middle Magdalena

Production water is a natural component of hydrocarbon extraction because crude oil, gas, and water mix in oil fields. This mixture is brought to the surface, where products (crude oil and gas) are separated from the water. The resulting by-product, known as "production water," undergoes multiple treatment stages to remove traces of residual contaminants and meet the quality criteria required for reuse, disposal, and/or discharge.

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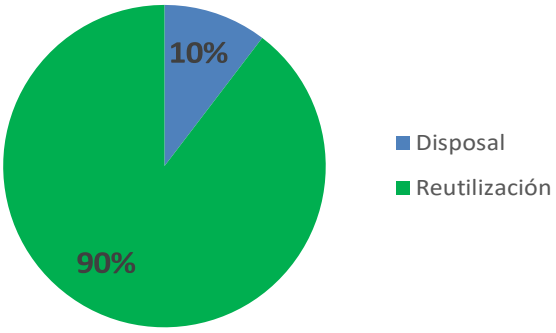
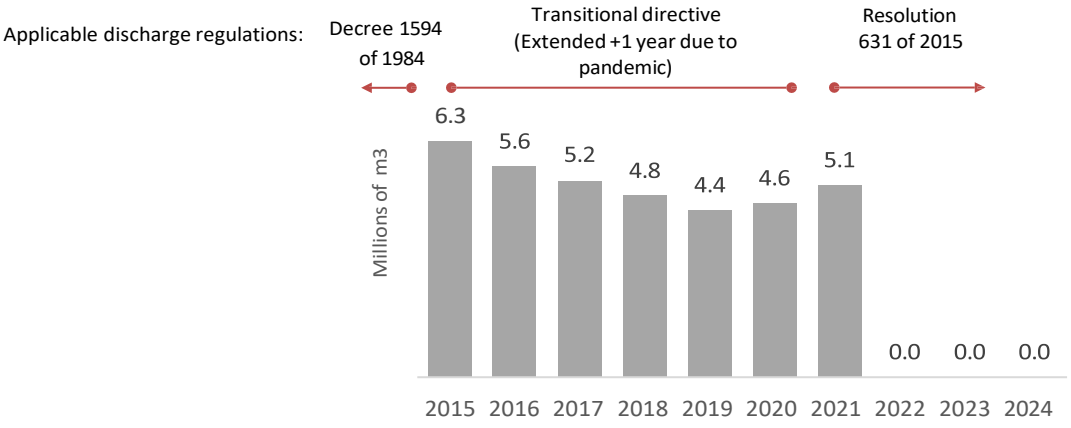
Currently, 90% of the total production water is reused, particularly in secondary crude oil recovery (recovery) processes, and the remaining 10% is reinjected into final disposal wells.

Figure 1. Production water management in the Middle Magdalena region (2024)



It is important to mention that **since the end of 2021, no production water has been discharged into the water bodies of the Middle Magdalena**. In 2016, Ecopetrol submitted Plans for the Conversion to Clean Technologies in Discharge Management (PRTLGV for its Spanish acronym) to the environmental authority to improve efficiency in the use of production water, aiming to definitively eliminate industrial discharges from its Casabe, Llanito, Provincia and Tisquirama assets, and which, in turn, would result in a significant reduction in the collection of fresh water.

Figure 2. History of discharges of production water in the Middle Magdalena



Up to 2021, there were six (6) production water discharge points in the Casabe, Casabe Sur, and Llanito

fields, into the Magdalena River; Santos, Suerte, and Tisquirama to NN pipes, authorized by the competent environmental authorities, who established flow and quality conditions, concluding said discharge did not affect the natural characteristics of the receiving bodies. Before discharge, the wastewater was treated to reduce concentrations of substances of environmental concern and to comply with the maximum permissible limits set by Colombian regulations.

In 2015, the Ministry of Environment and Sustainable Development issued a new standard for discharges into surface water bodies (Resolution 631 of 2015, effective January 1, 2016), replacing the quality criteria established in Decree 1594 of 1984. Likewise, Colombian regulations established a transitional directive to ensure compliance with the new regulations. In 2016, the Company submitted five (5) PRTLGVs for its six (6) discharges of production water, all of them approved by the competent authorities, and which granted a transition regime of five (5) years in accordance with the applicable environmental regulations (Decree 1076 of 2015; Article 2.2.3.3.11.1). According to the legal framework (Decree 1076 of 2015), during the transition period, the user is not obliged to comply with the parameters of the new discharge regulations, as they are executing the interventions included in the reconversion plan, are necessary to fulfill compliance at the end of this period.

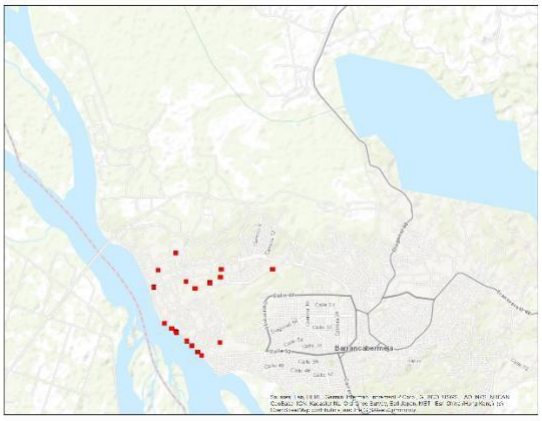
As a result of implementing the PRTLGVs, the six (6) aforementioned discharge points were eliminated, preventing the discharge of +5 million m3 of water annually.

Production water injection plants in the Casabe and Llanito fields, which allowed eliminating discharges from these assets

Discharges from the Barrancabermeja Refinery

The Barrancabermeja Refinery currently has a permit for discharges in 26 industrial and domestic wastewater points, granted by Resolution DGL 000344-2023 of the Autonomous Corporation of Regional Santander (CAS). Only the discharge termed “WWTP effluent” discharges industrial wastewater associated with the refining processes occurring at this asset to the Magdalena River. Two (2) points are associated with the water purification process (U2900 and U850), and the others are associated exclusively with domestic uses and rainwater. Figure 3 shows the location of the authorized discharge points of the Barrancabermeja Refinery.

Figure 3. Location of the authorized discharge points of the Barrancabermeja Refinery



Like the production segment, the Barrancabermeja Refinery presented a Plan for the Conversion to Clean Technologies in Discharge Management (PRTLGV for its Spanish acronym) to comply with the new requirements established in Resolution 631 of 2015 (new discharge standard) before the CAS. Through DGL Resolution 000448 of July 11, 2018, the CAS approved the PRTLGV and granted a transition directive for five (5) years to carry out the changes in the wastewater treatment system (WWTP) that would permit achieving the new quality standards, while guaranteeing a reduction in the pollutant load and an increase in water recirculation.

The launch of the WWTP, updated to the new regulatory requirements, was possible through the execution of a project to assemble a new industrial wastewater treatment system with a capacity of 4,700 gallons per minute, which separates fats, oils, and suspended solids and biodegrades chemical compounds such as phenol and COD using a set of sequential operation subsystems that ensure compliance with the environmental regulatory parameters established in Resolution 631 of 2015. The new treatment technology included thermal conditioning; separation of fats and oils by flotation with dissolved nitrogen; biological treatment of activated sludge to remove chemical compounds; and treatment and removal of biological sludge. Additionally, it includes piece-pack units for nitrogen self-generation, industrial air, instrument air, a cooling water tower, and systems for the treatment of oily and biological sludge.

The milestone achieved in the WWTP's discharge quality into the Magdalena River enables the Barrancabermeja Refinery to leverage projects such as recirculating industrial water for various processes and to advance toward the goal of water neutrality.

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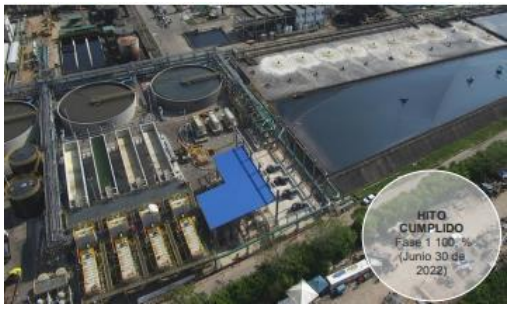
The total cost of the upgrade project for the Industrial Wastewater Treatment Plant at the Barrancabermeja Refinery amounts to USD 143 million. It is part of Ecopetrol's investment portfolio, which is aimed at protecting Colombia's natural resources.

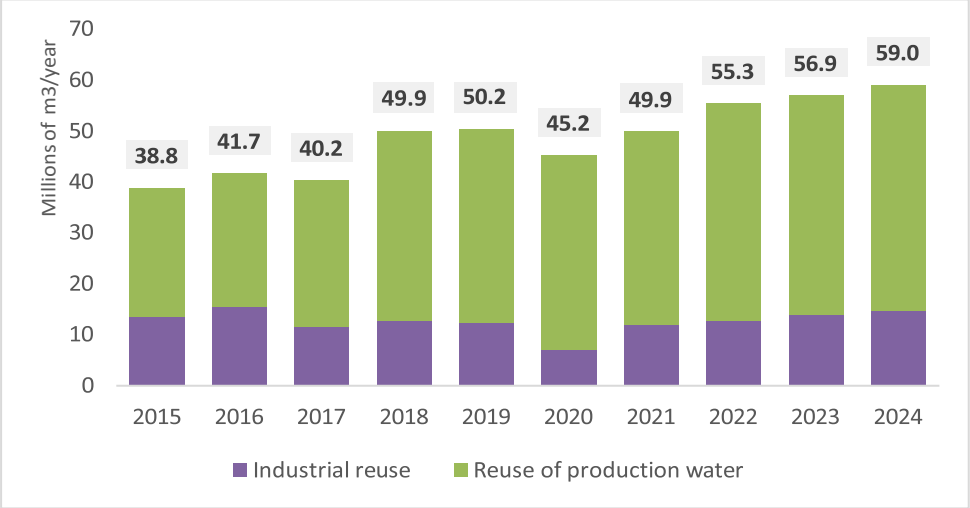


Photographs of the discharge area of the WWTP at the Barrancabermeja Refinery

Reduction in freshwater capture

The completion of the Plans for the Conversion to Clean Technologies in Discharge Management in the Middle Magdalena region enabled the Company to maximize wastewater reuse. Currently, 59 million m^3 of wastewater are reused annually (15 million m^3 from the Barrancabermeja Refinery and 44 million m^3 from oil fields), representing 67% of the total water required to operate the assets in this area.

Figure 4. Increase in water reuse in the Middle Magdalena region



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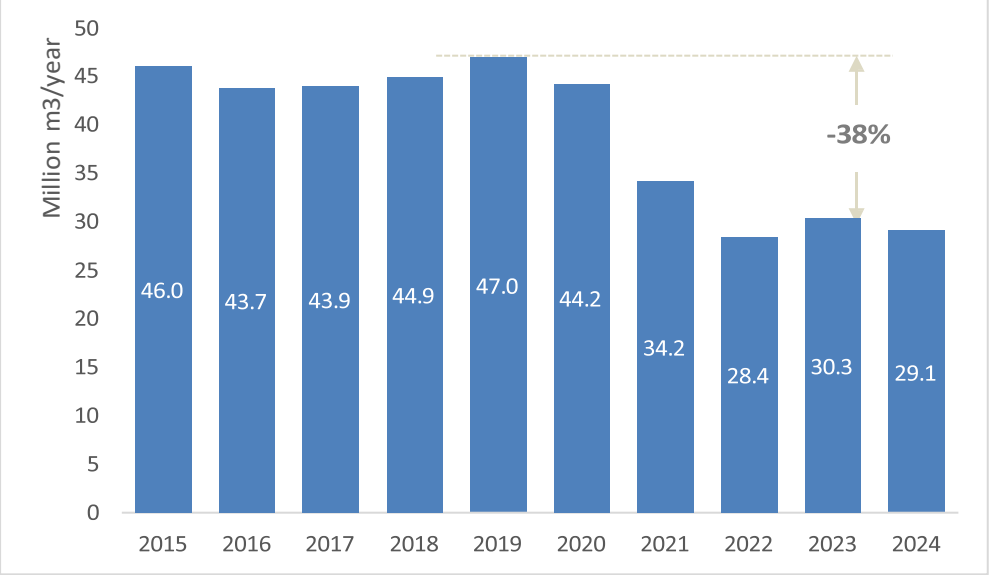
The increase in water reuse has led to an absolute reduction in the volume of fresh water captured from surface and groundwater sources. Compared with 2019, total water captured in the Middle Magdalena has decreased by 38%.

Figure 5. Freshwater capture in the Middle Magdalena region



Integrated Water Management

Annually, Ecopetrol establishes goals to meet the water-neutrality objectives for the next three (3) years.

This process involves multiple areas of the Company, including HSE, Finance, Operations, and Technology, and considers key factors such as the business plan, financial capacity, the water neutrality roadmap, legal constraints, and water-related risks.

For 2025, Ecopetrol established the following goals for its operated assets:

- Capture limit: **704.93 KBWPD** (-14% vs. 2019)
- Production water reuse: **31.2%**
- Reuse of fresh water collected: **44.1%**
- Reuse of treated production water in agroforestry cultivation: **69.49 KBWPD**
- Total Petroleum Hydrocarbons (TPH)content in discharges to freshwater bodies: **3.3 mg/L**

Long-term, Ecopetrol has committed to being water neutral by 2045, which includes:

- Reducing the capture of fresh water for industrial use by **66%,** compared to 2019.
- Eliminating industrial discharges into freshwater bodies.
- Replenishing the remaining **34%** through volumetric benefits in water security in the territories.

Conclusions

- Ecopetrol's commitment to the care of water resources in the Middle Magdalena region is real. As proof thereof, this document compiled some of the advances in the water-neutral roadmap for discharge management, which have enabled the Company to:

    - Eliminate six (6) discharge points of treated production water from the Casabe (2), Llanito (1), Provincia (2), and Tisquirama (1) fields, preventing since the end of 2021, the discharge of over 5 million m^3 of water per year to the Magdalena River and other bodies in the area.
    - Modernizing the Wastewater Treatment Plant (WWTP) at the Barrancabermeja Refinery, a benchmark of its kind in Latin America, enabled ensuring compliance with the new standard for industrial discharges to surface bodies and leveraging projects such as the recirculation of industrial water for different processes.
    - Increasing the reuse of wastewater as the main source of supply for industrial processes in fields and the refinery. Currently, 59 million m^3 are reused annually, representing 67% of the water required to operate in the area.
    - Decreasing freshwater capture. Over the last 5 years, the volume of fresh water extracted from surface and underground sources has decreased by 34%.

- Ecopetrol observes and complies with environmental regulations on discharges. In 2015, the Ministry of Environment and Sustainable Development issued a new standard for discharges into surface water bodies, and allowed a transition period to ensure compliance; the competent environmental authorities approved the five (5) Plans for the Conversion to Clean Technologies in Discharge Management (PRTLGV) in the Middle Magdalena presented by Ecopetrol, which were completed in a timely manner during said period.
- Currently, only industrial wastewater associated with refining processes is discharged at one (1) point into the Magdalena River, in compliance with the requirements established in the discharge permit and the maximum permissible criteria established in Resolution 631 of 2015. Consequently,the Barrancabermeja Refinery does not discharge industrial wastewater into the surrounding creeks and wetlands.