

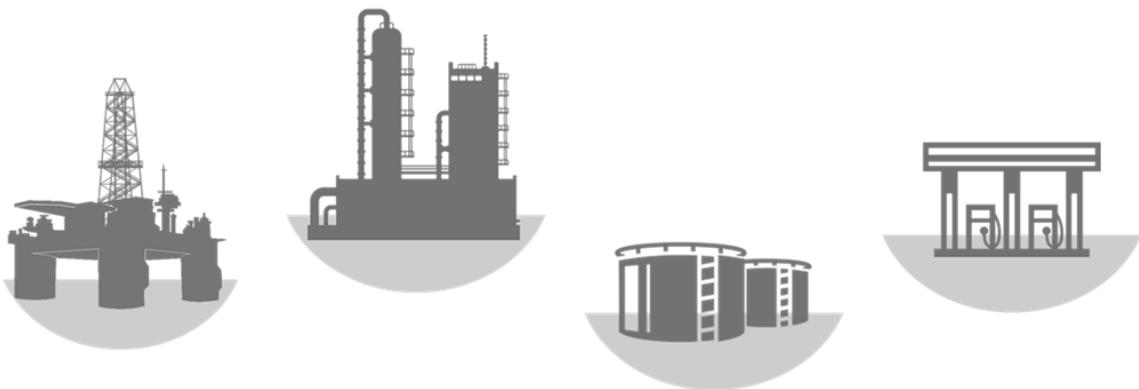


Empresa de Pesquisa Energética

# BRAZILIAN OIL & GAS REPORT

## 2021/2022

### TRENDS AND RECENT DEVELOPMENTS



**December 2022**  
**Rio de Janeiro, Brazil**



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## List of Abbreviations

- ADI** – Direct Act of Unconstitutionality
- ANP** – National Agency of Petroleum, Gas and Biofuels (Agência Nacional do Petróleo, Gás e Biocombustíveis)
- boe/d** – barrels of oil equivalent per day
- b/d** – barrels per day
- CADE** – Administrative Council for Economic Defense (Conselho Administrativo de Defesa Econômica)
- CBIO** – Decarbonization Credit (Crédito de Descarbonização por Biocombustíveis)
- CNODC** – CNPC Exploration & Development Company
- CNOOC** - China National Offshore Oil Corporation
- CNPE** – National Energy Policy Council (Conselho Nacional de Política Energética)
- Confaz** – National Council for Fiscal Policy
- E&P** – Exploration and Production
- EPE** – Energy Research Office (Empresa de Pesquisa Energética)
- FAME** – Fatty Acid Methyl Ester
- FID** – Final investment decision
- FPSO** – Floating Production Storage and Offloading Unit
- ICMS** – State Value Added Tax
- IMO** – International Maritime Organization
- LPG** – Liquefied Petroleum Gas
- LSFO** – Low Sulphur fuel oil
- LUBNOR** – Lubrificantes e Derivados de Petróleo do Nordeste
- MMBtu** – Million British thermal unit
- MME** – Ministry of Mines and Energy (Ministério de Minas e Energia)
- PEC** – Proposed Amendment to the Constitution
- PPI** – Investments Partnership Program
- PPSA** – Pré-Sal Petróleo S.A.
- PSC** – Production Sharing Contract (Contrato de Partilha de Produção)
- R&D** – Research and development
- Refap** – Alberto Pasqualini Refinery
- Regap** – Gabriel Passos Refinery
- Repar** – Presidente Getúlio Vargas Refinery
- Replan** – Paulínia Refinery
- RLAM** – Landulpho Alves Refinery
- Reman** – Isaac Sabbá Refinery
- RNEST** - Abreu e Lima Refinery
- RPCC** – Clara Camarão Refinery
- SAF** – Sustainable Aviation Fuel
- SIN** - National Interconnected System
- SIX** - Shale Industrialization Unit
- STF** – Supreme Federal Court
- TAG** – Transportadora Associada de Gás
- TBG** – Transportadora Brasileira Gasoduto Bolívia-Brasil

**TCC** – Term of Commitment for Termination of Practice (Termo de Compromisso de Cessação)

**TGS** – Terminal Gas Sul

**TRSP** – Terminal of Regaseification São Paulo

**ToR** – Transfer-of-Rights (Cessão Onerosa)

**ULSD** – Ultra-low Sulphur diesel

**YPFB** – Yacimientos Petrolíferos Fiscales Bolivianos

## Introduction

The Brazilian Oil & Gas Report is an annual publication, whose purpose is to outline the sector's trends and developments from July 2021 to June 2022. Facts that happened after June 2022 are not in the scope of this report, but can be found in Portuguese, in the “Boletim de Conjuntura da Indústria do Óleo & Gás (BOG)”, published semiannually.

In 2020 the Covid-19 pandemic had a considerable impact on Brazilian oil and gas demand, affecting investments in the sector. However, over the last semester of 2021 and the first of 2022 a recovery of the demand was perceived, with the oil product demand reaching levels similar to its previous peaks, even with air transportation and mobility still lagging.

While worldwide the pandemic has hit upstream investments hard, this was not the case for Brazil. Investments and production in Brazil did momentarily decline in 2020, but recovered quickly (especially investments). Following Petrobras' divestment program, the state-owned company reorganized its portfolio, shut or put up for sale many of its smaller and less productive fields, which had led to a decline in total national production. However, these fields have been or are being sold to private players that invest to revert recent declines. Meanwhile, Petrobras and other *majors* announced record investments in pre-salt fields, even while investments elsewhere were still lagging. This is led by relatively low development costs, low carbon intensity of the production, high field productivities and oil with low-Sulphur high middle-distillate output.

Interest into upcoming licensing rounds has been renewed after a reduction in the government take. A series of successful licensing rounds in the past few years, in addition to declining costs in the pre-salt, and investments already committed, should guarantee a considerable boost in production over the next decade. Prolific oil and gas reserves, declining exploration costs, increasing domestic demand, combined with more competitive and investor-friendly markets and legal security, should allow existing prospects for the country's oil and gas industry to materialize.

Oil and fuel prices have increased considerably in the first half of 2022, mainly due to the ongoing conflict between Russia and Ukraine, but also because of a stronger than forecast global demand growth. Domestically, retail prices also rose significantly. Ultra-low Sulphur diesel oil (ULSD) went through the sharpest increase, with 42%, while gasoline rose 8%, and liquefied petroleum gas (LPG) rose 10%, on average (ANP).

The Brazilian natural gas regulatory framework had important changes after the New Gas Law (Law No. 14,134 of April 8<sup>th</sup> 2021) promulgation, which established guidelines for the natural gas transport, import and export activities. The law also included natural gas outflow, treatment, processing, underground storage, conditioning, liquefaction, regasification and commercialization. This led to new companies starting to operate and others diversifying its activities, which boosts the development of natural gas infrastructure projects in Brazil. A important debate in progress is third-party access to essential facilities, with some interested companies suggesting creating a new midstream company responsible to manage gas flows and processing activities. New LNG terminal projects at the states of Pará (North), Pernambuco (Northeast), São Paulo (Southeast) and Santa Catarina (South) also advanced on their schedules.

The oil sector's mid- and downstream is also undergoing changes. Petrobras' refinery divestments were delayed by the pandemic; nevertheless the sale of four out of eight refineries was concluded. Once completed, these divestments are expected to stimulate other market participants to invest in the modernization of these refineries, and also in new maritime terminals, pipelines and railways. This investment is needed to support Brazil's growing fuel demand, as per capita income increases. Players have started committing resources to infrastructure, and even more investments are expected over the next few years.

## Upstream

### Licensing Rounds

The Brazilian upstream had two important licensing rounds in the second semester of 2021, as well as new oil discoveries, increase in the output of the Brazilian pre-salt and Petrobras divestments in oilfields and blocks. The period also held the 3<sup>rd</sup> cycle of the Open Acreage.

In December 17<sup>th</sup> 2021 the 2nd Transfer-of-Rights Surplus Licensing Round was held. Eleven oil companies were certified to participate, bidding for the areas of Atapu and Sépia, both in the Pre-Salt Polygon ([MME](#)). These two fields had been offered on November 2019, but failed to attract bids at the time<sup>1</sup>. An agreement between Petrobras and the Federal Government defined a financial compensation of US\$ 6.5 billion to be paid by the bidding winner to the company, as compensation for the investment already done in these two oil fields . This value does not include an earn-out based on future oil prices ([MME](#)) ([Petrobras](#)). Petrobras opted to confirm its preferential rights in both Fields, guaranteeing the company the operation of the fields and a minimum 30% share in each of them ([CNPE](#)) ([Petrobras](#)). The field of Sépia was awarded to the consortium formed by TotalEnergies (28%), Petronas (21%) and QP Brasil (21%), with a profit oil share of 37.43%<sup>2</sup>. Petrobras exercised its preferential rights clause to be the block's operator with a 30% stake. In the Atapu field, the bid winner was the consortium of Petrobras (52.5%), Shell (25%) and TotalEnergies (22.5%), with a profit oil share of 31.68%. The bids raised US\$ 2.13 billion (R\$ 11.14 billions) in signing bonus, making it the third most profitable oil round in Brazil's history ([ANP](#)).

Table 1 - Results for the 2<sup>nd</sup> ToR surplus Bidding Round

| Fields       | Signing Bonus                      | Minimum Profit Oil |
|--------------|------------------------------------|--------------------|
| <b>Sépia</b> | US\$ 1.4 billion (R\$ 7.1 billion) | 37.43%             |
| <b>Atapu</b> | US\$ 0.8 billion (R\$ 4.0 billion) | 31.68%             |

Source: Data from [ANP](#)

<sup>1</sup> In order to increase the attractiveness of the licensing round, Brazil made some changes in the technical and economical parameters for the bidding process, which included reducing signing bonuses for Sépia from R\$ 22.9 billion to R\$ 7.1 billion, and for Atapu from R\$ 13.7 to R\$ 4.0 billion, while minimum-profit oil was reduced from 27.8% to 15.0% in Sépia, and from 26.3% to 5.8% in Atapu([CNPE](#)).

<sup>2</sup> Petrobras presented an individual bid for the Sépia field, however, it presented a profit share oil of 30.30%, inferior to the bid presented by the consortium formed by TotalEnergies, Petronas and QP Brasil ([ANP](#)).

The 17<sup>th</sup> Concession Licensing Round was held in October 7<sup>th</sup> 2021, with nine companies registered to participate ([Agência Brasil](#)). The licensing round was criticized because of alleged environmental risks related to oil and gas production in some of the areas ([ANP](#)) ([Câmara dos Deputados](#)). Notwithstanding, a total of 92 blocks were leased in the offshore basins of Pelotas, Potiguar, Campos and Santos, with 5 receiving offers, resulting in total bonus fees of US\$ 7 million (R\$ 37 millions) and minimal investment commitments of US\$ 26 millions (R\$ 136.3 millions) in the exploration phase ([Agência Brasil](#)).

Furthermore, the Open Acreage consolidated its role as the preferential mode for leasing blocks for E&P. The Resolution CNPE n<sup>o</sup> 27/2021 authorizes the National Agency of Petroleum, Natural Gas and Biofuels (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis – ANP) to define and lease, in concession regimes, areas in onshore and offshore basins via the Open Acreage cycles, including the blocks that would be tendered in the 18<sup>th</sup> Concession Licensing Round, which was expected for 2022 ([MME](#)) ([epbr](#)). Furthermore, CNPE approved technical and economical parameters for licensing 11 blocks in the Production Sharing regime, authorizing ANP to offer them in the Open Acreage system. The authorization comprises areas previously expected to be auctioned in the 7<sup>th</sup> and 8<sup>th</sup> Production Sharing Licensing Rounds, along with areas that did not attract bids in past Production Sharing rounds. Currently, 11 pre-salt areas are qualified to be tendered in this bidding process<sup>3</sup> ([ANP](#)). On this upcoming tender process, Petrobras has manifested interest in exercising its preemptive right in the Água Marinha and Norte de Brava areas, located in the Campos Basin, ([CNPE](#); [Petrobras](#)).

Table 2 – Licensing rounds in Brazil between July/2021 and June/2022

| Round  | Date          | Description  |
|--|---------------|--|
| <b>17<sup>th</sup> Concession Licensing Round</b>                | October/2021  | 92 <i>offshore</i> blocks in Campos, Pelotas, Potiguar and Santos basins                     |
| <b>2<sup>nd</sup> Transfer-of-Rights surplus Licensing Round</b> | December/2021 | Surplus volumes in the Sépia and Atapu fields  |
| <b>3<sup>rd</sup> Open Acreage Cycle</b>                         | April/2022    | Blocks in the Espírito Santo, Potiguar, Recôncavo, Santos, Sergipe-Alagoas and Tucano basins |

Source: Data from [ANP](#)

<sup>3</sup> The offshore oil and gas blocks to be tendered are: Água Marinha, Bumerangue, Cruzeiro do Sul, Esmeralda, Itaimbezinho, Jade, Norte de Brava, Sudoeste de Sagitário, Tupinambá and Turmalina ([ANP](#)).

A summary of past and upcoming rounds can be seen in Figure 1.

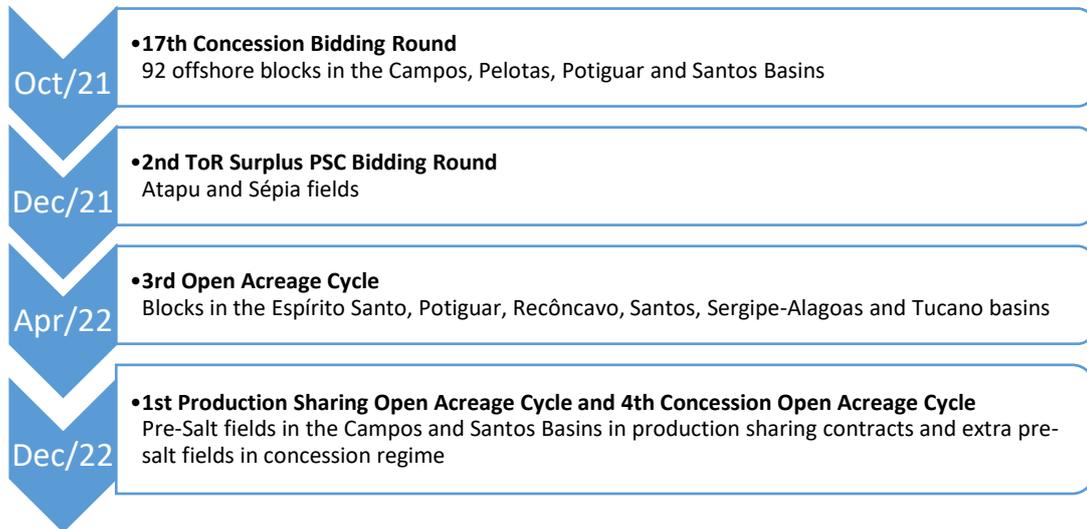


Figure 1 – Summary of recent Brazilian licensing rounds

Source: Data from [ANP](#)

By the end of 2021, a schedule was defined for the 3<sup>rd</sup> Cycle of Open Acreage of exploratory blocks and areas in mature sedimentary basins, leasing concession contracts for exploration and production of oil and natural gas. The bidding round was carried out in April 13<sup>th</sup> 2022 ([ANP](#)). A total of 59 exploratory blocks were acquired in six basins, which generated US\$ 81 million (R\$ 422 million) in signing bonus fees, and the leasing of the areas will result in at least US\$ 78 million (R\$ 406 million) in exploration investments ([PPI](#)).

Finally, in the beginning of 2020 co-participation agreements were signed for the Itapu and Búzios fields, whose transfer of rights surplus contracts had been signed in 2021. With the agreements, a total amount of compensation to Petrobras was fixed in US\$ 29 billion (recoverable as cost oil by the TOR+ Contract), and US\$ 2.9 billion in cash, already paid by CNODC and CNOOC<sup>4</sup> ([ANP](#)) ([Petrobras](#)) ([Petrobras](#)) ([Petrobras](#)). The resolution of these disputes favours more investments in the Brazilian upstream, reinforcing legal certainty.

<sup>4</sup> After the revision and acquisitions, final shares in the Búzios field are as follows: 88.99% for Petrobras, 7.34% for CNOCC and 3.67% for CNODC. ([Petrobras](#))

## Other highlights in Upstream

The rise in global oil prices had a positive impact in government tax revenues. From January to May 2022, oil producing companies paid over US\$ 4.4 billion (R\$ 23 billion) in government take under the Petroleum Law — an almost 80% increase in comparison with the same period of 2021 ([Agência Brasil](#)).

Among the main upstream divestments concluded by Petrobras over the last year, the company sold the Albacora Leste field to Prio for US\$ 2.2 billion ([Prio](#)), Polo Potiguar to 3R Petroleum for US\$ 1.38 billion, Polo Recôncavo to 3R Petroleum for US\$ 256 million ([3R Petroleum](#)), Polo Norte Capixaba to Seacrest for US\$ 544 million ([Petrobras](#)) and Polo Golfinho and Polo Camarupim to BW Energy for US\$ 75 million ([Petrobras](#)). Petrobras is still advancing with the divestment processes for the Albacora field, in Campos Basin, Polo Bahia Terra ([Petrobras](#)) and the company's 20% participation in the MP Gulf of Mexico joint-venture, that operates offshore assets in the Gulf of Mexico ([Petrobras](#)).

Pre-salt production accounted for 75% of the Brazilian production in June 2022 ([ANP](#)), an ascending trend, explained by the high productivity of giant fields, such as Búzios and Tupi, in the Santos Basin. Meanwhile, Campos Basin faces a decrease in production, as consequence of maturing fields, the deactivation of some platforms during the pandemic, Petrobras divestments and maintenances of floating production storage and offloading (FPSO) units and platforms ([Petrobras](#)). Petrobras signed a contract with Baker Hughes for the provision of subsea equipment, like manifold systems and control modules in the areas of Marlim and Roncador, in Campos Basin, aiming to drive efficiencies up, reduce costs and improve execution speed ([Baker Hughes](#)). Figure 2 shows the evolution of Brazilian production since 2019 and the output changes in Campos and Santos Basin.

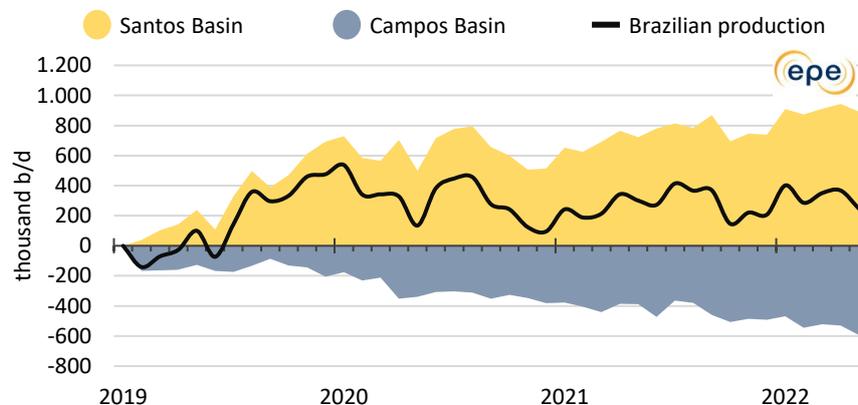


Figure 2 - National oil & gas production and accumulated monthly output change in Campos and Santos Basins since January 2019

Source: Data from [ANP](#)

In November 2021, Petrobras released its new Strategic Plan 2022-2026. The plan reinforced its focus on world-class giant oil and gas fields in deep and ultradeep waters, with high operational efficiency. Other key points of the Petrobras strategy are cost reduction, energy transition and the reduction of capital costs, in synergy with the company’s divestment plan ([Petrobras](#)). Petrobras has continued to sell onshore and shallow waters assets, announcing teasers or the signature of contracts in producing areas in states such as Rio de Janeiro, Espírito Santo, Rio Grande do Norte, Sergipe and Bahia ([EPE](#)). The sale of mature fields is expected to attract companies specialized in these types of assets, willing to invest in order to enhance oil recovery and stem the decline rates of these fields. Constrained for cash and with a focus on debt reduction, Petrobras had been focusing on new and more productive pre-salt fields, shifting away from mature fields. The resulting lack of investments accelerated their decline rates.

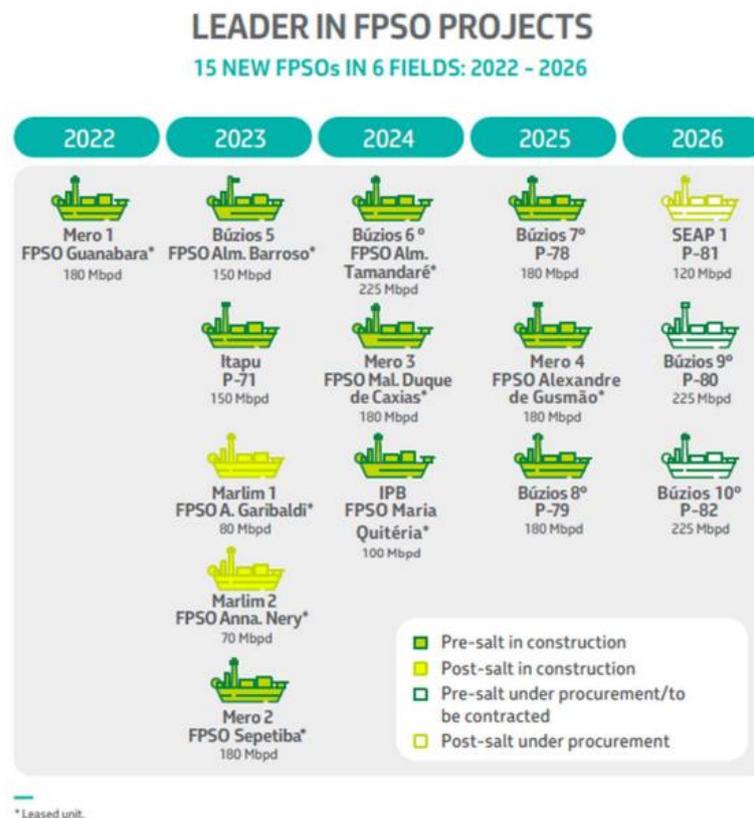


Figure 3 – Petrobras’ FPSOs under construction

Source: [Petrobras](#)

The Federal Government's forecast indicates a significant increase in future oil production, to 5.2 million b/d in 2031. This volume is considerably higher than the 2.9 million b/d average registered in 2021. Natural gas is also forecast to increase from 134 million m<sup>3</sup>/d in 2021 to 276 million m<sup>3</sup>/d ([EPE](#)) ([EPE](#)). Those forecasts are based on assumptions that the best-known assets will be developed by Petrobras or other international oil companies (IOCs), with exploration reaching new record highs. Meanwhile, midsize assets are being sold to smaller companies, who usually manage to extract more oil and gas volumes from these oil fields. In this scenario Brazil's production is expected to continue to grow, especially due to giant fields Búzios and Mero.

## Mid- and Downstream

### Refining

The Brazilian refining sector is in the middle of a major transformation. The refining park has a daily oil processing capacity of 2.3 million barrels per day (b/d). Previously, 98% of that capacity was owned by Petrobras ([ANP](#)), but that number is now 81%, with the company advancing with its divestment program. The stated objective of the company is to sell a total capacity of up to 1.1 million b/d throughout the country, as can be seen in Figure 4. According to an agreement (TCC – *Termo de Compromisso de Cessação de Prática*) signed between the company and the Brazilian antitrust regulator, CADE<sup>5</sup> ([EPE](#)), these divestments were originally set to be completed by mid-2021. This date has been postponed due to the pandemic ([Petrobras](#)). Over the semester, Petrobras sold Lubnor, in Fortaleza/CE, to Grepar Participações for US\$ 34 million ([Petrobras](#)), in addition to the sale of RPCC, located in Guamaré/RN, as an integral part of the Potiguar integrated asset ([3R Petroleum](#)). The sale of the Reman refinery, from Manaus/AM, to the Atem group, announced in 2021, was approved by CADE in the first half of 2022 ([Petrobras](#)). In June, Petrobras restarted the sale processes for the refineries RNEST (Ipojuca/PE), Repar (Araucária/PR) and Refap (Canoas/RS) ([Petrobras](#)). Another Petrobras divestment in the downstream was the sale of its entire stake (27.88%) in Deten Química<sup>4</sup> to Cepsa Química, for US\$ 98 million (R\$ 514 million) ([Petrobras](#)). The company also opened a new tender process for the sale of the Nitrogen Fertilizer Unit III (UFN-III)<sup>5</sup>, in Três Lagoas/MS ([Petrobras](#)).

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<sup>5</sup> CNPE Resolution nº 9/2019 established guidelines for the promotion of free competition in the country's refining activity, with the objective of stimulating the entry of new players and attracting investments to the sector, guaranteeing supply, and avoiding the creation of production, transport and distribution monopolies. The antitrust regulator understood that there was a high concentration in the refining segment, and demands that Petrobras completes the divestment of all assets by the end of 2021 and sells each asset separately in order to guarantee market competition after the sale. The regulator has also restricted buyers from acquiring several pairs of refineries because they are located in the same region, which would constrain competition.



Figure 4 – Refineries in the divestment process

Source: EPE

## Portfolio Management: Evolution of Projects



Figure 5 – Evolution of Petrobras concluded and ongoing divestments

Source: [Petrobras](#)

Petrobras is still investing in its refining sector though. From 2022 to 2026, US\$ 4 billion will be spent focused on increasing operational and energy efficiencies, reducing emissions and production of high quality fuels ([Petrobras](#)). The slate of products has been changing considerably in Brazil, in particular because Heavy Duty Trucks, manufactured after 2012, can only operate with low-Sulphur fuel ([EPE](#)). This has led to an increasing low-Sulphur demand, that has been forcing Petrobras to invest in its refining park. The company announced it is going to build one hydrotreating unit and revamp two other units by 2025 to increase its low-Sulphur diesel output ([Petrobras](#)). With the additional hydrotreating capacity and the planned divestment of refineries, Petrobras expects to produce only low-Sulphur diesel by 2026 ([Petrobras](#)). Refineries have established records for low Sulphur diesel and fuel oil production in the first half of 2022 ([Petrobras](#)).

Petrobras is also undergoing a Digital Transformation<sup>6</sup> program and efficiency program (RefTOP) in all its remaining refineries ([Petrobras](#)). The RefTOP program intends to invest up to US\$ 300 million until 2025 to increase efficiency in refineries ([Petrobras](#)).

<sup>6</sup> Petrobras is implementing the Digital Twins program in its refineries. It is a rigorous and integrated digital representation of every refinery process. This helps the operator to achieve ideal operating conditions, optimizing output and profitability. Other digital tools are the Data Lake, a data specialist tool, the Trip Detector, that predicts outages, the Smart Alarm, that helps with real-time decision-making.

## Natural Gas

As mentioned before, natural gas is an important component in Petrobras' and the Government's plans. The natural gas industry is also in the midst of a structural transformation after the promulgation of the New Gas Law (Law No. 14,134 of April 8<sup>th</sup>, 2021). An element that will contribute to the market competitiveness is reducing Petrobras' market share. There has been a lot of progress in this front.

An unexpected event took place regarding the import of Bolivian gas. The Bolivian authorities announced a new gas sale contract with Argentina during the winter of 2022. This contract led to Bolivia reducing gas exports to Brazil by 30%. Bolivia and Petrobras have a long-term contract valid until 2026. However, the country preferred to pay the contractually stipulated fine. As a result, Petrobras had to resort to the international LNG market, paying a higher price, as the Bolivian gas import contract is priced at around 10% of the value of Brent oil (\$11 per MMBtu by the end of June), while LNG on the spot market was around US\$25 per MMBtu ([EPBR](#)) ([Agência Brasil](#)) ([Brasil Energia](#)).

In the first semester, some innovative projects were announced in the Brazilian gas industry. Of note are the small-scale projects announced by Eneva, which signed an agreement with Suzano to supply LNG to the pulp and paper company's industrial facilities in Imperatriz/MA, and a contract with Vale to supply gas to their facilities in São Luís/MA. The Company will supply LNG from its concessions in the Parnaíba Basin, where an additional natural gas liquefaction unit with a capacity of 600.000 m<sup>3</sup>/d will be installed, mainly intended to meet the contracts of Vale and Suzano. The total estimated investment for the implementation of the two liquefaction units is US\$ 187 million (R\$ 980 million). These contracts are the first to use LNG through small-scale road transport with supply directly to an industrial customer. ([Eneva](#)) ([Abegás](#)).



Figure 6 – Existing and Future LNG terminals in Brazil

Source: EPE

Brazil has three private LNG terminals – Porto do Açu/RJ, Barra dos Coqueiros/SE and Baía de Todos os Santos/BA (leased from Petrobras) – and state-owned Petrobras holds two terminals – Baía de Guanabara /RJ and Pecém/CE. In accordance with the Commitment for Termination of Practice signed with Cade for the opening of natural gas domestic market, Petrobras leased its Baía de Todos os Santos terminal to Exceletrate Energy Comercializadora de Gás Natural, until December 2023 ([Petrobras](#)) ([Petrobras](#)).

Regarding new natural gas infrastructure, progress was made in last 12 months for the implementation of two new LNG terminals. The terminal Gás Sul (TGS), in Santa Catarina state, reached 60% Project completion, with conclusion expected for August 2022 ([Canal Energia](#)). The Terminal de São Paulo (TRSP) project was also initiated during the first half of 2022. Furthermore, the enterprise obtained a favourable ruling regarding the connection of the terminal with the pipeline Subida da Serra, linking the project with distribution pipelines owned by the São Paulo state gas distribution company Comgas ([EPBR](#)).

The Gaslub Natural Gas Processing Unit (UPGN) passed its first operational tests with the reception of unprocessed gas originated from Cabiúnas terminal. The GasLub UPGN unit is part of the Integrated Project Rota 3, and when fully operational will be able to gather and process up to 21 million m<sup>3</sup>/d of natural gas from pre-salt fields ([Petrobras](#)).([Petrobras](#)).

Petrobras finalized the sale of 51% of Gaspetro to Compass. The transaction was concluded for the amount of R\$ 2.097 billion, fully paid off. Compass and Mitsui informed that Gaspetro is renamed Commit Gás. ([Petrobras](#)) ([EPBR](#)). Another important point to highlight is that more than

100 gas transport service contracts were signed until June 2022, all with effective movement in the transmission system (ANP).

A broader competition is also expected in the Brazilian natural gas market, with at least eleven companies obtaining licenses for commercializing gas between January and June (ANP) (ANP) (ANP) (ANP) (ANP) (ANP) (ANP) (ANP) (ANP). Other five companies received authorizations for carrying natural gas (ANP) (ANP) (ANP) (ANP) (ANP).

### Oil Products Prices and Demand

Early 2022 saw a significant increase in oil product prices, mainly as a result of the conflict between Russia and Ukraine, but also as the recovery of global demand exceeded the expected volumes. The rise in global fuel prices affected the domestic market, with ULSD having a 42% increase and LPG having a 10% adjustment in the average resale prices throughout the semester (ANP). In the natural gas distribution, prices for the residential consumer increased by 16%, and for the industrial, residential, commercial and automotive segments, up to 22% compared to December 2021 (MME). The rise in fuel prices contributed to the growth of Brazilian economy inflation, and a series of discussions on the matter of how to mitigate or dampen these prices' increase. In this context, the Government introduced a spate of actions.

In March, the Supplementary Law nº 192/2022 was sanctioned, establishing the single-phase incidence<sup>7</sup> of the Value Added State Tax (ICMS) for diesel oil, biodiesel, gasoline, anhydrous ethanol and LPG. The Law also defines a standard throughout the national territory, which can be differentiated by product, and that these rates are specific (*ad rem*) per unit of measure adopted (Brasil)<sup>8</sup>. This new law was not immediately applied, which led the Presidency to file a Direct Act of Unconstitutionality (*Ação Direta de Inconstitucionalidade - ADI*) nº 7,164. In, Brazil's supreme court (*Supremo Tribunal Federal - STF*) granted an injunction suspending the effect of two clauses agreed among the States<sup>9</sup>. The States had implemented single-phase taxes on diesel. However, by authorizing discounts to be chosen by each State for a period of 12 months, this effectively meant the tax had not changes, and was not the same throughout the country (STF).

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<sup>7</sup> In order to avoid illegal tax evasion, facilitate the tax control processes and tax collection, the legislation appoints a single taxpayer of a product's chain as the sole liable party. This taxpayer will collect the ICMS due by all parties, and therefore has to forecast what the price paid by the final consumer will be.

<sup>8</sup> Before, ICMS state taxes were set by each State, therefore varying considerably. Additionally, these taxes were based on a percentage, therefore *ad valorem*, not *ad rem*. Which means these taxes varied depending on the product prices. This tends to leverage changes, since volatility is increased by *ad valorem* taxes.

<sup>9</sup> Modifications relative to ICMS state taxes have to be agreed unanimously within the national Council for Fiscal Policy (*Conselho Nacional de Política Fazendária - Confaz*). However, these have to adhere to some limits imposed by the Federal Constitution.

Subsequently, Supplementary Law nº 194/2022 was sanctioned in June. The law introduced a list of products and services now considered as essential. This list included fuels, electricity, public transportation and telecommunications. The tax rate for ICMS on essential products and services is limited at 17% or 18%, depending on the State ([Brasil](#))<sup>10</sup>.

Regarding oil product demand, the pandemic did not impact freight transport negatively. On the contrary, rising international prices coincided with a currency devaluation, and an increasing agricultural production. This led to an elevation in road transport, and diesel demand. This was not the case for passenger transport, that was significantly impacted by the pandemic and remote work. This trend started to reverse by the end of 2021. And continued in the first half of 2022. This is reflected in fuel sales throughout the last year. The increase in prices in the first half of 2022, however, impacted the aviation sector and the gasoline and LPG markets, as shown in Figure 7.

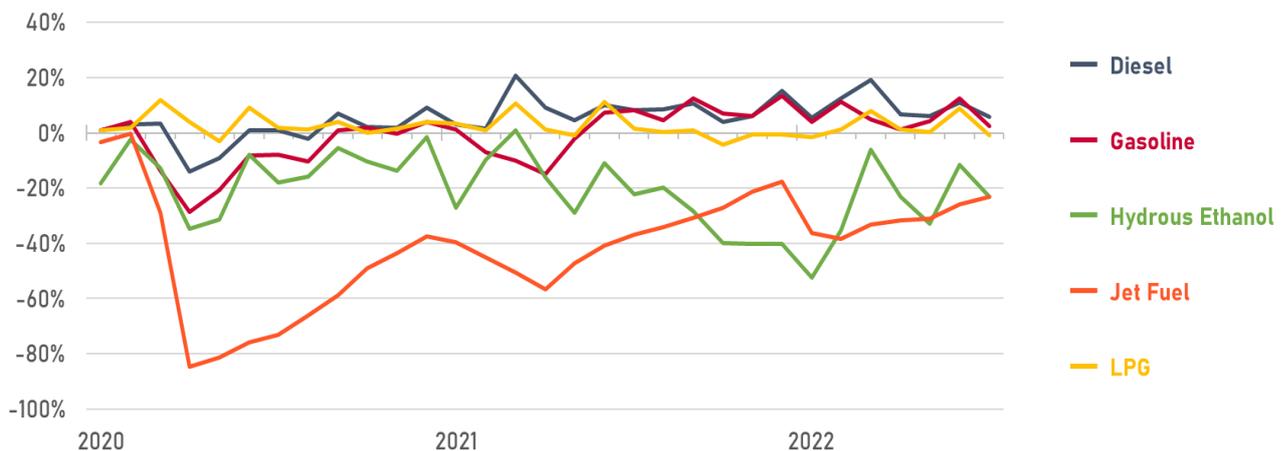


Figure 7 – Change in fuel sales from pre-pandemic levels, %

Source: Data from [ANP](#)

<sup>10</sup> In July, the Proposed Amendment to the Constitution (*Proposta de Emenda à Constituição - PEC*) nº 15/2022 was approved, establishing a State of Emergency until the end of the year. This law was implemented on the grounds that the soaring price of fuels, in foreign and domestic markets, caused the deterioration of the purchasing power of the population, overburdening the most vulnerable sectors in the population. The text allows for supplemental expenses until December 31<sup>st</sup> 2022, such as an increase in Auxílio Gás (a subsidy for LPG acquisition for vulnerable families) and the institution of monthly aid for autonomous truck drivers and taxi drivers ([Congresso Nacional](#)).

Hydrous ethanol, which in Brazil directly competes with gasoline since most of the automobile fleet is flex-fuel, experienced an even worse blow. Some sugarcane mills have flexibility in their output, choosing to produce more ethanol or sugar. Many producers decided to make sugar instead, which can be exported, and was interestingly priced due to the currency depreciation. Other ethanol producers that don't have that flexibility had to curtail their production. This caused a significant fall in ethanol supply. This situation seems to have permitted gasoline demand to avoid further losses ([EPE](#)).

Jet fuel was the most impacted fuel by the pandemic. Demand had been recovering steadily, reaching 63% of its pre-pandemic levels. From February to April demand fell as flights were canceled due to the lockdowns, but these started being reversed in May. LPG, which is mainly used as a cooking fuel in Brazil, increased due to the pandemic, and has been maintaining consumption levels above those registered before the pandemic ([EPE](#)).

Diesel demand was very resilient, and demand between July 2021 and June 2022 has been on average 4.1% above the consumption over the previous 12 months ([ANP](#)). This can be explained by the fact that road transportation is responsible for most of the freight in Brazil. The recovery in consumption, the increase in online shopping, and record agribusiness exports, hauled around the country mainly by heavy duty trucks, drove distillate demand ([EPE](#)). Brazil reached new grain production records in 2020 and 2021 ([IBGE](#)), and the local currency's devaluation and record commodity prices led to the best historical performance in agricultural exports ([MAPA](#)), increasing diesel demand by agricultural machines and trucks.

Refinery utilization rates surged to a recent record in the first half of 2022, in the wake of the Ukraine conflict and the rapidly increasing domestic demand, as shown in Figure 8. The production was focused on diesel, because of the considerable uncertainties regarding the availability of product in the context of Russian embargos, leading to record diesel outputs.

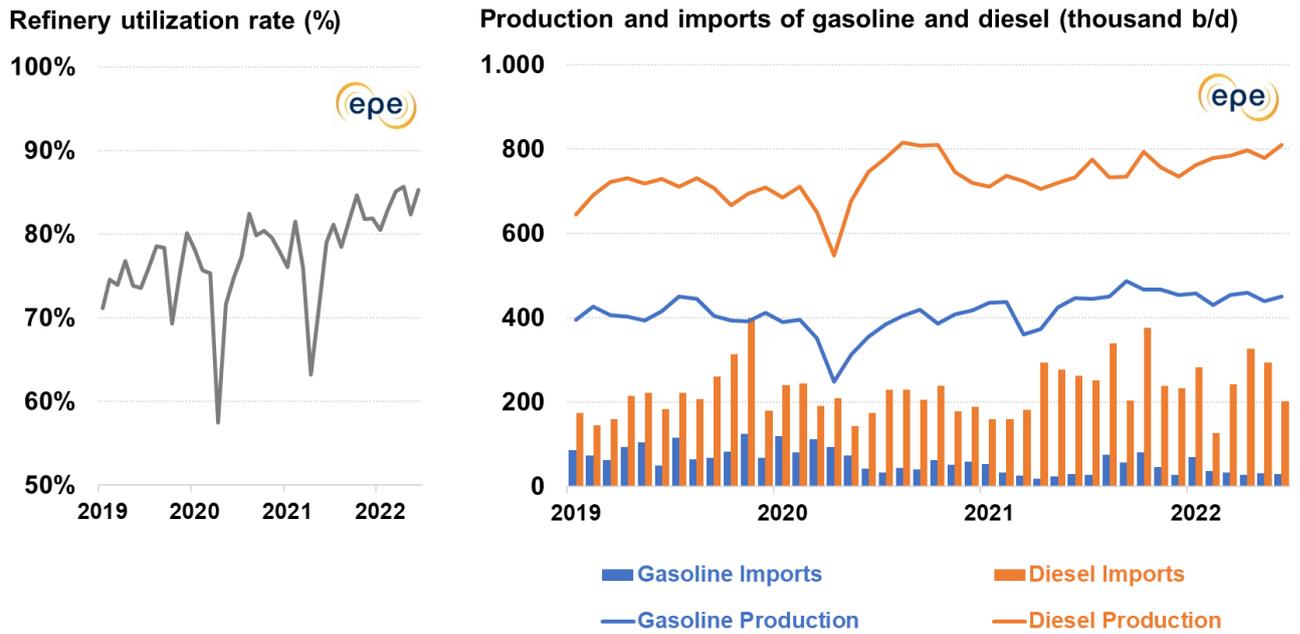


Figure 8 – Brazilian refinery utilization rate, and production and imports of gasoline and diesel

Source: Data from [ANP](#) and [ANP](#)

Refineries have also focused on producing low-Sulphur fuel oil (LSFO). Figure 9 shows how LSFO exports increased considerably since 2020, especially due to the impacts of new IMO Sulphur restrictions on marine fuels. Higher refinery utilization rates have also affected Brazilian oil trade, partially explaining the declining oil exports in the first half of 2022.

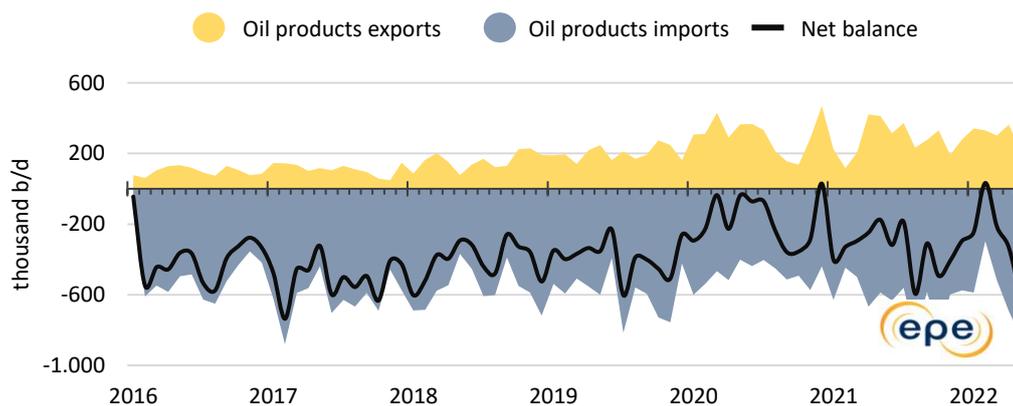


Figure 9 – Oil product exports and imports

Source: Data from [ANP](#)

Note: Imports are accounted as negative, while exports are accounted as positive. The supply of jet fuel to foreign airships and fuel oil for foreign ships was not considered.

The local currency devalued significantly as the first coronavirus wave reduced the country's prospects. More recently, this has been reversing, as can be seen in Figure 10.

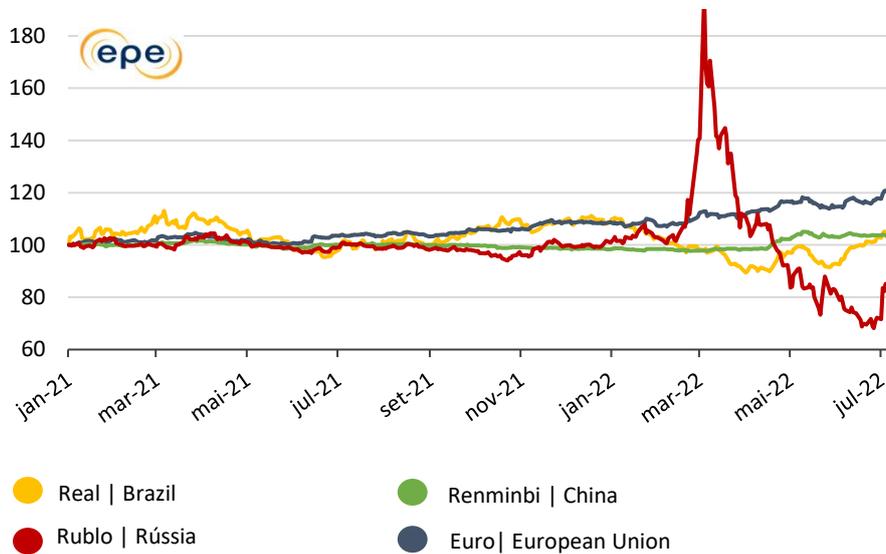


Figure 10 – Selected currencies in relation to the USD (base 100 in January 2021)

Source: Data from [Banco Central do Brasil](#)

The Ukrainian conflict raised international fuel prices considerably. This was compounded by a devalued domestic currency, pressuring domestic fuel prices, as can be seen in Figure 11. Petrobras, the dominant fuel supplier in Brazil, readjusted local diesel prices four times within the first semester of 2022, increasing them by 42% ([Petrobras](#)). Local gasoline prices increased by 10% over the same period.

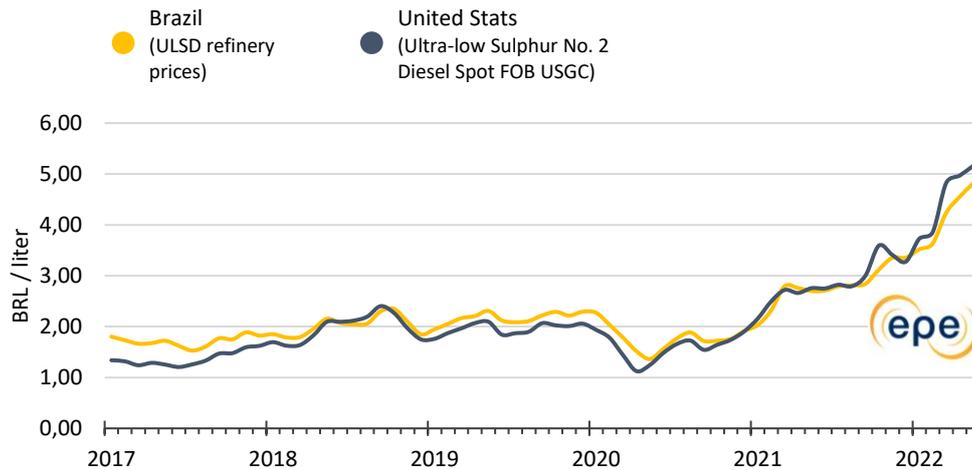


Figure 11 – Reference diesel prices in the Gulf of Mexico (USGC) and refinery prices in Brazil

Source: Data from [ANP](#), [EIA](#) and [Banco Central do Brasil](#)

Petrobras reaffirmed its commitment to its pricing policy based on the international price parity ([Petrobras](#)). However, some changes were made on the company's management to reconcile the interests of consumers and shareholders, without disrespecting the international price parity, which appeased the market ([Petrobras](#)).

## Biofuels

Biofuels are very important to understand the Brazilian fuel demand. The national biofuels' production has been steadily growing, as can be seen in Figure 12.

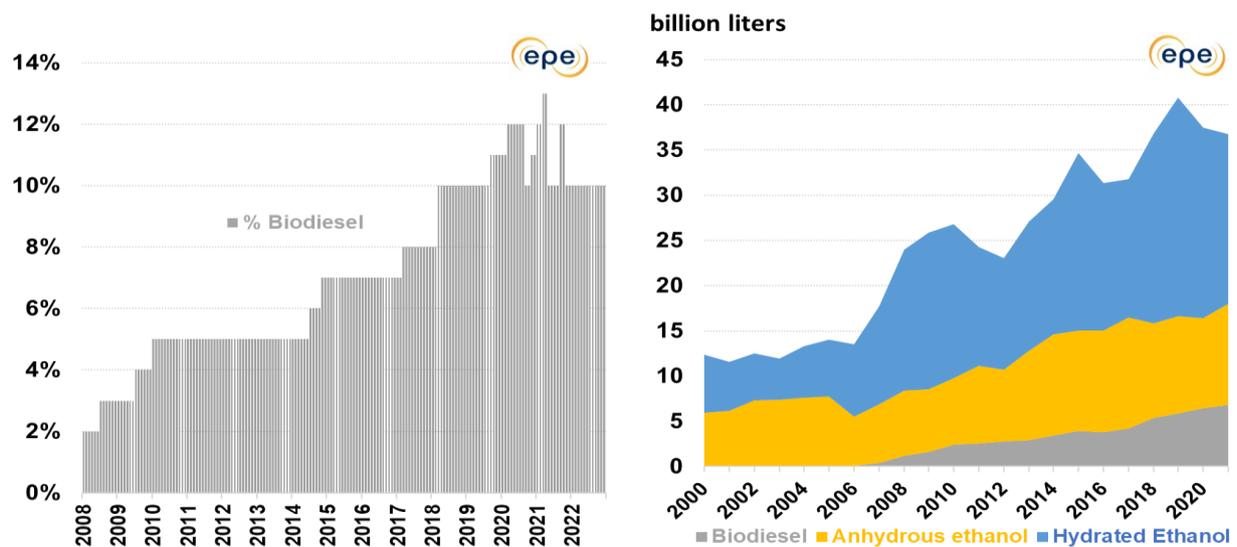


Figure 12 – Mandatory biodiesel addition and total biofuel consumption

Source: Data from [ANP](#) and [ANP](#)

One of the reasons for this growth is the increase in the mandatory biodiesel addition, that was elevated to 13% in March 2021 ([ANP](#)). Biofuel use has also been continually incentivized by local fuel carbon prices (CBIO), implemented by the RenovaBio law, instituted in 2017 ([ANP](#); [MME](#)). These CBIOs started being mandatory for fuel distributors selling fossil fuels in 2020 and are traded in the Brazilian stock exchange. These credits are generated by biofuel producers, that can sell them in the exchange. However, biodiesel prices increased significantly since 2021. Brazil reduced mandatory biodiesel addition to 10% in volume in the last two months of 2021 and for 2022 ([ANP](#); [ANP](#); [MME](#); [MME](#)). This was done to limit the rise in diesel prices for final consumers.

Despite these setbacks, Brazil has been increasingly betting on advanced fuels and biofuels to help decarbonize its economy. The Government has launched the Future Fuel Program (*Combustível do Futuro*). The main objective of the program is to promote the use of alternative energy sources and to strengthen the national technological development by encouraging sustainable fuels, such as 2<sup>nd</sup> generation ethanol and ethanol fuel cells, biomethane, paraffinic and FAME biodiesel, but also synthetic fuels ([MME](#)) ([MME](#)) ([MME](#)). The country is also discussing the directives to create a National Hydrogen Program. Among the objectives is to incentivize its production and use (in sectors such as transport and steel mills), but also to develop distribution infrastructure, research and development (R&D) and legal and regulatory framework ([MME](#)) ([MME](#)).

Petrobras launched its Biorefining 2030 Program to help direct its actions towards carbon reduction and energy efficiency ([Petrobras](#)), which includes the production of renewable diesel and sustainable aviation fuel (SAF) in its refineries by 2030 ([Petrobras](#)). Recently, tests were performed in Repar refinery to produce diesel with a 5% renewable content directly in the refinery ([Petrobras](#)).

## Final Remarks

Since the discovery of prolific pre-salt province in Brazil's southeastern region in 2006, the country has been hailed as the next big oil and gas producer. Over the past few years, changes in the market, in company strategies and in regulations have started to allow these expectations to materialize. Even the Covid-19 pandemic and the impact it had on the global upstream oil and gas industry has not materially dimmed projects, investments decisions and forecasts for this industry in Brazil.

Domestic oil and gas production is recovering its previous peaks in 2022, as a reduction of investments in mature and less productive fields, especially in recent years, and platform maintenance during the pandemic reduced overall production. However, these fields have been or are being sold to private players that are starting to invest to revert recent production declines and enhance oil recovery. When considering new FPSOs that are in construction, and the productivity and size of the fields that will start producing, Brazil's production is expected to reach successive records over the next few years. Improvements in the bidding process, competitive assets, resilient projects, world-class resources and legal security allowed Brazil to realize new licensing rounds. EPE forecasts a considerable growth, with the country's production expected to reach 5.2 million b/d of oil and 91 million m<sup>3</sup>/d of natural gas in 2031.

The natural gas market is in the midst of a structural transformation, by undergoing an opening process that is attracting ever more competition, players and new investments. A new regulatory framework, introduced through the New Gas Law, allowed for more predictability. Combined with Petrobras' divestments, the sector is changing considerably. New companies started operating and diversifying its activities, which in turn favors the approval and development of new natural gas infrastructure projects. Third party access has also become more widespread, allowing more companies to use Petrobras' infrastructure, which in turn stimulates more supply, promoting more demand. Brazil's natural gas supply has been diversifying, with LNG imports becoming more relevant, and pre-salt pipelines allowing more natural gas to reach Brazil's shores. All of this is bound to increase the size of the natural gas market, and its efficiency.

The fuel sector is also a highlight. Although the sector was heavily impacted by the pandemic, this negative impact has been quickly reversed, with diesel oil demand having surpassed pre-pandemic levels. The extreme volatility in demand was adequately handled by the local refineries and import infrastructure, that has become ever more diversified, and currently refineries are operating at levels higher than 2019. The refining sector is also becoming less concentrated. These factors should contribute to increase investments in Brazilian refining.

Oil supply should continue to increase, driven by future and already committed investments, especially due to the prolific reserves and declining exploration costs. Oil product and natural gas demand should also continue growing, as *per capita* income increases, and more people become part of the middle class. This growth will guarantee demand for new downstream assets, which, in combination with Brazilian energy policies, improvements in legal and regulatory framework and promoting a more competitive and investor-friendly market should attract more investments and players.