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GENERAL OVERVIEW OF THE OIL AND GAS INDUSTRY: AN AGENDA FOR THE FUTURE

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Expedient

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EXECUTIVE SUMMARY

:: The oil and gas industry plays a strategic **role in Brazil due to its importance as an energy source and for the benefits it provides to society**, such as attracting investments, generating employment and income for the country.

:: The industry represents 17% of the country's industrial GDP and will continue to contribute to the economic growth through planned investments in exploration and production of US$ 173 billion, foreseen for the 2024 to 2033 period.

:: The national oil production should reach a total volume of approximately 4.5 million barrels per day in 2031, providing, in the upstream segment alone, more than 344,000 jobs on an annual average from 2024 to 2033. In the same period, more than US$ 600 billion will be destined to the public coffers (Royalties, Income Tax, Special Participations, profit oil installments and investment obligations in Research & Development are considered).

:: The ongoing energy transition process is an opportunity for Brazil due to the country's unique greenhouse gas emissions profile, the high share of renewable sources in its energy matrix, and the relatively low level of emissions from oil production when compared to other countries.

:: In order to benefit from all the opportunities associated to the oil and gas production, a a business environment that provides:

i. legal certainty and assurance of existing contracts;

ii. tax simplification with regulation of the single phase of ICMS on derivatives, with *ad rem* rates;

iii. pricing liberty;

iv. incentive for competition in the natural gas and refining industries, as to attract investment;

v. multiple agents.

INDUSTRY OVERVIEW

The oil and gas industry is one of the main pillars of the Brazilian energy system, **responsible for more than 40% of its internal energy supply**[1]. The industry´s relevance is measured by its great capacity to generate employment and revenues from exports and domestic sales, in addition to the significant tax collection at municipal, state and federal levels. In addition, energy security and decarbonization have started walking side by side in recent years. Brazil has unique conditions to become a relevant energy exporter to the global markets. Every day, more than 4.2 million boe[2] (oil and gas) are produced in Brazil, and the refineries process around 2.0 million barrels[3] that are transported to the most diverse locations in the country. This is done safely, efficiently, and with environmental responsability. According to IBP's estimates, over the next 10 years, the upstream industry alone is going to be responsible for **more than 400 thousand jobs** on an annual average, holding investments of approximately USD 180 billion and securing more than USD 600 billion to the public coffers (considering Royalties, Income Tax, Special Participation, profit oil installments and investment obligations in Research & Development). The oil and gas industry is considered to be one of the most dynamic in the Brazilian economy, and guarantees the country an important position in the global market.

BRAZIL **IS THE EIGHTH LARGEST OIL PRODUCER IN THE WORLD, THE EIGHTH LARGEST CONSUMER**, IN ADDITION TO HAVING **THE NINTH LARGEST REFINING PARK**.

[1] EPE, 2022. National Energy Balance.
[2] Barrels of Oil equivalent.
[3] 2022, BP *Statistical Review*.

Oil and derivatives exports is one of the highlights in the Brazilian trade balance, with revenues exceeding US$ 54 billion in 2023[4]. Over the last eight years, the oil and derivatives segment generated more than US$ 110 billion in trade surplus, being crude oil the third most important item in terms of value. Data from the Industry National Confederation (CNI)[5] show that the O&G industry accounted for approximately 10% of industrial GDP in 2020.

Brazilian oil and natural gas industry's robustness results of opening the Exploration & Production (E&P) segment, which began in the 1990s and, more recently, of opening the natural gas and refining market. With effect since the 1997, the Petroleum Law, revised Petrobras' monopoly of the market, which led to the entry of new agents. This important milestone brought more company competition and diversification, reducing risks and providing an attractive business environment for investments, generating more jobs and income. Over the last 20 years, oil production went from just over 1 million barrels/day to 3,4 million barrels/day[6] . Brazil, which imported around 90% of the oil it consumed in the early 1970s, is a

A NET EXPORTER WITH A BALANCE OF MORE THAN 1 MILLION BARRELS/DAY.

The initial opening movement took place with the presence of companies with diversified experiences, both national and foreign, while Petrobras tried focusing on activities in deep waters due to its high potential and the expressive results achieved.

Brazil currently has **84 groups in the upstream segment, 45 of which are national**, with different sizes and acting profiles. Independent companies were responsible for 4% of national production in 2023 - around 237,000 barrels per day. According to a WoodMackenzie7 and 8 report, independent operators will invest US$ 10 billion in projects foreseen until 2027, increasing these assets' production, which should reach a peak of 485 thousand barrels per day in five years. These companies are expected to increase these assets remaining reserves by 980 million barrels of oil equivalent (boe), a significant volume for those investing in projects to revitalize production.

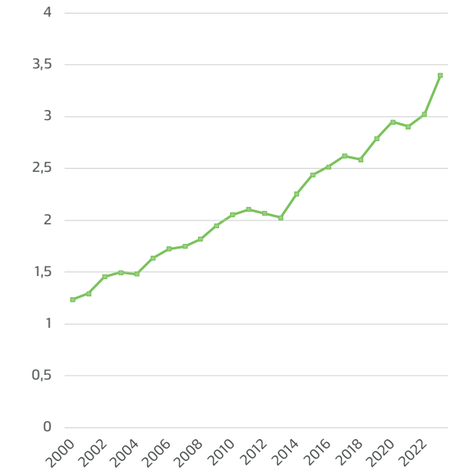
[4] 2022, MDIC - SISCOMEX Data.
[5 e 6] ANP 2023.
[7 e 8] Wood Mackenzie. https://www.woodmac.com/reports/upstream-oil-and-gas-the-rise-of-independent-operators-in-brazil-150072451/
https://epbr.com.br/independentes-vao-investir-us-10-bilhoes-em-projetos-vendidos-pela-petrobras/

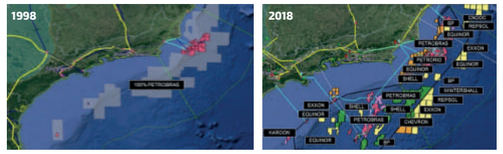
| O&G Sector General Overview: An agenda for the future

Data taken from the Oil National Agency (ANP) indicate that production per concessionary, excluding Petrobras, was around 35% in 2023, which represents approximately 1.2 million barrels/day[9]. Figure 1 shows the production evolution, as well as an increase in the number of players in the sector throughout recent decades.

Figure 1: Evolution of national oil production

Millions of barrels per day, 2000-2023





Source: Elaborated by IBP with data taken from ANP [10]

The production increase levels also led the country to an important position in exports of oil and derivatives.

IN 2022, BRAZIL APPEARED AMONGST THE LARGEST EXPORTERS OF OIL AND DERIVATIVES, WITH A TOTAL OF 1,9 MILLION B/D SENT ABROAD, AS SHOWN IN FIGURE 2.

Figure 2: Oil and derivatives exporters

Millions of barrels per day, 2022

Source: Elaborated by IBP with data taken from ANP and Energy Institute

[9] 2022, ANP. Dynamic Panel. Available in: https://app.powerbi.com/view?r=eyJrIjoiNzVmNzI1MzQtNTY1NC00ZGVhLTk5N2ItNzBkMDNhY2IxZTIxIiwidCI6IjQ0OTlmNGZmLTI0YTYt-NGI0Mi1iN2VmLTEyNGFmY2FkYzkxMyJ9
[10] 2022, ANP. Dynamic Panel. Available in: https://app.powerbi.com/view?r=eyJrIjoiNzVmNzI1MzQtNTY1NC00ZGVhLTk5N2ItNzBkMDNhY2IxZTIxIiwidCI6IjQ0OTlmNGZmLTI0Y-TYtNGI0Mi1iN2VmLTEyNGFmY2FkYzkxMyJ9

THE OIL AND GAS INDUSTRY IN THE ENERGY TRANSITION CONTEXT

Brazil has a privileged position in the energy transition discussions with a **share of more than 49.17% of renewable energies** in its energy matrix[11] - the world average, being less than 20%[12]. Considering the electrical matrix, renewables correspond to 87%, while the world average stands at around 30%[13]. These data show how rich and diverse the energy sources are in Brazil.

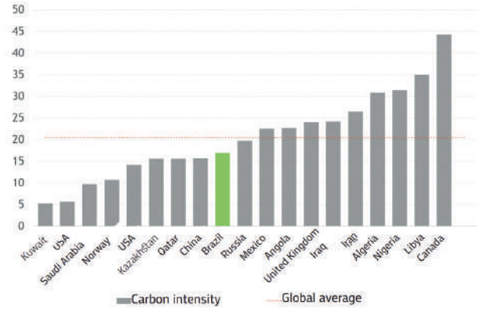
The country's oil and natural gas industry also has competitive advantages in terms of energy transition, ensuring a strategic position in the global industry. Even though the world must move towards decarbonization, there is a consensus that **oil and natural gas will remain indispensable** to ensure energy supply and the well-being of the population in the years to come. Recent projections from the International Energy Agency (IEA) indicate that the global oil demand will be around 100 million barrels/day over the next decades. Even in a scenario that considers the already announced decarbonization targets, the global demand for oil will stay above 50 mb/d until 2050[14]. These projections clearly show that

A DECARBONIZED FUTURE WILL NOT BE A FUTURE WITHOUT OIL.

To address the global challenge of reducing emissions, oil and gas companies are already diversifying their investments to include new low-carbon technologies; implementing measures to reduce emissions associated with their operations; and prioritizing types of oil with lower carbon intensity. This is the case in Brazil: the country's oil production is characterized by a lower carbon intensity per barrel than most other producing countries, as per Figure 3.

Figure 3 – CO2 emission rate per barrel (2019)

$kgCO_2/boe$



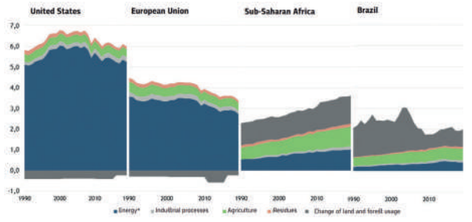
Source: 2022, BP

Large world oil producers, such as Canada, Iran and Iraq, have CO2 emission rates per barrel considerably above the global average. In a medium- and long-term scenario, the lower emission rate of Brazilian oil, tends to benefit Brazil as a producing country.

Another competitive lead for Brazil relies on its emission profile. While in most countries, the energy industry is the main responsible for CO2 emissions, in Brazil, **most of the CO2 emissions come from agriculture and the change of land and forest usage**, as per Figure 4.

Figure 4: Annual Greenhouse Gas Emissions by Sector

1990-2019, Gigatons of CO_2 equivalent ($GtCO_2e$)



(*)) Includes emissions from activities related to heating buildings, manufacturing, transport and construction.

Source: Elaborated by IBP with data from Financial Times and SEEG (2022)

The data shows that **decarbonization policies aimed at land and forest usage, and agriculture, tend to be more effective** in meeting the country's decarbonization commitments.

One aspect of energy transition in which the oil and gas sector can make significant contributions is in developing decarbonization technologies. Brazil has examples, such as projects of carbon capture, use and storage (CCUS)[15] mechanisms, as well as the offshore wind potential, and green hydrogen development projects.

The industry companies in Brazil have extensive experience and a privileged position for technological development of offshore wind. The Brazilian coast length, as well as the wind currents, particularly in the Northeast of the country, are important differentials for expanding this energy source.

[11] EPE, 2024. National Energy Balance
[12] EPE, 2024. National Energy Balance
[13] EPE, 2024. National Energy Balance
[14] 2022, *IEA. World Energy Outlook* 2022.
[15] Technology that captures part of CO_2 emissions, which contributes to avoid the increase of the greenhouse effect and global warming.

At present time, **Brazil has almost 170 GW of offshore wind energy projects** with an open environmental licensing process at IBAMA[16].

Another example is the CCUS Program, developed in the pre-salt fields by Petrobras, as a pioneer innovation, is the largest offshore CO2 reinjection program in the world. The company also has a commitment to reinject 80 million tCO2 by 2025 in CCUS[17] projects.

In terms of green hydrogen[18], Brazil stands out due to the high share of renewable sources in its electrical matrix. This way, **the country has great competitive potential as an exporter**, thus, attracting the interest of several international players who have already signed an agreement for future production in the country.

To meet the climate goals and ensure the energy supply necessary for its economic development, it is important for Brazil to maintain a plural, diversified, balanced energy matrix with a high percentage of renewable sources. The energy transition process is a great opportunity for generating wealth through oil and gas resources exploration in Brazil. Our current moment is crucial to define the sector's trajectory in the country for the upcoming years.

For the refining segment, it is necessary to develop a modern regulatory process, including the new technological routes for biodiesel production, a strategy that has already been successfully adopted in several countries, enhancing and extending the useful life of the Brazilian refining park by starting to produce fuels with lower carbon levels. These technologies generate additional use of renewable biomass in Brazil, in addition to logistic optimization and more competition between different products with benefits in terms of price, quality and availability to consumers.

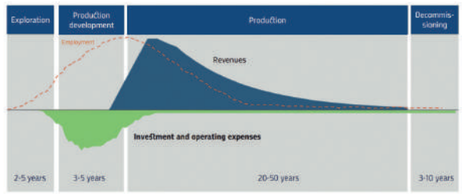
[16] 2022, IBAMA. http://www.ibama.gov.br/phocadownload/licenciamento/2022-08-11_Usinas_Eolicas_*Offshore*_Ibama.pdf
[17] Petrobras, 2022. 2023-2027 Strategic Plan
[18] Hydrogen is that which is produced with electricity generated from renewable sources such as wind, solar and hydro.

INDUSTRY'S PRIORITY AGENDA

THE OIL EXPLORATION & PRODUCTION SEGMENT

The investment cycle in the oil and gas industry is long, with a significant time gap between the start of investments in exploratory activities, and the start of production and revenue generation, as per Figure 5.

Figure 5: Typical investment cycle for E&P



Source: Elaborated by IBP with data taken from ABESPETRO (2022)

Thus, investments in the sector have a long maturation period - five to seven years, on average - before an economically viable resource can be discovered. The production cycle can reach up to 35 years. It is also worth mentioning that, until the start of production, the projects operate with no revenue. This characteristic of a more prolonged phase of investments reflects the importance of tax regimes and legal security to attract new investors and maintain the existing ones.

Competition between countries to attract new investments in E&P takes place by designing tax and regulatory systems that are attractive and stimulate competition. This aspect is especially sensitive when it comes to Brazil, which has complex tax regimes, affecting competitiveness with international competitors.

To partially offset tax asymmetries in comparison to other countries, and ensure competition in the industry in Brazil, the REPETRO[19] customs regime has been implemented. Established in 1997, **REPETRO was the way designed to give Brazil the same fiscal treatment** used by other countries, without burdening investments or taxing revenues arising from production.

Without the presence of REPETRO, equipment purchased in the investment stage would suffer a significant increase in value due to customs taxes, which would make most of the exploration and production projects in Brazil, including the presalt, economically unfeasible. Thus, maintaining REPETRO is essential to ensure industry competitiveness in Brazil during exploratory stage – which concentrates investments to discover oil and gas fields and develop production – a stage in which there are no revenues from selling the oil.

Considering only the Exploration & Production (E&P) step, IBP projects

MORE THAN 344 THOUSAND JOBS, ON THE ANNUAL AVERAGE, UNTIL 2033. THE ESTIMATE POINTS TO MORE THAN USD 173 BILLION IN INVESTMENTS IN THIS PERIOD.

Without REPETRO, the industry would fail to generate almost US$ 130 billion in investments over the next 10 years, and 322 thousand jobs, on an annual average, would no longer be provided. For this reason, **maintaining REPETRO is essential for the country's competitiveness and for the sector as well.**

It is important to point out that REPETRO does not represent a subsidy or tax waiver, but rather the taxation transfer from the initial investment step to the effective production step. This model follows the best practices observed in other major oil producers, such as United States, Canada and Norway.

From a regulatory point of view, it is important to strengthen the participation of regulatory agencies by maintaining definitions based on technical criteria, speeding up processes, promoting broad debate with social participation and assertive supervision of regulated activities, thus, ensuring a healthy and transparent business environment that also protects customers interests.

Another priority agenda should be improving the environmental licensing process. Given the industry specificities and the large volume of activities occurring in the exploration and production of oil and gas, celerity, regulations and standardization are still necessary.

The current international oil market context - in which energy security is increasingly relevant and has intensified competition - reinforces **the importance of developing fiscal and regulatory frameworks to maintain and increase the country's attractiveness.** In this context, the existence of instruments that ensure competitiveness, such as REPETRO, the stability of legal and regulatory framework and the improvement of environmental licensing are essential matters.

[19] REPETRO is the special customs regime for exporting and importing goods intended for research and exploration of oil and natural gas pits

THE NATURAL GAS SEGMENT

In the context of energy transition, **natural gas plays an increasingly strategic role for the national energy matrix**, due to its lesser emission features when compared to fuels that are commonly used in the transport and industry, while being complementary used with renewable sources for electricity generation. According to the Energy Information Administration (EIA) estimates,

NATURAL GAS EMITS ABOUT 45% LESS THAN COAL AND 29% LESS THAN DIESEL[20].

Brazil has great potential to increase the share of natural gas in its matrix. However, the inputs utilization and investment viability rely on the creation of a broad and competitive market with several agents. Estimates of the 2031 Ten-Year Energy Plan by the Energy Research Company (EPE) indicate that the natural gas net production, which in 2021 was 64 million m3 /day, could reach the mark of 136 million m3 /day in 2031. The larger production will occur according to the increase in investments expected for the upcoming years, as shown in Figure 6.

Figure 6: Foreseen and indicative investments[1]

Rating	Foreseen		Indicatives (business as usual)	
	Projects	R$ bi	Projects	R$ bi
Drainage Pipelines	1	6.0	2	6.6
Transport Pipelines[2]				10.0
LNG Regasification Terminals	1	0.4	3	1.1
UPGNs and Hubs	1	2.4	1	3.5
Distribution[3]				5.5
TOTAL				26.7

Fonte: (1) EPE 2022 (PDE 2031); (2) ATGás 2022; (3) Abegás 2022

[20] Comparison using emissions in Kg of CO_2 per million of British Thermal Unit (BTU) based on data available in: https://www.eia.gov/environment/emissions/co2_vol_mass.php

Until recently, the natural gas chain links were dominated by a single agent. However, after signing the Term of Cessation Commitment (TCC), accorded between the Administrative Council of Economic Defense (CADE)21 and Petrobras, and the publication of Law 14.134/2021 (New Gas Law), new players have started operating in the sector, intensifying diversification and providing more competition in the natural gas sector. The arrival of new agents who share the same transport infrastructure offers **more cost transparency in a regulated economy sector.**

AMONG THE NEW GAS LAW BENEFITS ARE THE STIMULATION OF LOWER SUPPLY CONCENTRATION, INCREASE IN COMPETITION AND THIRD-PARTY ACCESS TO THE TRANSPORT NETWORK AND INFRASTRUCTURES (DRAINAGE PIPELINES, PROCESSING PLANTS AND REGASIFICATION TERMINALS).

The regulation improvement by ANP, the reconciliation of state regulations and tax adequacy, are elements still in progress and vital to attract investments in the sector.

It is worth noting that third-party access to outflow and processing infrastructure has already started, and Brazil has a perspective of gas supply increase as of 2024, with the implementation of new projects (Rota 3, SEAP and BM-C-33). As for the need for gas reinjection, the technique is known worldwide for increasing oil extraction in producing fields, in an essential strategy, in many cases, to turn viable and generate value for Exploration & Production projects. In addition, gas reinjection itself allows the storage of CO2 into reservoirs, so the gas is not released into the atmosphere, significantly contributing to goals for reducing greenhouse gas emissions (IGEE).

[21] The Administrative Council of Economic Defense (Cade) is a federal autarchy, affiliated to the Department of Justice, with headquarters and jurisdiction in the Federal District, which exercises, throughout the national territory, attributions given by Law nº 12.529/2011.

THE REFINERY AND DISTRIBUTION SEGMENT

The recent introduction of new players has transformed the Brazilian downstream market and brought a new investment cycle for the segment, compatible with the growing demand for derivatives in Brazil, as foreseen by 2031 EPE's Ten Year Energy Plan.

The movement to promote free competition will imply a new dynamic for the sector, providing the coexistence of multiple business models, new opportunities for investments in the expansion of product offerings (including second-generation biofuels), and improvements in logistics handling infrastructure, besides increasing competition between different supply routes that benefit the final consumer.

This scenario requires a healthy, competitive, and transparent business environment, guided by market mechanisms with pricing freedom, and regulatory, legal and tax stability.

Defending the pricing freedom, supported by Petroleum and Economic Freedom Laws, which define State intervention as only subsidiary and exceptional, is in line with the global commodity characteristic of derivatives, whose prices are defined based on numerous agents interactions, **reflects the balance between product demand and supply**, stimulating the search for greater efficiency and competitiveness while attracting new investments.

Starting with the entry of multiple players in refining and importing derivatives, it will be possible to develop the national market price indicators for fuels. Until this scenario becomes true, it is important that prices are aligned with the market, to provide transparency, predictability, and coherent signals to economic agents.

The historical price series for the last 20 years shows an alignment with international prices. But over these years, there have been longer periods of detachment in international prices, which have generated competitive distortions due to higher or lower prices than the reference quotations.

In the tax area, the fuel market will benefit from the implementation of a single-phase system for ICMS as provided for in the Constitution since 2001, and regulated by Complementary Law 192/22. Monophasia, incident only once to the producer or importer, with uniform and specific rates (ad rem, that is, establishing a fixed value per liter) throughout Brazil, represents an unprecedented advance to the sector tax simplification, reducing the costs related to verification, collection and inspection. This change eliminates rate differences between states, and, as a result, the breaches for tax evasion and irregular market. In addition, the tax ad rem rate, since it is specified per liter, disindexes the tax from the commodity price, thus, no longer contributing to price volatility.

Considering the transport impact to the greenhouse gas emissions, the refining and distribution sector makes an important contribution to the production of lowgrade fuels by adapting refineries to process renewable loads, taking advantage of the potential of the enormous national biomass to produce liquid hydrocarbons (LPG, diesel, aviation kerosene), with a relatively low investment in additional capital for existing refineries.

To this end, **it is mandatory that the public policy confirms the introduction of new technological routes for biodiesel production** on equal terms with the existing route to fulfill the mandate for blending diesel oil sold to society. Aside from the additional use of renewable biomass in Brazil, the introduction of new routes will lead to logistical optimizations, more competition between different products with benefits in terms of price, quality and offer to consumers and the valuation of refining assets, attracting investments to the industry.

Due to being the base of the economy, moving cargo and people, the downstream segment is important in economic terms, mainly due to the investments associated with the necessary infrastructure for the segment.

AN IBP ESTIMATE INDICATES THAT EVERY R$ 1 INVESTED IN LOGISTICS INFRASTRUCTURE GENERATES A TOTAL IMPACT OF R$ 3.82 ON GDP.

To meet the growth in demand over the next 10 years, more than **R$ 130 billion of investments in sectoral and multisectoral infrastructure** are needed, which puts the segment in a **relevant position for the country's economic growth**.

IT IS EXPECTED TO GENERATE 3.7 MILLION NEW JOB POSITIONS IN A DECADE.

However, materializing these projections depends on an attractive business environment for investments.

CONCLUSION

The oil and gas industry plays a strategic role in Brazil both from an energy and a socioeconomic point of view, considering its ability to attract investments, as well as generate jobs and income. The industry's robustness is associated with great changes that have occurred in recent decades towards its opening, which have increased competitiveness and turned Brazil into a **highly relevant player in the international market**. The contribution to the public sector is extremely relevant as well. According to ANP's calculations, Union, states and municipalities should collect R$ 90 billion in royalties and special participations in 2024, R$ 99 billion in 2025, R$ 108 billion in 2026, and R$ 105 billion in 2027. In 2024 alone, for instance, the states shall collect R$ 28 billion, while municipalities are expected to collect R$ 20 billion. The remaining revenues (R$ 42 billion) are divided between resources from the Union and the Special Fund.

The energy transition process also unfolds a series of opportunities for Brazil due to some specific characteristics of the country: the unique emission profile, the high share of renewable sources, as well as the relatively low carbon intensity in oil production give the country the possibility of being a protagonist in this industry. In this context, the industry can be an important ally through its contributions focused on technological solutions, such as offshore wind, CCUS, geothermal and green hydrogen.

It is also important to highlight that **bringing these opportunities to reality also depends on an attractive business environment**, which must go through setting up a legal, tax and regulatory system that promotes the sector competition.

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