

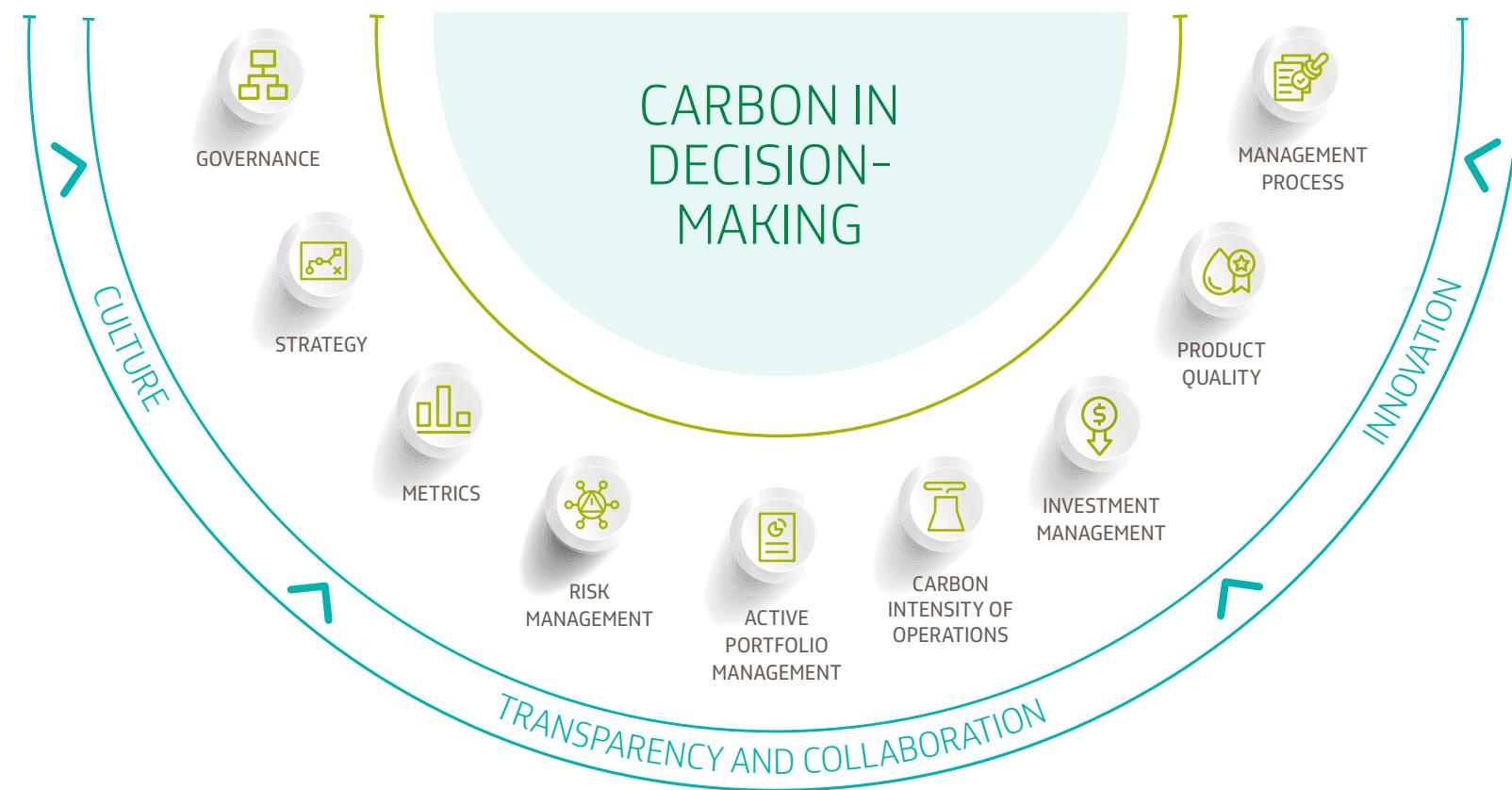
# CLIMATE CHANGE SUPPLEMENT

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# OUR FOCUS AND PRIORITIES

Version control: This Climate Change Supplement is an update of the current version, published in 2019 and related to the planning elaborated in 2018. This update aligns the brochure with the review of Petrobras' Strategy as described in the 2020-2024 Strategic Plan (PE 2020-24).



Our view related to climate change is based on three pillars: transparency, resilience of our position in oil and gas to the energy transition in oil and gas and strengthening of our skills in line with the low-carbon economy.

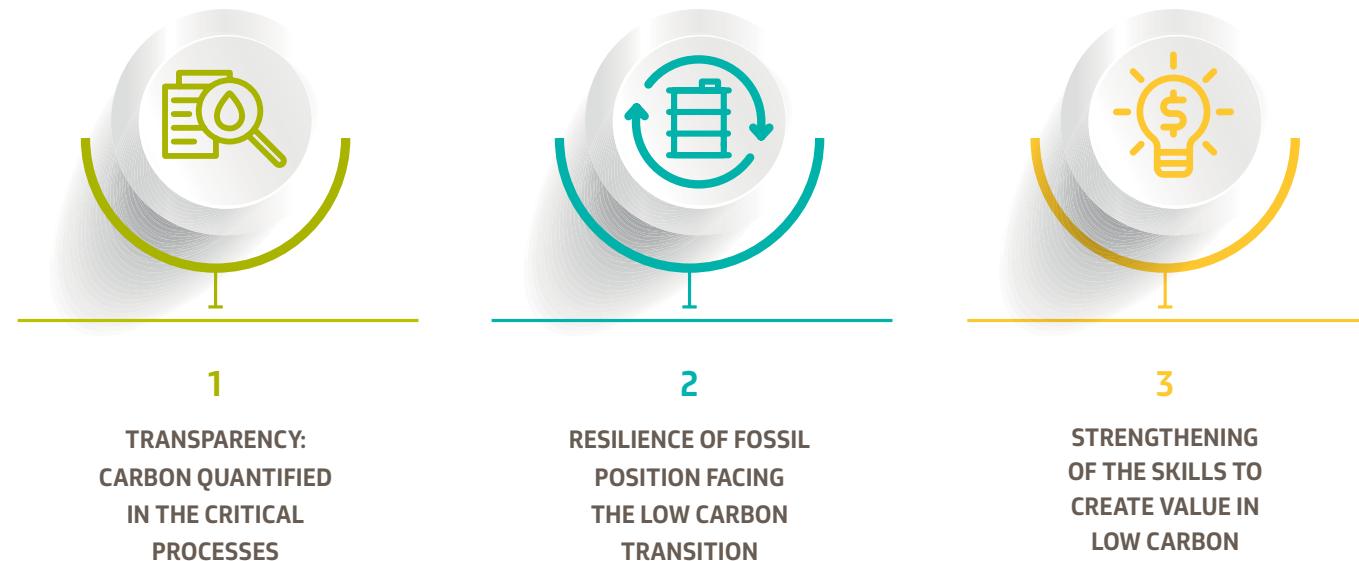
Prospective evaluations indicate the persistence and importance of oil and gas in the global power grid, even though their relative participations may be reduced in a scenario of accelerated energy transition.

This importance is underlined by the forecasts of growth of the global demand for energy, and the limited possibilities of expansion of the energy offer based on economically feasible and sustainable solutions that use the available technologies.

Our priority is to operate at low costs and with low carbon emissions, delivering accessible energy according to our commitments with the reduction of carbon emissions. Thus, we contribute both with the economic growth and the transition to a low carbon economy.

Conciliating the demand of society for our products with the concerns related to climate change in our planning and our decision-making processes is an ethical requirement, included in our strategy, and in our safety, environment and health and social responsibility policies. It is also a business need, in line with the expectations of our stakeholders.

Our actions are supported by the following three pillars:





## 1) TRANSPARENCY: CARBON QUANTIFIED IN THE CRITICAL PROCESSES

The environment of energy transition is uncertain, surrounded by doubts related to the effects of the COVID-19 pandemic to the sector. Our decisions today affect the carbon performance and the value generation in the short, medium, and long term.

Our priority is to warrant that carbon risks and opportunities are properly captured in scenarios, quantified, and considered in our choices, assuring the sustainability and resilience of our business, which requires attention to the continuous improvement of decision-making processes.

We adopted transparency in carbon and highlighted our recent public support to the TCFD – Task Force for Climate Related Financial Disclosures.



## 2) RESILIENCE OF FOSSIL POSITION IN FOSSILS IN VIEW OF LOW CARBON TRANSITION

The Oil & Gas sector (O&G) currently provides more than half (54%) of the primary energy in the world, focused on meeting the needs of mobility, industrial production, and electric power. Such demand is achieved by products with substantial variation of performance in carbon. Our scenarios indicate the persistence of oil in the global grid, although in lower volumes. Our priority is to operate at low costs and with superior performance in carbon, protecting the competitiveness of our oils in the global markets in a scenario of downturn and subsequent retraction of the demand.

In our understanding, companies will be as competitive to the long term market as they are capable of producing at low cost and with lower greenhouse gases (GHG) emissions, with prosperity in scenarios of low price of oil, carbon pricing and possible oil differentiation practices based on their carbon intensity in production. As a resilience measure, in May 2020 we disclosed new oil price premises (Brent) for the appraisal of our business opportunities, considering an oil price interval ranging in the average of USD 25/bbl in 2020 and achieving USD 50/bbl in the long term.



## 3) STRENGTHENING OF THE SKILLS TO CREATE VALUE IN LOW CARBON

The objectives of the Paris Agreement require a deep reduction of the GHG emissions and the transformation of energy supply. Our scenarios indicate an unequivocal energy transition, at uncertain pace. The risks and opportunities are different and depend on the markets, characteristics of each company, evolution of the innovation, and public policies.

We are currently focused on the investment in decarbonization of our operation, innovation, and in the acquisition of skills that may allow future diversification in renewable. While we are working to protect a solid financial situation in the medium and long term, we also work our competitiveness to capture the potential opportunities in renewable in a long-term perspective.

## WARNINGS

This document contains possible scenarios that only reflect our managers' expectations. The terms "anticipates", "believes", "expects", "projects", "intends", "plans", "forecasts", "aims", "shall", as well as other similar terms, aim at identifying such expectations, which, evidently, involve risks or uncertainties whether or not forecasted by the Company.

Therefore, the future results of our operations may be different of the current expectations, and the reader shall not be based exclusively on the information contained herein. The Company is not responsible for the update of such forecasts in view of new information or future developments.

The goals, ambitions, and perspectives presented throughout this supplement may be reevaluated due to external and/or internal factors.

# 1. THE CHALLENGE OF CLIMATE CHANGE AND ENERGY SUPPLY

The World Economic Forum warns that climate change implies relevant long term risks: "climate change action failure" is today the risk of highest impact on economic systems, and the forum emphasizes the need for action by public policy makers and companies to avoid risks of substantial future losses (WEF, 2020).





## MAIN RISKS TO ECONOMIC DEVELOPMENT BY THE WORLD ECONOMIC FORUM



There is a globally need to tackle climate change, with attention to measures to mitigate GHG emissions and adaptation to its impacts, as consolidated by the science reported by the Intergovernmental Panel on Climate Change – IPCC.

We are aware of the intrinsic relationship between energy and GHG emissions, with different proportions in different nations. The activities of production and use of energy represent more than 70% of global GHG emissions, while in Brazil, due to the penetration of renewable in the grid, represent approximately 30% of GHG emissions, with specific challenges in the low carbon transition (SIRENE/MCTIC, 2020 e CAIT/WRI, 2019).

At the same time, life as we know today is linked to energy systems. Today, 10% of global population (more than 700 million people) still live unacceptably in extreme poverty (IEA, 2017 and World Bank, 2020) and, therefore, without access to electric power. Basically, all the Sustainable Development Goals of the UN require energy to be met.

Conciliate the expansion of the access to energy, energy security, and GHG emissions reduction in the necessary deadlines and at acceptable costs is far from being achieved by a government administration or a sector individually. Each company must develop its route towards the transition to a low-carbon future, based on its social and economic needs, emissions profile, and mitigation options.

We reinforce our commitment towards contributing with the Paris Agreement, focused on operational excellence and innovation in energy.



## 2. STRATEGY

As a company of the energy sector, we recognize the unprecedented transformations in relation to meeting the energy needs of society. In this first half of the 21st century, the need of decarbonization of the energy systems begins to be materialized.

However, the high level of uncertainty about the timing and the form of the energy transition in each country requires an approach that considers different future scenarios, as determined by the TCFD. Developing scenarios is an instrument that qualifies the strategic analysis and the consequent positioning decisions in the long term.

We elaborated specific scenarios over a decade ago, which guide our view of the future and serve as a support to our strategic planning, both for the quantification of the assumptions and for the evaluation of risks. The energy transition in these scenarios is different in terms of pace and extension:

- > **Growth Scenario:** gradual energy transition;
- > **Base Scenario:** moderate energy transition;
- > **Resilience Scenario:** accelerated energy transition.

In these scenarios, consolidated trends and critical uncertainties are combined to shape the routes of the transition. The economic growth models, the environmental and climate policies, innovation, and changes of behavior play a crucial role in the transition and change substantially the forecasts of our sector (oil demand and price).

The intrinsic competitiveness of fossil liquid fuels is anchored to the high-power density, to the possibility of transport and storage, as well as the existence of infrastructure already developed, factors with more or less relevance in different power services. The determinant aspect in the resilience of each product in the transition to low carbon is the feasible scale of substitutes, so that innovation is a particularly relevant factor in the transition.

Even in the scenario of accelerated transition, we estimate a persistent demand, even though decreasing, for oil derivatives in the next decades, which shall be supplied progressively in models with less carbon intensity.





## SCENARIO: PETROBRAS SCENARIOS

### GROWTH SCENARIO

In the short term, the scenario is characterized by the fast recovery of the economy after the effects of COVID-19. The impacts are limited to the period in which the restrictive measures of the circulation of individuals, goods, and services were adopted to control the pandemic. In the medium and long term, the economic growth is accelerated, there is less attention to the environmental boundaries, and the prices of commodities are higher.

### BASE SCENARIO

In the short term, the scenario is characterized by a more gradual recovery after the effects of COVID-19. The impacts to the dynamics of the economic demand are structural, with unemployment and uncertainty affect the level of consumption of families in a long-lasting instance. In the medium and long term, the economic growth is median, there is a greater concern with mobility and the quality of air in the great urban centers, in addition to a moderate expansion in the price of commodities.

### RESILIENCE SCENARIO

In the short term, the scenario is characterized by a delay in finding a solution for the pandemic and a route of recovery substantially slow. This result is explained by structural impacts both in the demand and offer. In addition to the uncertainty and unemployment affecting consumption, a reduced volume of investments will have a negative impact in yield. The global chains of value will have their structure affected and global trade will decline. In the medium and long term, there will be slower global growth, greater environmental risk, and therefore a higher acceleration of the energy transition that generates low commodity prices.

The set of the fourteen strategies of the 2020-2024 Strategy Plan privileges the balance between profitability and risk in this context of deep transformations.

Our business model is structured based on our competitive advantage in oil exploration and production in deep and ultra-deep waters. This model is our key vector of cash generation and promotion of the improvement of the financial condition of the company, so that we can prepare to successive investments (and also diversification) in the medium and long term.

Our strategies seek to provide resilience to our business models for different paces of energy transition, with particular focus on the competitive cost of production to support periods of high volatility and low oil prices.

Oil price is a variable that influences substantially the definition of the portfolio and the identification of non-profitable assets in a context of accelerated transition. In this regard, in the base scenario for the quantification of PE 2020-2024 (2019 planning), we already were adopting premises of conservative prices, similar to the Scenario of Sustainable Development of the International Energy Agency (IEA) in the short term and even lower in the long term. In the current context, the effects of the pandemic are added to the uncertainties and motivated the review of our assumptions of quantification of the scenarios disclosed in May 2020 ([see chapter 6](#)), reinforcing the commitment with the resilience of our oil and gas portfolio.

## Strategies in Force



### EXPLORATION AND PRODUCTION

- > Maximize the portfolio value, focused on deep and ultra-deep water, seeking operational efficiency, recovery factor optimization, and partnerships
- > Grow sustained by oil and gas assets of world class, in deep and ultra-deep waters



### GAS AND POWER

- > Act competitively in the sale of own gas
- > Optimize the thermoelectric portfolio, focused on self-consumption and the sale of own gas
- > Completely exit the gas distribution and transport



### REFINING, TRANSPORT, AND SALE

- > Act competitively in the activities of refining, logistics, and sale of derivatives focused on the operations in the Southeastern region
- > Exit all activities involving fertilizers, distribution of LPG, and biodiesel
- > Act competitively in the global sale of oil



### RENEWABLES

- > Develop researches aiming the participation, in the long term, in activities of renewable energy focused on wind power and solar power in Brazil
- > Commercially allow renewable diesel and BioQAV as a response to the policies of sustainability of the Brazilian energy matrix



### TRANSVERSAL STRATEGIES

- > Transform Petrobras digitally, delivering solutions to challenges, empowering our collaborators, generating value and increasing the security of operations
- > Develop critical skills and a culture of high performance to meet the new challenges of the company, using the economic value added as a management tool
- > Constantly seek a competitive and efficiency cost and investment structure, with a high degree of security and respect to the environment
- > Strengthen Petrobras' credibility and reputation

In the strategic planning process, we conduct simulations of metrics to assess the performance of our operations and our value chain, in addition to the resilience of our generation of value in multiple scenarios of the oil price and carbon pricing (*see chapter 5*). Due to the quality of our reserves, technologies, and assets, we believe we can maintain our position as a competitive producer, supplying oil and gas with superior quality in terms of carbon intensity.

We have also observed the electrification of economies as a consolidated trend, as well as a scaling-up and cost reduction of modern renewables and power storage (wind and solar). We act in the Brazilian market of electric power since early 2000 and believe in innovation and in the search of synergies with our assets to seek business models with long term competitive benefits, allowing diversification with generation of value. ("Develop

researches aiming the participation, in the long term, in activities of renewable energy focused on wind power and solar power in Brazil").

In addition, we observed the opportunity of capturing value by applying our technological skills for the production of fuel using advanced industrial routes, such as, for instance, the production of BioQAV and renewable diesel in plants integrated to the oil refineries. ("Commercially allow renewable diesel and BioQAV as a response to the policies of sustainability of the Brazilian energy matrix").



### 3. OPERATIONAL PERFORMANCE

Teams dedicated to the theme of emissions and climate change for **almost 20 years**

SIGEA® system with more than **17 thousand active sources registered**

We are a founding member of the **Brazilian GHG Protocol Program**

We are currently classified as **Gold Seal** in the Public Record of Emissions

#### MANAGEMENT OF EMISSIONS

Our scenarios indicate a persistent global demand for oil in the next decades, even though decreasing. We have relevant reserves and our priority is to continue supplying oil and gas competitively and on an environmentally responsible basis.

In this context, the good operating performance in GHG emissions is a strategic requirement for the resilience of the company in the long term, contributing with the achievement of the Paris Agreement goals and with the credibility and market opportunities to our products. With 9% of the global GHG emissions, the contributions of the O&G sector for decarbonization are relevant. In this regard, we reinforce our cycle of sustainability commitments published for the 2025 forecast, continuing our decarbonization route.

We have maintained teams dedicated to the theme of emissions and climate change for almost 20 years. We have listed all assets under operating control, and count on an automated system with more than 17 thousand active sources registered, the SIGEA® (Petrobras Atmospheric Emissions Management System). Our inventory of emissions is voluntarily published since 2002 and verified by a third party on an yearly basis. In addition, we are a founding member of the Brazilian GHG Protocol Program and publish our inventory in its Public Greenhouse Gas Emissions Registry, which is currently classified as Gold Seal.



## GOALS, AMBITIONS, AND OPERATING PERSPECTIVES FOR 2025

We have recently published our ten Commitments with Sustainability, in conjunction with the disclosure of the PE 2020-24, and present below six of these commitments related to the carbon issue (2015 base year), reinforced by the company's executive management:



- 1.** Zero growth of absolute operational emissions until 2025.



- 2.** Zero routine flaring by 2030, according to initiative *Zero Routine Flaring* of the World Bank.



- 3.** Reinjection of ~40 MM ton CO<sub>2</sub> by 2025 in CCUS projects (*Carbon Capture, Use and Storage*).



- 4.** 32% reduction in carbon intensity in the E&P segment by 2025, reaching 15 kgCO<sub>2</sub>e/boe.



- 5.** 30%-50% reduction in methane emission intensity in the E&P segment by 2025.



- 6.** 16% reduction in carbon intensity in the refining segment by 2025, reaching 36 kgCO<sub>2</sub>e/boe.

Note 1: To all goals, the operational GHG emissions, both direct (Scope 1) and indirect resulting from the acquisition of electric and/or thermal power produced by third parties (Scope 2), are considered.

Note 2: The zero growth considers the absolute emissions of the Petrobras System in 2015, which summed 78 million tons of CO<sub>2</sub>e. Petrobras is committed not to exceed 78 million t CO<sub>2</sub>e in any year until 2025, except in the case of accentuated pressure for electricity generation from the power plants due to national events of water-related stress.

Note 3: The "Zero Routine Flaring by 2030" initiative of the World Bank aims to eliminate the routine flaring, i.e., that resulting from the impossibility of utilization of the gas produced in the E&P segment. Its scope does not include non-routine flaring, such as during start ups, malfunction, or maintenance of assets, as well as flaring due to emergency reasons.

Note 4: The kg CO<sub>2</sub>e/boe indicator considers in its denominator the raw production of oil and gas (wellhead).

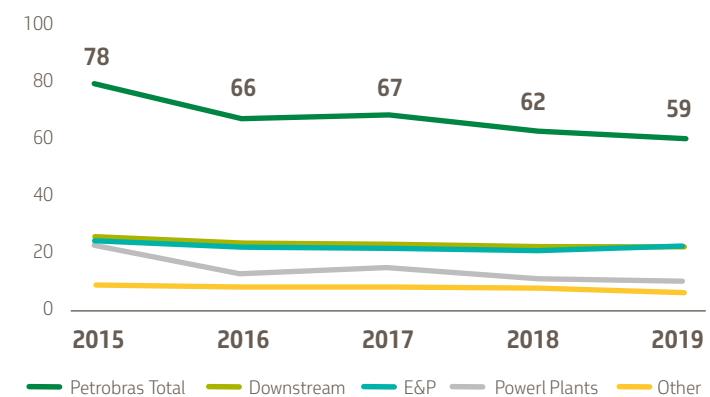
Note 5: The kg CO<sub>2</sub>/CWT indicator was developed by Solomon Associates specifically to refineries and was adopted by the EU Emissions Trading System – EU ETS and by CONCAWE (association of European companies of oil and gas refinement and distribution). The CWT (Complexity Weighted Tonne) of a refinery considers the potential of CO<sub>2</sub> emission, in equivalence to distillation, to each process unit. Therefore, it is possible to compare emissions of refineries of different sizes and complexities. Petrobras follows the kg CO<sub>2</sub>/CWT indicator according to its original identity. We also accompanied an adapted indicator: kg CO<sub>2</sub>e/CWT, to allow the inclusion of other GHG emissions (e.g. Methane), which, however, represent a small fraction of our refining emissions.

Our commitments contemplate existing assets and also in the design of new projects.

Our "zero growth of emissions" goal covers all greenhouse effect gases and 100% of the assets operated in our activities, including power generation. In addition, our carbon intensity goals (E&P and Refining) represent a 74% of the emissions from activities performed by the Company in 2019. It is relevant to mention that there was a decrease in the absolute emissions of the company for the past five consecutive years.

## HISTORY OF GHG EMISSIONS OF THE COMPANY

million tCO<sub>2</sub>e



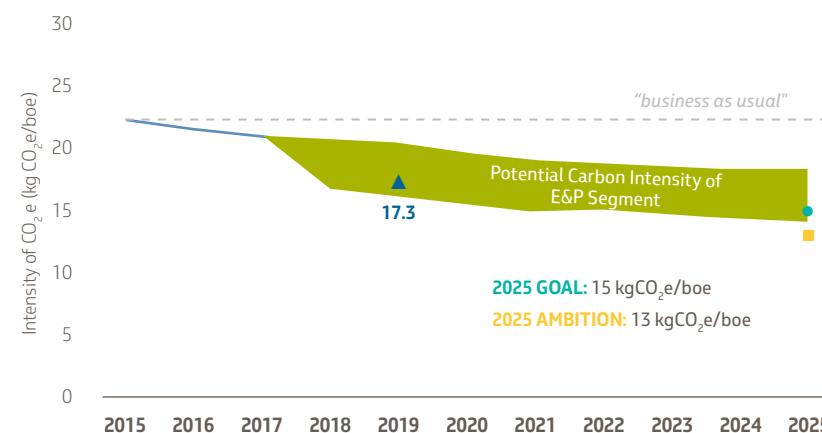
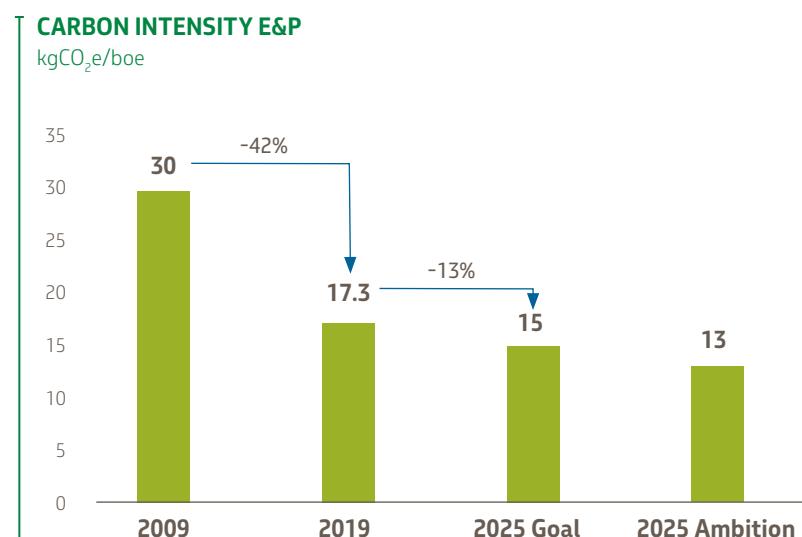
Source: Petrobras Sustainability Report, 2020

The Company has a corporate program to mitigate GHG emissions, with dedicated budget, with the aim to guarantee the observance of the disclosed commitments. It is worthwhile noting the relevance of the requirements implemented for the individual evaluation of the carbon risk to all investment projects, focused on the most representative portfolio of E&P (see chapter 5).

## E&P: EXPLORATION AND PRODUCTION

The foreseen actions aim the continuous improvement of our carbon efficiency in the E&P activities. The goal is to achieve 15 kgCO<sub>2</sub>/boe by 2025, which means a reduction in the carbon intensity by 13% in the period from 2019 to 2025.

This commitment combines with the reduction of more than 40% in the upstream's carbon intensity during 2009 and 2019. **Such improvements allowed an increase of approximately 40% of the oil and gas production in our operations, without disrupting the absolute emissions.**



### Key factors to reduce emissions in E&P:

- Characteristics of new assets;
- Reduction of flaring, fugitive emissions, and losses;
- Energy efficiency;
- Portfolio management;
- CCUS (reinjection with *Enhanced Oil Recovery – EOR*).

Note: The bottom line represents the successful implementation of all options mapped in the strategic study of emissions. The upper line of the graph represents the partial implementation of these actions.

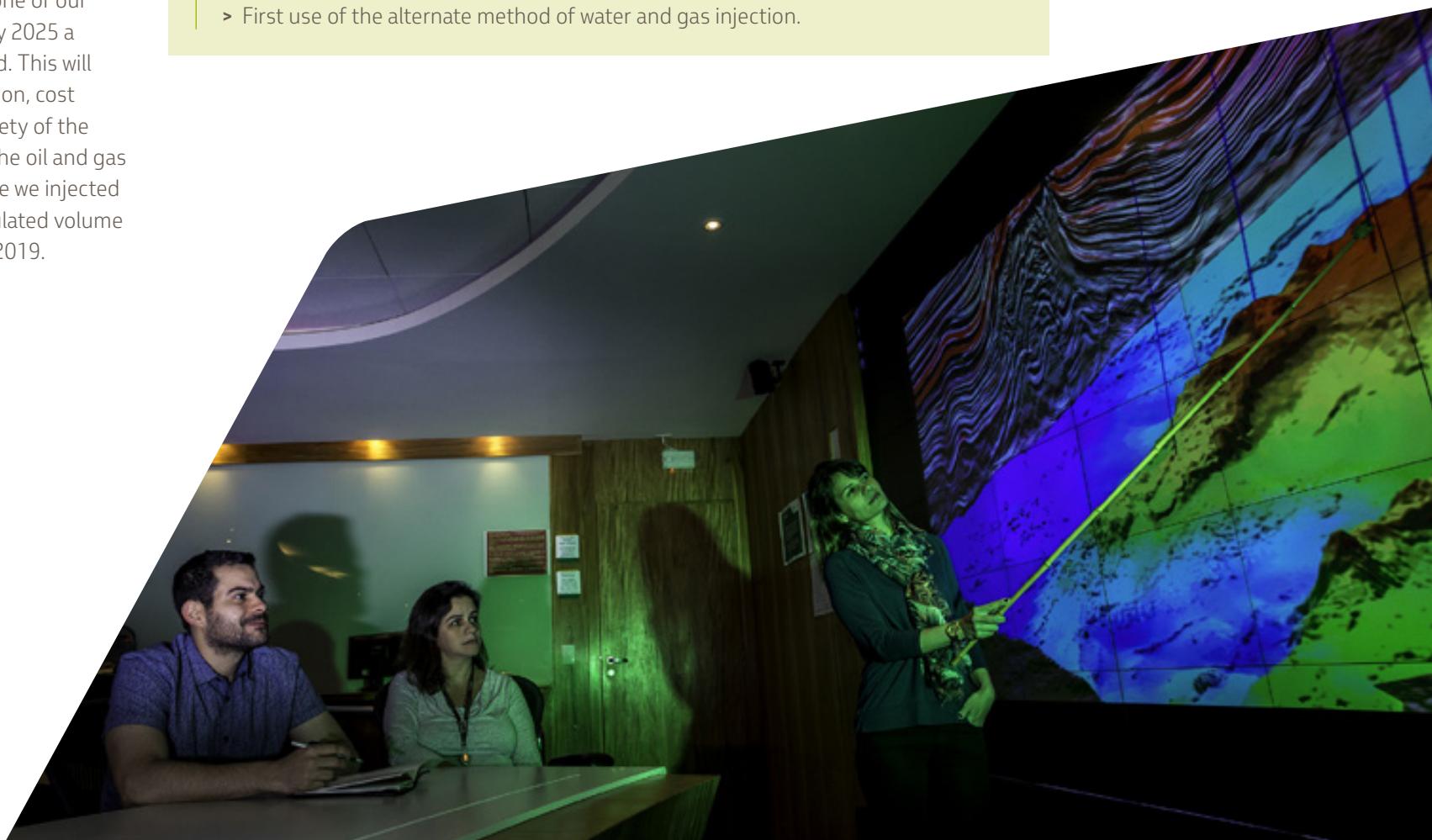
In 2018, we disclosed our support to the World Bank's "Zero Routine Flaring by 2030" initiative, the observance of its criteria being considered one of our Commitments with Sustainability. We highlight that Petrobras has already a high produced gas utilization rate, achieving 97% in 2019.

The reinjection of CO<sub>2</sub> associated with enhanced oil recovery (EOR) will remain playing a relevant role in the trend to reduce GHG emissions. As one of our Commitments, we estimate to achieve by 2025 a total of 40 millions tons of CO<sub>2</sub> reinjected. This will contribute with the technological evolution, cost reduction, and demonstration of the safety of the CCUS technology for the application in the oil and gas industry and other sectors. In 2019 alone we injected 4.6 million tCO<sub>2</sub> and achieved an accumulated volume of 14.4 million t CO<sub>2</sub> between 2008 and 2019.

## CO<sub>2</sub> REINJECTION

Award-winning CO<sub>2</sub> reinjection technologies (CCUS EOR) in ultra-deep waters at the OTC 2015 – Offshore Technology Conference (water depth 2,220 m):

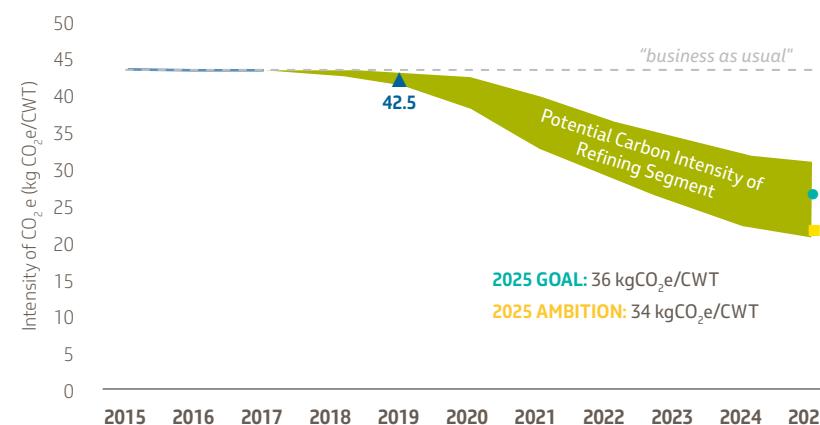
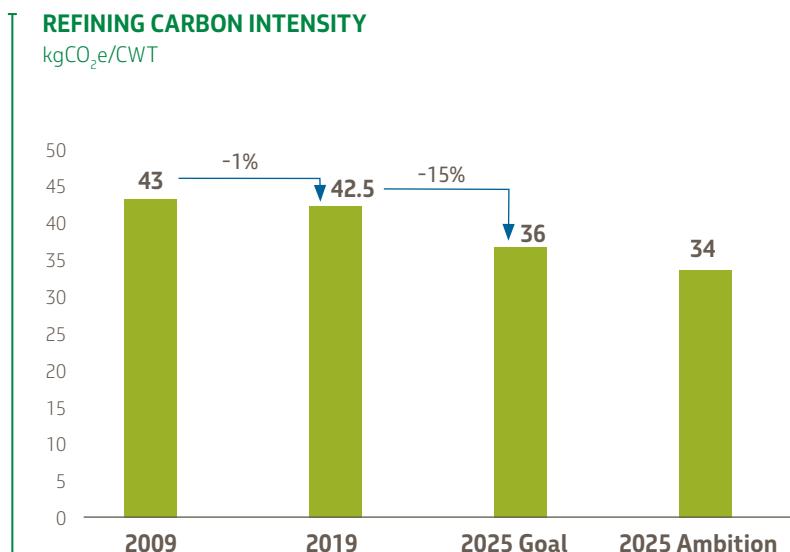
- First separation of carbon dioxide (CO<sub>2</sub>) associated with the natural gas, with CO<sub>2</sub> injection in production tanks;
- Deepest subsea CO<sub>2</sub> gas injection well;
- First use of the alternate method of water and gas injection.



## REFINING

In refining activities, we established the goal to achieve 36 kg CO<sub>2</sub>e/CWT by 2025, which means reducing more than 15% in the segment's carbon intensity between 2019 and 2025.

It is relevant to note that actions of carbon intensity reduction also have gains for the reduction of emissions from other gases (particulate matter, sulfur oxides and nitrogen oxides).



### Key factors to reduce emissions in Downstream:

- Feed optimization;
- Reduction of flaring;
- Optimization in heat and electricity balance;
- Improvements to the power performance.

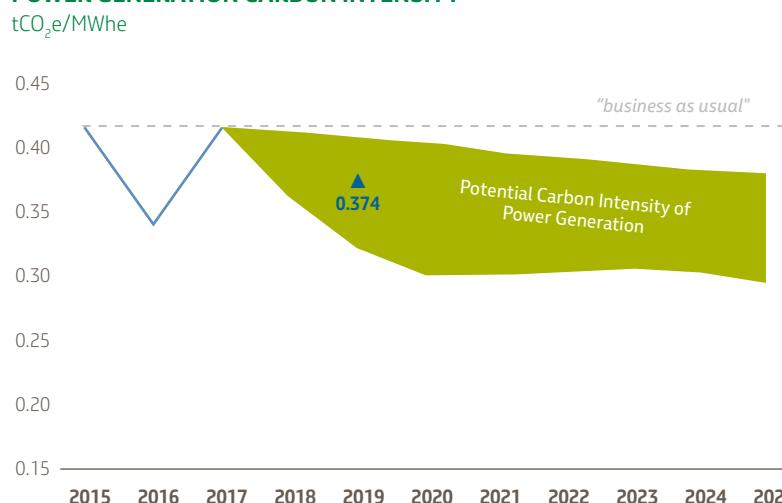
Note: The bottom line represents the successful implementation of all options mapped in the strategic study of emissions. The upper line of the graph represents the partial implementation of these actions.



## POWER GENERATION

Our power plants are essentially powered by gas with high efficient combined cycle to export steam to our assets. In the last decade we implemented combined cycles at the plants of Três Lagoas (MS), Baixada Fluminense (RJ) and Canoas (RS). In 2019, our electricity supply had an average carbon intensity of 0.374 tCO<sub>2</sub>e/MWhe.

### POWER GENERATION CARBON INTENSITY



#### Key factors to reduce emissions in Power Generation:

- Portfolio management;
- Fugitive Emissions Control Program;
- Research aiming the long-term participation in renewable energy activities.

Note: The bottom line represents the successful implementation of all options mapped in the strategic study of emissions. The upper line of the graph represents the partial implementation of these actions..

With 83% of Brazil's electricity coming from renewable sources, our power plants operate mainly outside the reference load of the electric system, with partial dispatch to meet the seasonality and intermittence of renewable sources.

Therefore, the carbon intensity of this segment is affected by the regional needs for electricity, based on the hydrological regimes, which determine the needs of dispatching our different power plants. In the 2025 forecast, we estimate the reduction in the carbon intensity of our power plants with the implementation of fugitive emissions (methane) control program and with research aiming the long term participation in renewable energy activities.

## METHANE EMISSIONS

Our carbon intensity goals incorporate different GHG, such as methane. However, since methane has specific characteristics with an elevated potential of acceleration in the short term, we assess this gas with a specific metric.

Within this context, one of the goals of our Commitments with Sustainability is to reduce between 30 and 50% our methane emissions with respect to the total hydrocarbons production (tCH<sub>4</sub>/thousands tHC) in the E&P segment (2015 basis)<sup>1</sup>.

#### Key factors to reduce methane emissions in E&P:

- Increase and deployment of flare gas recovery system (FGRS)<sup>2</sup>;
- Fugitive emissions control program;
- Assessment of flares efficiency.

In addition, in the Midstream and Downstream sectors, the fugitive emissions control program is already in place for our refineries and will be applied to gas processing units and power plants.

Note 1: According to the metric of the IOGP (International Association of Oil & Gas Producers).

Note 2: The Flaring Gas Recovery System – FGRS aims to minimize gas flaring with the operation of a closed recovery system. The flaring only occurs when the required flows exceed the project specification, e.g., in a emergency situation.

## 4. VALUE CHAIN EMISSIONS, INNOVATION AND INVESTMENT IN CONSERVATION

We are aware that the Paris Agreement requires neutrality in the net balance of GEE emissions in the second half of the 21st century, which exceeds the current voluntary commitments of the countries signing the Agreement, and involve challenges for the power systems much beyond the operational emissions in the production of power.

We act as an integrated power company in two markets:

- 1) O&G – supply of crude oil, liquid fuels, and gas, and
- 2) Electricity – supply of electric power, mainly by gas-fired power generation.

As an integrated energy company, we follow the absolute emissions and the carbon intensity of value chain of our global power sources inventory. We also deem relevant the carbon performance of each product individually, since there are expressive differences in carbon intensity of different oil types, natural gas streams, and electric power from fossils.



## VALUE CHAIN GHG EMISSIONS

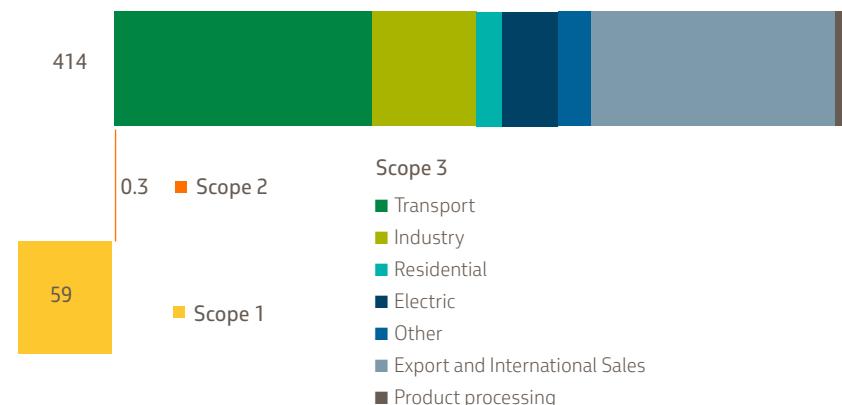
In the oil and gas value chain, most emissions occur in the final stage of use by final consumers. In this sense, since 2012, we have been disclosing the emissions from the use of our products in our Sustainability Report (Category 11 of the Scope 3, according to the GHG Protocol).

With this Brochure, we also started to report Category 10, related to the processing of our intermediate products, applicable especially to the sale of crude oil and naphtha. These data are also included in the verification process of our inventory by a third party, granting them reliability and transparency.

In 2019, it has been observed that the emissions of processing and use of the products are preponderant in relation to the operating emissions, responding for 87% of the chain of value, while the operating emissions respond for approximately 13% of the total. From 2015 to 2019, we observed a reduction of the absolute emissions to our value chain, a result both due to the reduction in the sale of products and the improvement in the segmentation of the different products sold, which allowed the improvement of the calculation of the associated emissions.

## GEE EMISSIONS OF PETROBRAS' CHAIN OF VALUE IN 2019

million tCO<sub>2</sub>e



Note:

**Scope 1** – direct operating emissions.

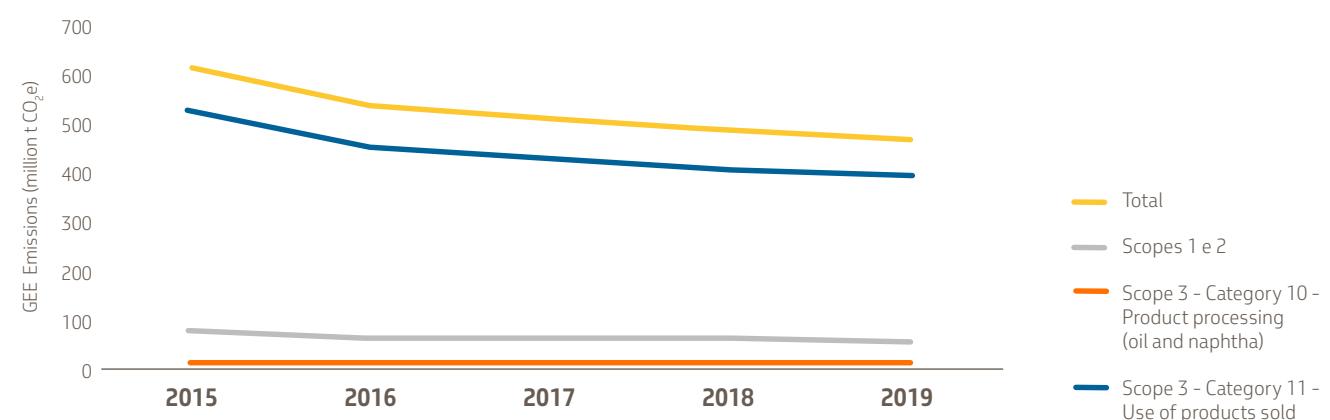
**Scope 2** – indirect emissions resulting from the acquisition of electric power and/or thermal power produced by third parties.

**Scope 3** – Category 10 – indirect emissions of the processing of products and Category 11 – indirect emissions related to the use of the products delivered to the market.

The **Scope 3** emissions are calculated according to the CDP factors, not being based on the evaluation of the individual life cycle of the Petrobras products. Scope 3 includes categories 10 and 11, fundamental in our chain of value.

## HISTORY OF GEE EMISSIONS OF PETROBRAS' CHAIN OF VALUE PER YEAR

million tCO<sub>2</sub>e



## CARBON INTENSITY OF VALUE CHAIN

Since 2019 (year 2018), we started the experimental use of the metric of carbon intensity of our value chain as an element of analysis of our risks and opportunities in carbon.

$$\text{INTENSITY} = \frac{\text{Total Emissions (g CO}_2\text{e)*}}{\text{Total power delivered with our products (MJ)}}$$

\* Total power = Scope 1 + Scope 2 + Scope 3 (Category use of products)

The metric allows an analysis related to the quantity of GHG emissions associated with each power unit delivered to our customers, i.e., the sum of our operating emissions with those from the use of our products with the total power delivery to our customers. It also allows modeling the impact of different variables, such as decarbonization of the assets under operation, intensity of the mix of liquid fuels and gas, the effect of the insertion of renewable powers or the removal of CO<sub>2</sub>.

Throughout 2019, we reduced the interest in the capital stock of affiliate Petrobras Distribuidora, no longer holding its operating management. Thus, the products sold by it to end customers no longer compose the portfolio of products delivered to the market by Petrobras. In addition, the review of the oil price premises disclosed in May 2020 (*as per chapter 2*) induced the portfolio reevaluation. Currently the projections and perspectives are being reevaluated.





## INNOVATION AND THE STRENGTHENING OF THE SKILLS TO CREATE VALUE IN LOW CARBON

Innovation is the most relevant element of the link to allow routes with an expressive reduction of carbon intensity with power arrays that no longer increase the cost of power to society. We are committed to investment in research, development and innovation in low carbon. Our research portfolio explores the opportunities of the oil and gas value chain and also in renewables technologies, seeking renewable sources that can become competitive, such as, for instance, in bioenergy and modern renewables.

Brazil has specific challenges, for it already counts on a power grid with a high participation of renewable energies (45.3% in 2018, according to the data of the National Power Balance – BEN 2019, 83.3% being in the participation in the generation of electricity) and has a high dependency on the long-distance road transport. In this context, several mitigation options of low-cost emissions in the use of power have already been partially or totally implemented, restricting the options of power decarbonization with lower cost to society.

Our priority is to innovate and structure models to maximize the value generation and our competitiveness in low-carbon business, aiming diversification in the long term. We highlight two strategies of our PE 2020-24:

- Carry research aiming the participation, in the long term, in activities of renewable energy focused on wind power and sun power in Brazil
- Commercially allow renewable diesel and BioQAV as a response to the policies of sustainability of the Brazilian power grid

The development of low-carbon solutions is important in our technological routing, with minimum allocation of 10% of our investment in Research and Development (R&D) until 2025. We believe that the competitiveness of the renewable energy power generation, low carbon fuels, less intensive processes in terms of energy, new thermodynamic cycles, energy storage, efficiency in mobility, urban innovation, CCUS, among others, are essential for the creation of new energy paradigms based on low carbon, with generation of value to society.

MAIN FOCUS	➢ Improvement in the power efficiency for own consumption. ➢ CCUS (CO <sub>2</sub> capture, use and storage).	➢ CO <sub>2</sub> separation subsea. ➢ Supercritical CO <sub>2</sub> gas turbines. ➢ Renewable Diesel and BioQAV.	➢ Offshore wind power and sun power. ➢ OGCI (Oil and Gas Climate Initiatives): partnership in the initiatives.
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Our activities in research, development and innovation are coordinated by the Petrobras Research Center (Cenpes), one of the main centers of energy innovation in the world, the largest in Latin America, with more than one thousand dedicated researchers.

The low-carbon solutions were also established with priority in the relationship with startups. Petrobras inaugurated in 2019 a new cycle of investments, the program Petrobras Connections to Innovation – Startups Module, initiative of funding to R&D and innovation,

focused on startups and micro and small companies engaged in innovation. The first call, in partnership with Sebrae, was published in July 2019, with results disclosed in December of the same year. Seven innovative companies were selected to receive from BRL 750 thousand to BRL 1.5 million, with the purpose of transforming their ideas into products. Among the focus areas of such first Call included the issues "CO<sub>2</sub> capture, use and storage" and "New Energies".

In May 2020, we began the second cycle of the Call with the invitation to technological bids. The Call includes 4 challenges related to the performance in carbon of the operations and products.

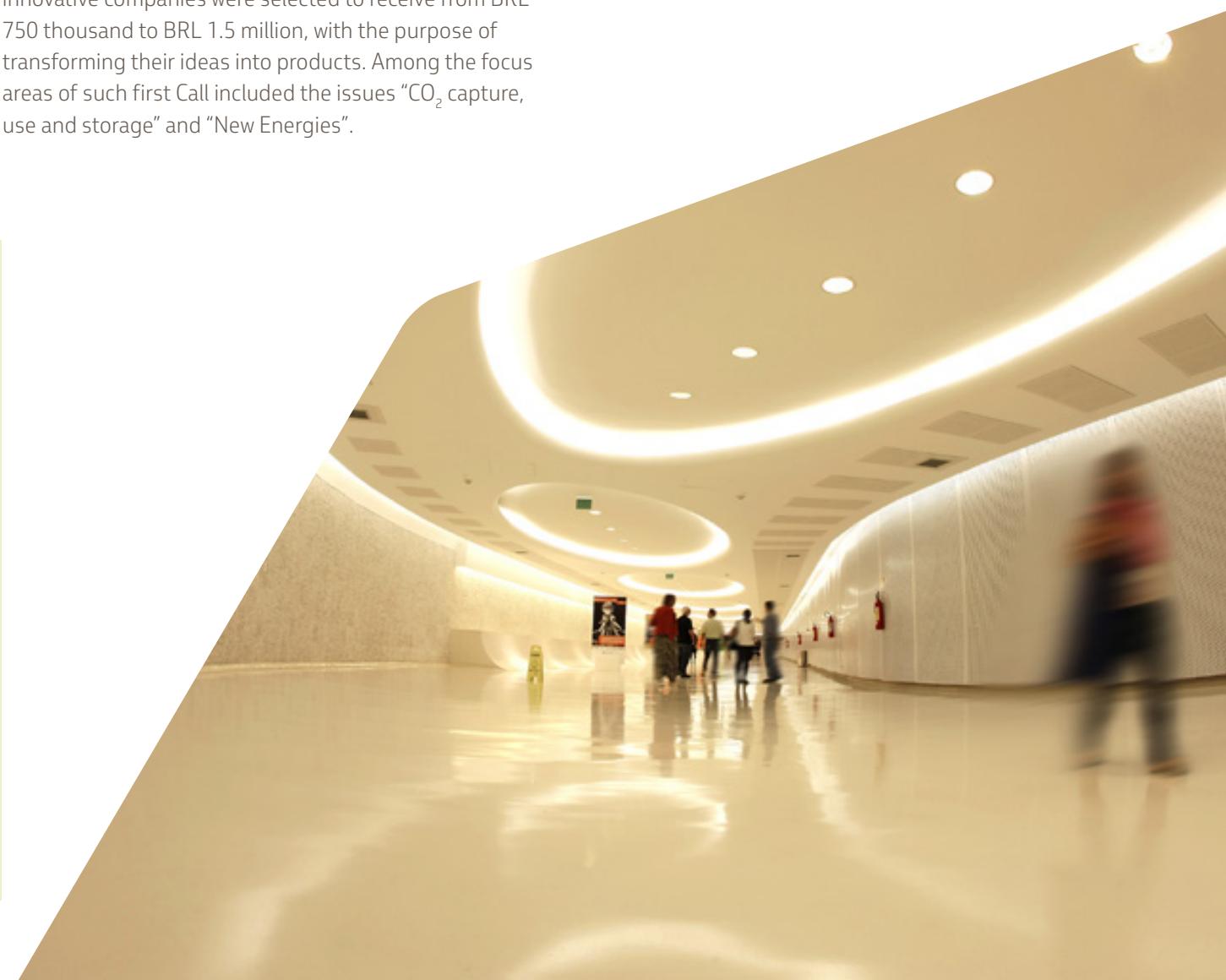
## THE CHALLENGES OF THE STARTUPS CALL

**Challenge 47:** Local generation and storage of power to supply submarine equipment of low consumption.

**Challenge 48:** Identification and quantification of losses of steam in heated systems.

**Challenge 51:** Reduce the Greenhouse Gas Emissions (CO<sub>2</sub> and methane) of the processes and operations of Petrobras with higher efficiency and lower costs.

**Challenge 52:** Liquid fuels that allow the reduction of carbon footprint and that are compatible with the current infrastructure of distribution and combustion engines. These new fuels may be used pure or mixed with the existing fuels.



## VOLUNTARY INVESTMENT IN THE FOREST CONSERVATION AND OFFSETS

The goals, ambitions, and forecasts informed in this Supplement are related to the effective performance of our processes and products, and do not consider the use of offsets to achieve them, either resulting from industrial carbon markets, environmental requirements, or voluntary projects.

We understand that the natural climate solutions (related to forests, soils, oceans, mangroves etc.) do not substitute the need for low carbon energy supply. However, they may play a relevant role, especially while the emission reduction options presented high costs or extremely challenging scales.

In a country such as Brazil, in which the emissions of use of land represented 24% of the total emissions in 2015 (SIRENE/MCTI, 2020), we consider relevant the contribution with natural solutions, and make voluntary investments in forest conservation with fixation of carbon and other social and environmental benefits.

Our Social Responsibility Policy has as its guideline the investment in socio-environmental programs and projects, contributing with the communities where we are located, and more expansively, to society.

The Petrobras Socio-environmental Program structures the voluntary investments made by Petrobras, defining the thematic areas, objectives, and guidelines in pluriannual planning and counted in 2019 with investments at the order of BRL 100 million.

For over ten years, the Company has as its priority the investment in the Climate theme and the projects supported in this area perform actions of forest conservation, reforestation, and productive reconversion, generating positive results regarding the mitigation of the GHG emissions.

The Climate portfolio currently counts on 15 projects and, after the conduction of integrated work in thematic network and under the coordination of the Company, has as its accumulated result during the supporting period to Petrobras, the potential contribution of 850 thousand tCO<sub>2</sub> in recovered areas or areas directly conserved, in addition to the social and environmental benefits associated and distributed in five Brazilian biomes (Amazon, Rain Forest, Cerrado, Caatinga and Pampa). Approximately 100 thousand hectares of deforested areas were recovered and 35 million hectares involved in sustainable agriculture actions and strengthening of Protected Areas (Indigenous Lands and Conservation Units).

In addition to the contribution in the carbon theme, this portfolio produces 1.5 million of native seedlings during the project, directly benefiting ten thousand people and contributing with the Sustainable Development Goals (ODS) 13 (action against the global climate change) and 15 (terrestrial life).

Thus, Petrobras aims at having an innovative position to raise the quality of the information provided to the different interested parties about the results of voluntary socio-environmental investments of the company and to highlight the potential contribution of the projects with the mitigation of the GHG emissions.

In addition to the voluntary investments above, since 2009 we have offset more than 1.2 million tons of CO<sub>2</sub> in compliance with permitting requirements.



## 5. GOVERNANCE, METRICS, RISK, AND TRANSPARENCY

The energy transition involves uncertainties that affect our markets and our cost structure. Our role in the transition process to a low carbon future require us to remain as a healthy economic agent, creating value to society. Due the intensive capital nature and long-cycle of our business, considering carbon properly in the governance, strategy, portfolio management, risk evaluation, metrics, and other processes will be fundamental to increase our competitiveness.

### GOVERNANCE

Climate change subject is part of Petrobras' Safety, Environment and Health (HSE) and Social Responsibility (SR) Policies.

#### OUR POLICIES



Consider the HSE requirements and climate change in the business decisions.



Contribute with the sustainable development and the mitigation of climate change, acting in line with the national and international commitments of which we are signatories.



In this regard, the follow-up of the theme is a formal attribution of both committees of our governance with representatives of the executive Management:

## OUR COMMITTEES



HSE Executive Committee,  
one of the committees  
counseling our Executive  
Management.

*Formed by executive managers of  
the corporate and operating areas*



HSE Committee, a supporting  
committee to the Board  
of Directors, formed by  
Board members and  
external members.

*Formed by members of the  
Board of Directors*

## METRICS

We have developed a portfolio of metrics to our carbon management, in addition to the follow-up of the goals related to flaring and power efficiency (*see the attached chart at the end of the Supplement*).

Since 2019, the metrics related to the carbon intensity in our downstream and upstream operations (74% of coverage) are integrated to the remuneration of executives. In 2020, these metrics were incorporated as a top indicator, influencing the variable remuneration of the executives and the manpower in the entire company.

## RISK MANAGEMENT

Our risk management process includes a stage of risk identification for the entire company, with the identification of threats and opportunities of all natures. These risks are evaluated regarding the likelihood of occurrence and impacts to the financial dimensions, to the image and reputation, to the legal and compliance aspect, and environment and life dimension. The management of each type of risk is part of our daily routine and the prioritization given to each theme will be based on the respective impacts. The carbon risk was mapped and based on its severity, it is a priority theme for the treatment and follow-up by the leaders of the company. The relevance of this theme is ratified by risk perception research among the members of the executive management. Among the initiatives associated with the mitigation of this risk, we have the incorporation of carbon price metrics in the analysis of investments and the monitoring the business environment.

In addition, we evaluate the physical risk associated with the climate changes to our operations, with research and development of climate regionalizations with renowned institutions in Brazil and abroad (Universidade Federal de São Paulo – USP, Instituto Nacional de Pesquisas Espaciais – INPE and the National Oceanic and Atmospheric Administration – NOAA) of parameters considered potentially more susceptible to these changes, such as water availability to our refineries and patterns of wave, wind, and current to our offshore platforms, generating qualified information to adapt our operations.



## TRANSPARENCY AND COLLABORATION

We value transparency, following the main global codes on conduct and reporting, including the guidelines to reporting sustainability of the Global Reporting Initiative (GRI Standards) and the complementary reporting methodology of IPIECA (Global Oil and Gas Industry Association for Environmental and Social Issues – guideline for Voluntary Reports of the Oil and Gas Industry). We also present the correlation of our activities with the Principles of the Global Compact and with the Sustainable Development Goals (SDG) of the United Nations.

We highlight in this Brochure our decision, in June 2020, to publicly support the TCFD (Task Force on Climate Related Financial Disclosure), already a reference to our carbon management process since 2018.

Between 2006 and 2019, we integrated the Carbon Disclosure Project (CDP), a non-profitable institution that manages a system to provide transparency to the actions of the company in climate change, having achieved in 2019 grade B (management level).

In addition, we believe that the transition to a low-carbon economy is an area in which cooperation is fundamental and we join other companies and the community of science, technology, and innovation (CT&I). We are

affiliated to the IPIECA, with 40 years of experience in the promotion and exchange of good sustainability practices in our industry, to the IOGP (The International Association of Oil and Gas Producers), and to the Brazilian Oil Institute, acting in the Climate Change Commission.

Since 2018 we are part of the Oil and Gas Climate Initiative (OGCI), which gathers twelve of the largest oil and gas companies of the world, responsible for more than 30% of the global production of oil and gas. The companies that are members of the OGCI undertake to invest, in conjunction, more than USD 1 billion, in the next ten years, to develop technologies and initiatives that contribute with the reduction of the GEE emissions.

We seek to also collaborate outside the industry, dialoguing and searching for solutions, acting in conjunction with the Brazilian Forum on Climate Change (FBMC), the World Economic Forum (WEF), the Brazilian Enterprise Council for Sustainable Development (CEBDS), the National Industry Confederation (CNI), the Ethos Institute, and other institutions.

We have not identified among the organizations that we are associates with material misalignments in relation to the climate change issue, and we do not finance lobby activity in the matter.

## 6. INTEGRATED QUANTIFICATION OF RESILIENCE

### PORTFOLIO RESILIENCE

The transition to a low-carbon economy affects mainly two variants of our value generation: oil price and carbon price. Currently we perform our portfolio assessment decisions according to the premises of our internal "Base" scenario (*see Chapter 2*).

To analyze our premises, we adopted the metric of portfolio resilience evaluation by comparing to the external scenario at 2°C, in direct observance with the recommendations of the TCFD.

As the public external source for reference, we adopted the Scenarios of the International Energy Agency in WEO 2019 (World Energy Outlook), specifically the SDS – Sustainable Development Scenario, which establishes a view on the transformation of the energy systems in line with the Paris Agreement goals, in addition to the so-called Stated Policies Scenario (STEPS).



## SCENARIOS OF THE INTERNATIONAL ENERGY AGENCY USED AS REFERENCE

### **SDS** (Sustainable Development Scenario):

It establishes an energy transition trend compatible with the goals of the Paris Agreement. In this scenario, the global emissions of the energy systems will decrease from 33 billion tons of CO<sub>2</sub>e in 2018 to less than 10 billion tons of CO<sub>2</sub>e in 2050. The scenario is aligned with 66% and 50% of likelihood of maintaining the increase of temperature below 1.8°C and 1.65°C, respectively.

### **STEPS** (Stated Policies Scenario):

This scenario reflects the possible energy transition in view of the current policies and ambitions, according to the analysis of the regulatory frameworks, market, infrastructure, and financial conditions of the countries.

Since the IEA has not yet made updates to the premises of its scenarios in 2020, we simulated using the Petrobras premises from the PE 2020-2024 in 2019. Such comparison allows an analysis of the scenarios prepared in the same context pre-COVID 19. Quantifying the portfolio from the PE 2020-2024 using the premises of the SDS external scenario, it is possible to note a negative impact of 10% in the net present value ("NPV"), especially due to the levy of the carbon prices in the SDS scenario. On the other hand, using the premises of the STEPS external scenario, in view of the highest oil prices, there would be a substantial increase in the value of the portfolio compared to the calculation with the Petrobras premises (40%).

The result reflects the conservative oil price premises adopted by Petrobras. It is observed that the base scenario adopted by Petrobras in the PE 2020-2024 (pre-COVID-19) already present oil prices at the thresholds of the curve of the external SDS scenario, reflecting our strategic choice of portfolio with a high resiliency to the volatility of prices considering the energy transition. We would like to stress that in May 2020 we disclosed the review of our oil price premises that reflected the accounting impairment in the 2020 first quarter financial report. Within the new premises, the long-term oil price, used in the decision-making process, was reduced from USD 65/bbl to USD 50/bbl, supporting even more resiliency portfolio decisions.

### BASE COMPARISON 2019 PUBLIC SCENARIOS VERSUS PE 2020-2024

QUANTIFICATION  
IN THE  
**SDS SCENARIO**

> **-10%**  
IN RELATION TO THE BASE NPV

QUANTIFICATION  
IN THE  
**STEPS SCENARIO**

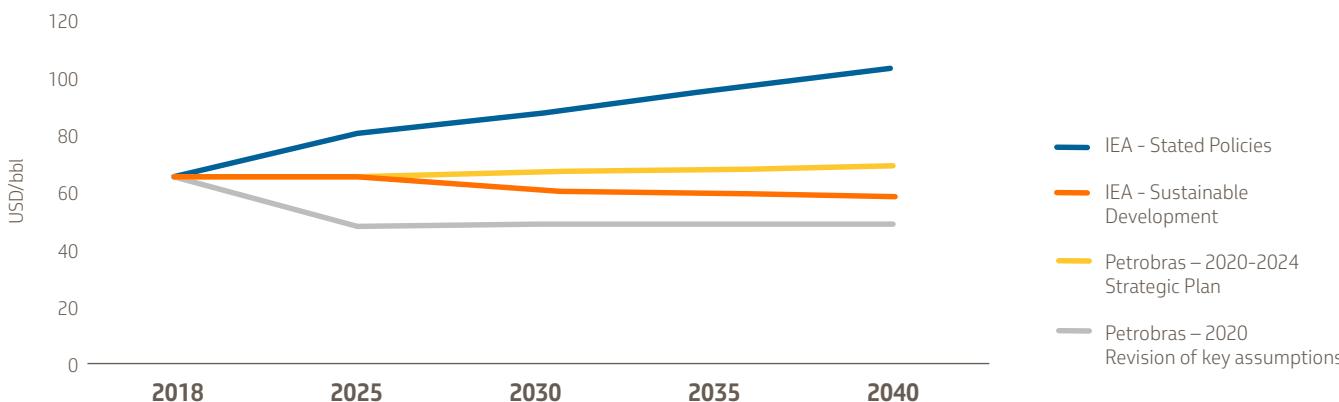
> **+40%**  
IN RELATION TO THE BASE NPV

### BASE COMPARISON 2020

There are no scenarios of the International Energy Agency with premises reviewed in 2020, preventing the comparison on the same base.

The valuation of the portfolio by the premises of the SDS 2019 external scenario results in NPV substantially above the calculation with the premises reviewed by Petrobras in 2020 (effect > +100%).

Such effect occurs due to the more favorable oil price condition in the SDS 2019 scenario when compared to the Petrobras premises as of March 31, 2020.

OIL PRICE  
USD/bbl

Source: International Energy Agency (IEA), WEO (2019) – average price of oils imported by the IEA members.  
Petrobras: Brent price, PE 2020-24 Strategic Plan.

It is worthwhile noting that we have in course a portfolio revaluation process considering the new premises published, an update of the scenarios from IEA is expected, which will allow a new cycle of analysis of sensitivity already considering the effects of the COVID-19 pandemic.

With respect of the cash flow profile and our reserves, it is fundamental the low cost offshore operations. We disclosed in our PE 2020-24 the perspective of operating, as of 2020, with an extraction cost below USD 8/boe, excluding the cost of leasing, and below USD 4/boe in the case of production in the pre-salt region.

## DECISION-MAKING PROCESS OF INVESTMENTS, ACQUISITIONS, AND DIVESTMENTS

The assessment of HSE (Health, Environment and Safety) factors are part of the decision making process of investment projects. These investments are approved only if they keep their feasibility in all our scenarios, including the resilience scenario. Such premise is applicable to all projects and represents the guarantee that our investments maintain their economic feasibility even in less favorable price scenarios.

The evaluation process of new ventures incorporates the exposure to the carbon risk, including the proposition of actions to reduce emissions intensity and resilience to carbon prices. The metrics of carbon of equilibrium and the analysis of sensitivity to carbon price scenarios are calculated in the venture evaluation process and are part of the decision-making process for each investment (*see the table of metrics attached hereto*).

Similarly, the process in force for acquisitions, partnerships, and divestments foresees the assessment of HSE factors, including information about the impact of such acquisition, partnership, or divestment over the total GHG emissions and metrics of intensity.

## ANNEX OF METRICS USED IN THE ASSESSMENT OF LOW-CARBON RISK AND OPPORTUNITIES

KPI	UNIT	COVERAGE	DESCRIPTION	METRIC USE
Absolute GHG emissions	Tons of CO <sub>2</sub> e	100% of the activities under operational control	Total emissions of GHG, including Scope 1 and Scope 2, in terms of CO <sub>2</sub> equivalent (CO <sub>2</sub> e) for the Petrobras System.	Internal follow-up, public commitment not to raise emissions from 2015 to 2025.
E&P greenhouse gas emissions intensity	kgCO <sub>2</sub> e/boe	Activities of oil and gas Exploration and Production with operating control	GHG emissions, in terms of CO <sub>2</sub> e, resulting from the activities of E&P in relation to the total production operated of oil and gas (wellhead) registered in the same period. The GHG emissions of Scope 1 and 2 are considered. This indicator represents the rate of GHG emission barrel of oil equivalent, used to analyze the carbon performance of the assets in our current and future portfolio.	Internal follow-up, public commitment to reaching 15 kgCO <sub>2</sub> e/boe in 2025. This indicator composes one of the top metrics that affects the variable remuneration of the entire Company in 2020 (partial goal for the current year).
Refining greenhouse gas emissions intensity	kgCO <sub>2</sub> e/ CWT	Refining Activities with operating control	GHG emissions, in terms of CO <sub>2</sub> e, resulting from the Downstream activities in relation to the unit of activity known as CWT (Complexity Weighted Tonne). The CWT represents a measurement of activity, similar to the UEDC ( <i>Utilized Equivalent Distillation Capacity</i> ), which considers the potential of emission of CO <sub>2</sub> , in equivalence to the distillation, per unit of process, allowing a better comparison between the refineries of different complexities. For this adjusted metric followed by Petrobras, Scope 1 and Scope 2 emissions are considered. This indicator composes the analysis of the carbon performance of the assets in our current and future portfolio.	Internal follow-up, public commitment to reach 36 kgCO <sub>2</sub> e/ CWT in 2025. This indicator composes one of the top metrics that affects the variable remuneration of the entire Company (partial goal for the current year).
Upstream methane emissions intensity	tCH <sub>4</sub> /Gt hydrocarbons	Activities of oil and gas Exploration and Production and activities of gas processing and treatment with operating control	The indicator uses the IOGP metric that represents the ratio between the methane emission and the total operated production of hydrocarbons.	Internal follow-up and public commitment of reduction from 30 to 50% until 2025, based on the 2015 result.



KPI	UNIT	COVERAGE	DESCRIPTION	METRIC USE
Greenhouse gas emissions intensity	tCO <sub>2</sub> e/MWhe	Activity of commercial generation of thermoelectric power commercial generation with operating control	GHG emissions, in terms of CO <sub>2</sub> e, resulting from the processes of the Power Plants in relation to the total of power supplied (electric and thermal) by these units. The GHG emissions of Scope 1 and 2 are considered. This indicator composes the analysis of the carbon performance of the assets in our current and future portfolio.	Internal follow-up and item of external disclosure
Upstream methane emissions intensity	%	Activities of oil and gas Production and activities of gas processing and treatment with operating control	The indicator uses the OGCI metric that represents the ratio between the volume of methane emission by the volume of gas delivered to the market.	Indicator of internal follow-up
Greenhouse gas emissions intensity of value chain	gCO <sub>2</sub> e/MJ	100% of the activities with operational control and use of products	Total emissions of GHG, including Scope 1 and Scope 2, of our operations and the Scope 3 emissions related to the use of our products in relation to the total power delivered to our customers. This metric represents an analysis related to the number of GEE emissions associated with each power unit delivered to our customers.	Internal follow-up
Stabilizing carbon	USD/tCO <sub>2</sub> e	Projects under evaluation	The indicator represents the value of a carbon taxation that would take the VPL of the project under analysis to zero by a simplified internal methodology.	Internal follow-up
Sensitivity to the carbon price	%	Projects under evaluation	The indicator represents the impact to the VPL of the project under analysis from a possible carbon pricing, by a simplified internal methodology.	Internal follow-up
Loss of NPV of the Portfolio (experimental)	%	Portfolio of the Company	The indicator represents the impact to the VPL of the Portfolio of the Company derived from a possible carbon pricing.	Internal follow-up and item of external disclosure

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