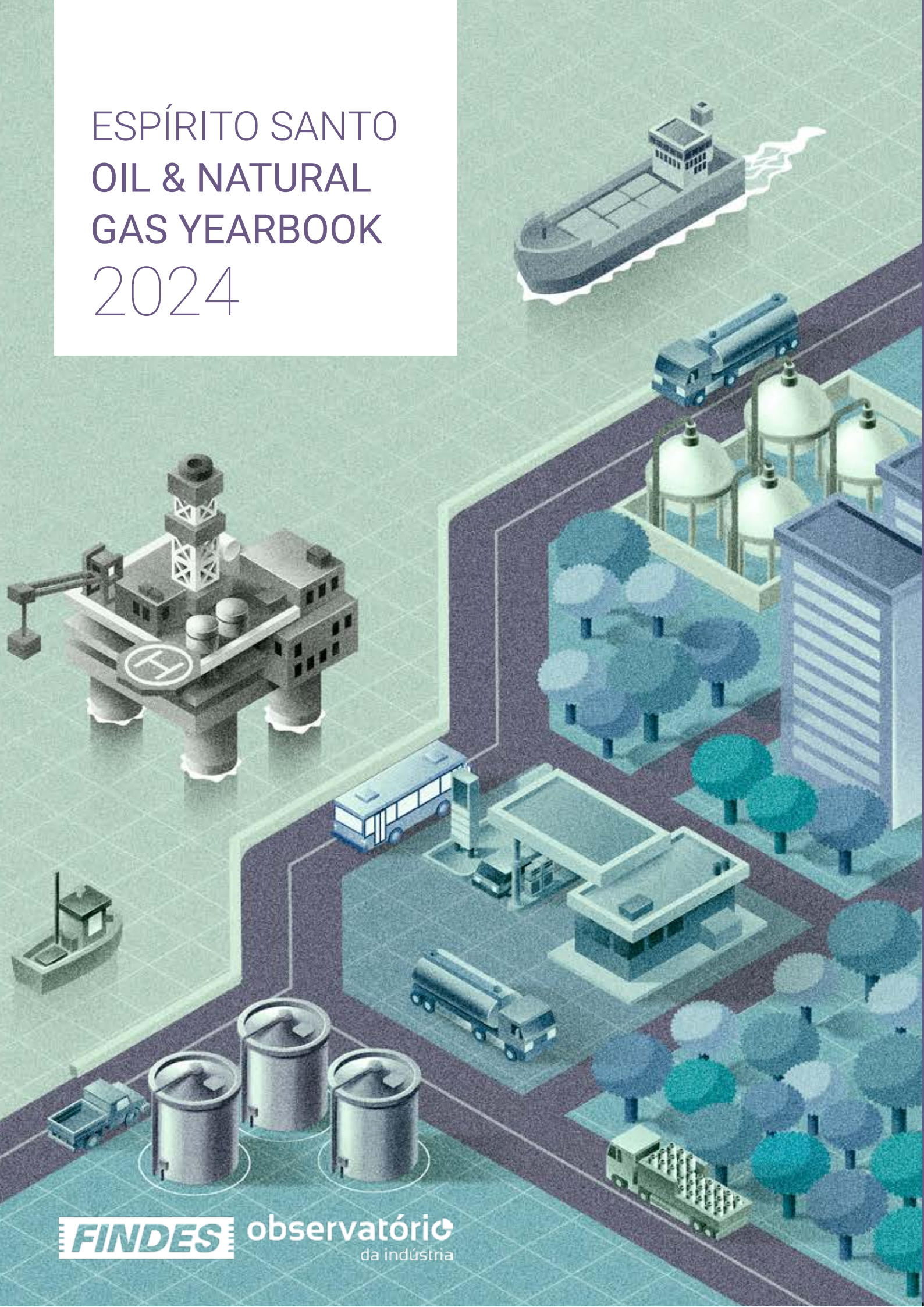
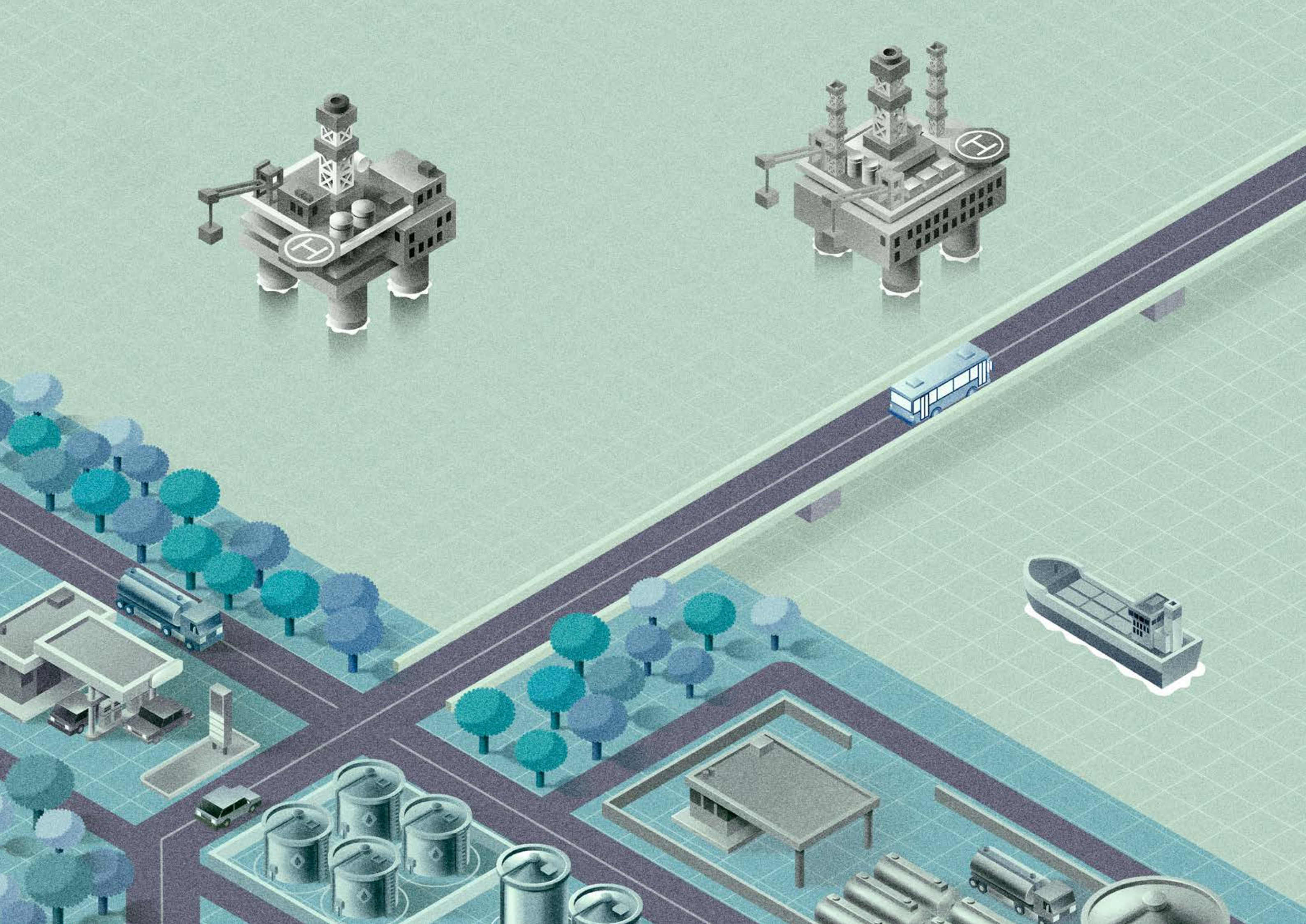


ESPÍRITO SANTO OIL & NATURAL GAS YEARBOOK 2024





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OPENING LETTER

The production of oil and natural gas is experiencing growth in Espírito Santo, presenting new opportunities before us. Among the producing states, we rank as the third-largest in oil and the fifth-largest in natural gas. However, we possess the potential to surpass these standings in a sector of significant relevance, constituting 25.5% of the Capixaba industry.

Presently, the productive chain within this sector in Espírito Santo comprises 565 companies, fostering over 11,200 high-quality jobs with one of the most favorable remuneration averages. Furthermore, this segment stands out as one of the leading investors in research and development of new technologies.

Information and data such as these concerning production, exploration, and the entire chain that propels the sector forward are encapsulated in the 7th edition of the Espírito Santo Oil and Natural Gas Yearbook—a document crafted by the Industry Observatory of Findes. This publication not only provides insights into current scenarios but also offers essential projections, aiding in our understanding of the direction in which the segment is heading.

One of the highlights brought forth by this publication is the productive recovery of wells. The year 2023 marked the resurgence of growth in oil and gas production, which had been declining since 2016. Last year, Espírito Santo yielded 23% more oil than in 2022. While natural gas production saw an increase of 22.5%.

Part of this achievement stems from the newfound momentum in Capixaba onshore activities. In recent years, the entry of junior oil companies and the diversification of operators have bolstered terrestrial operations, a movement supported by Findes and the Capixaba Forum for Oil, Gas, and Energy.

Undoubtedly, significant strides have been made, and we believe that the future holds even greater promise, as oil and gas extraction is expected to continue expanding over the coming years. According to industry projections, between 2024 and 2028, oil and natural gas production is estimated to advance by an average of 5.1% and 5.2%, respectively.

The productive expansion of natural gas aligns with the country's transition towards a cleaner energy matrix, as gas will play a fundamental role in shifting towards more sustainable fuels.

Additionally, the utilization of natural gas can be pivotal within the context of the new industrial policy, NIB, which aims to drive the expansion and modernization of the national industrial landscape and enhance the competitiveness of Brazilian companies.

For some, the Yearbook serves as a mere source of data. For us, it signifies much more than that! It embodies the portrait of opportunities and the paths we have chosen to further develop our state.



Cris Samorini
President of Findes





Marília Gabriela da Silva
Executive Manager of
Observatório da Indústria

PRESENTATION

Sixty-five years ago, a significant moment in the history of Espírito Santo unfolded when the first oil well was drilled in the municipality of Conceição da Barra, marking the beginning of a new era for the state. At that time, little was known about the potential of oil and natural gas reserves, nor were the challenges faced in establishing a competitive, dynamic sector characterized by constant technological innovations understood.

In the 2000s, with the advancement of investments and research in the Espírito Santo Basin and the Capixaba part of the Campos Basin, significant volumes of oil and natural gas (O&G) were discovered. In 2006, with the announcement of oil and natural gas reserves in the pre-salt layer, Espírito Santo became the stage for an important movement in the national industry.

In the more recent history of the O&G sector, the year 2023 marked a turning point, with a significant increase in the production of inputs, following six consecutive years of declining activity levels. Explanations point to overcoming operational

problems and the revitalization of onshore fields. Optimism with the entry of new oil companies has been consolidated, and today the state witnesses a new phase of O&G exploration.

Key characteristics of this new phase include the presence of new oil companies, the recovery of onshore production, and a new cycle of investments announced for the state, focusing on the revitalization of production in known reservoirs.

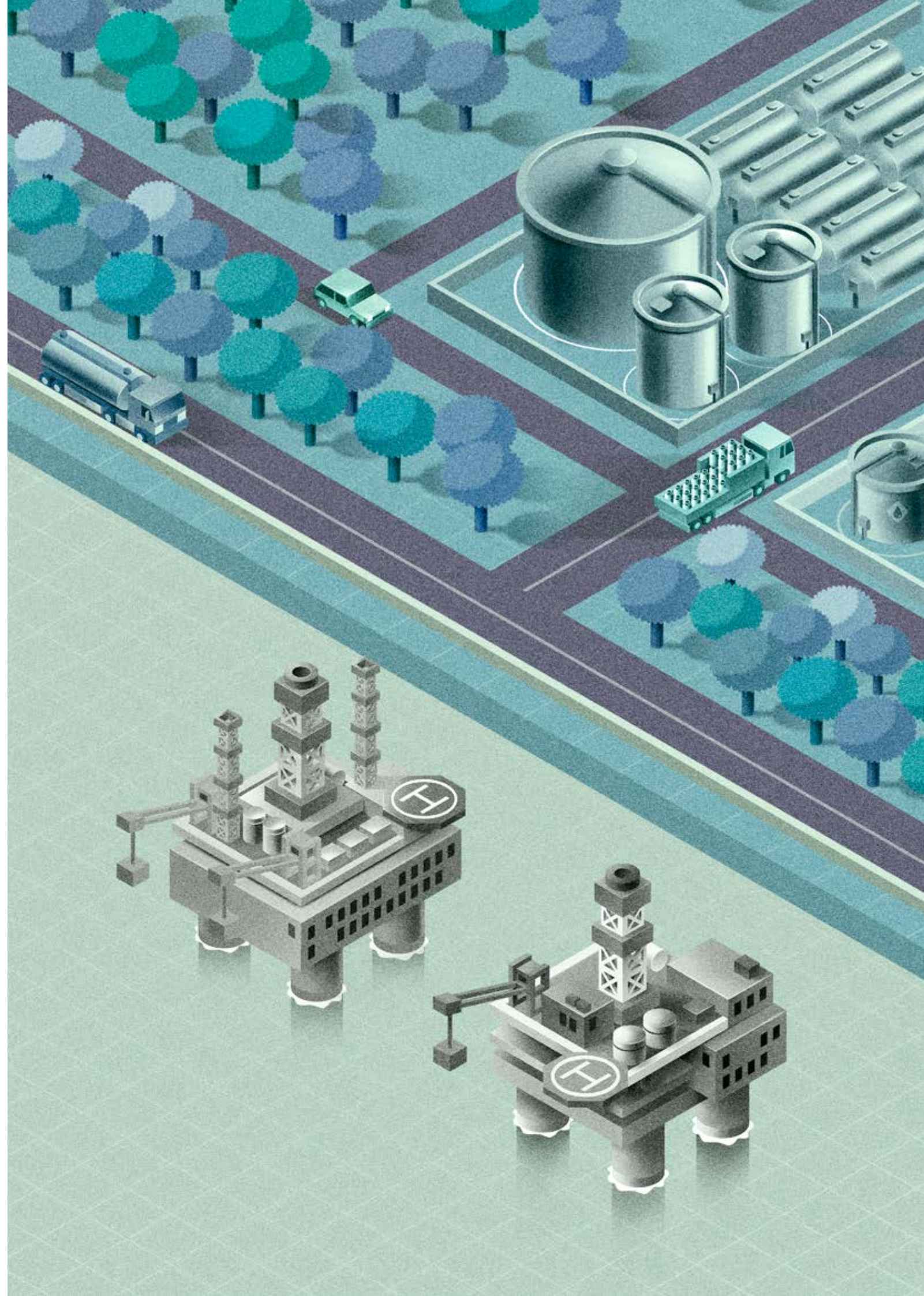
It is worth noting that challenges are also attributed to this new phase. The continuity of exploration in frontier production areas, the supply of natural gas at competitive prices for industry, and the challenges of energy transition are the main hurdles to be faced. However, we understand that challenges are inherent to sector activities, and for this new phase, it is hoped that the continued coordination between public and private entities can consolidate strategies to achieve prosperous solutions.

It is in this context that the 7th edition of the Espírito Santo Oil and Natural Gas Industry Yearbook brings together the most important sector analysis variables for Espírito Santo, combining technical rigor with structured, updated, and reliable information.

Enjoy your reading!



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PANEL - INDUSTRY OIL AND GAS



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Chapter 1

INTERNATIONAL
PANORAMA

1.1 Overall energy consumption

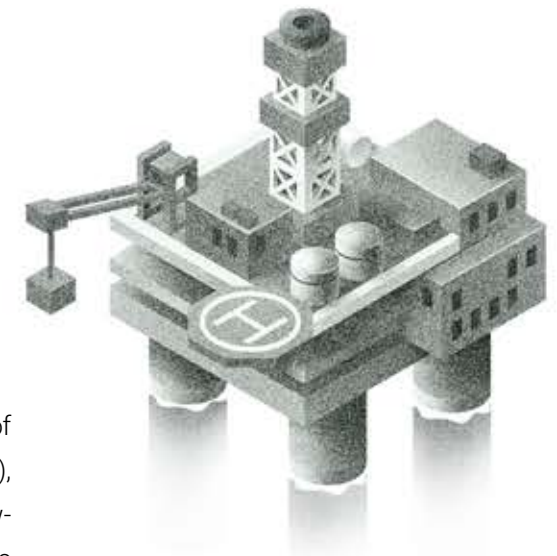
In 2022, global primary energy consumption was 604 exajoules, a value 1.1% higher than that recorded in the previous year.

The increase is slight compared to that recorded in 2021 (5.5%) and can be attributed to the slowdown in global economic activity. According to the World Bank, in 2023 the world's Gross Domestic Product (GDP) recorded growth of 2.4%, a lower expansion than that recorded in 2022, when the world grew 3.0%. For 2024, the institution projects an increase of 2.4%, a level even lower than that recorded in previous years. Explanations for this slowdown include the low level of trade and investment in countries.

Global energy consumption was concentrated in a group of ten countries (Chart 1), which together account for 67% of the world's total energy consumption. China and the United States alone accounted for 42.3% of total global energy consumption.

China's energy matrix is made up of the following sources: coal (55.5%), oil (17.7%), natural gas (8.5%), renewable energies (8.4%), hydroelectric (7.7%), and nuclear energy (2.4%). The United States' energy matrix is made up of the following sources: oil (37.7%), natural gas (33.1%), coal (10.3%), renewable energies (8.8%), nuclear energy (7.6%) and hydroelectric power (2.5%).

Over the last twenty years, primary energy consumption in the world has grown by an average of 2.4% per year. The highlight for the period was the increased participation of renewable energy sources in the energy matrix. In 2002, renewable sources accounted for 0.8% and in 2022 they will rise to 7.5% of the total energy consumed in the world (Chart 2). The growth in the consumption of these sources was present in regions with a greater share of total primary energy consumption, especially China and the United States.



67%

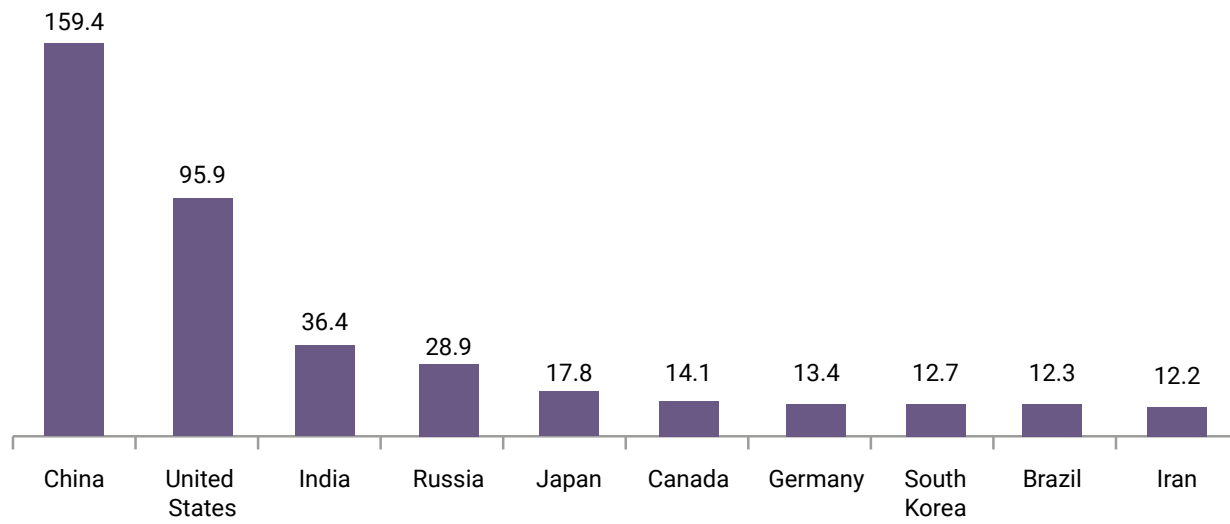
of the world's total energy consumption was concentrated in a group of ten countries

42.3%

of total global energy consumption was concentrated in China and the United States



Chart 1- Countries with the highest primary energy consumption (in exajoules) – 2022



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.

31.6%
of the total primary energy consumed in the world in 2022 came from oil

23.5%
of the total primary energy consumed in the world in 2002 came from natural gas

In turn, fossil fuels have grown more discreetly. In 2002, coal represented 25.4% of the total primary energy consumed in the world and in 2022 it rose to 26.7%. China, India and the United States accounted for 73.3% of total coal consumption worldwide. China and the United States have reduced the share of coal in total energy consumption in each country, while India has increased the share of coal in total primary energy consumption. Coal is one of the most polluting energy sources and yet its global consumption has grown by 5.1% in the last 20 years.

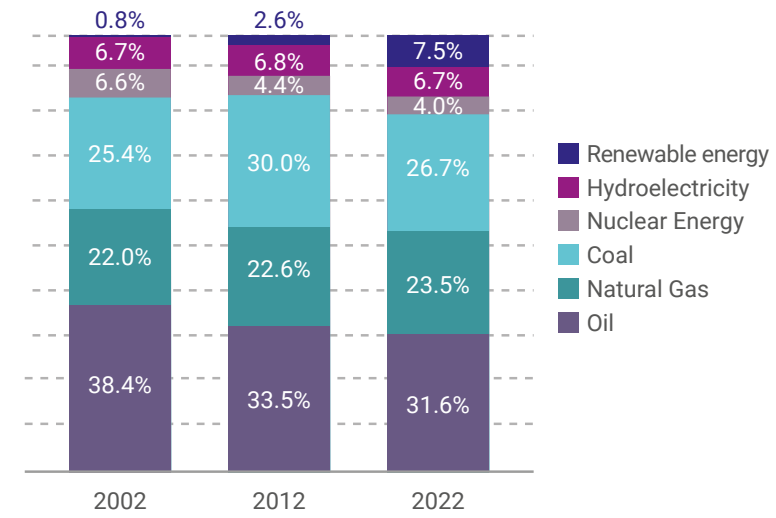
Natural gas, which represented 22.0% of the total primary energy consumed in the world in 2002, rose to 23.5% in 2022. The consumption of natural gas rep-

resents an alternative in the transition to energy production with less polluting sources.

Given that renewable sources are not yet widely accessible, the use of natural gas becomes crucial due to the existing infrastructure for its production, transportation, treatment and regasification. In addition, the input is less polluting than oil and coal, contributing to the decarbonization of the energy sector. The United States, Russia and China accounted for 42.2% of the total natural gas consumed worldwide in 2022.

Finally, oil held a 38.4% share of the global energy matrix in 2002 and, in 2022, reduced to 31.6%. The United States, China and India accounted for 39.0% of total oil consumption worldwide. Ac-

Chart 2 - Share of fuels in the global energy matrix (in % and in exajoules)



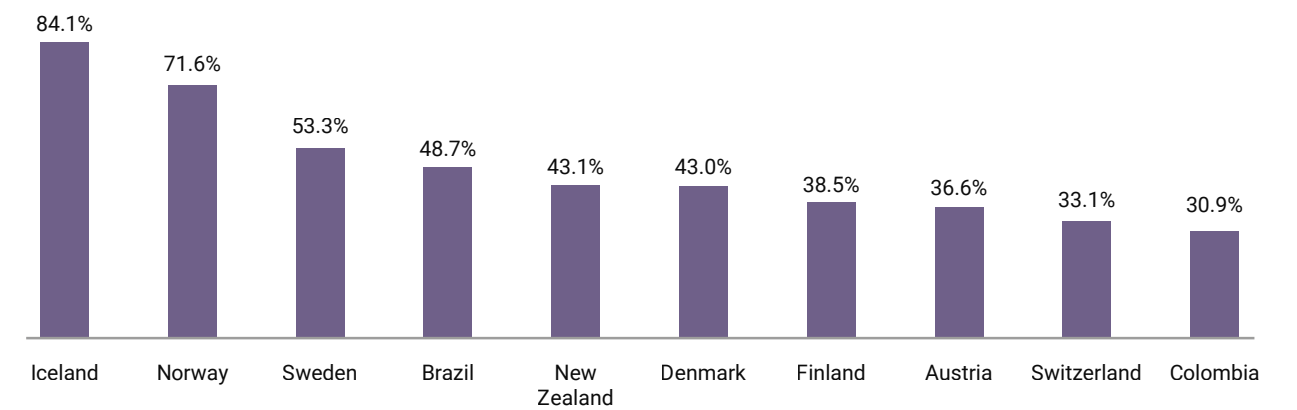
Source: BP Statistical Review of World Energy | Elaboration: Observatório da Indústria/Findes.



According to the International Energy Agency (IEA), the movement towards a clean energy economy is accelerating and this is the main explanation for the reduction in consumption of this input.

In line with the increased participation of renewable energy sources in the global energy matrix, it is worth highlighting the **good performance presented by Brazil, fourth in the global ranking** (Chart 3).

Chart 3- Countries with the highest share of renewable energy in total primary energy consumption (in %) – 2022



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.

1.2. Global production and consumption of oil and natural gas

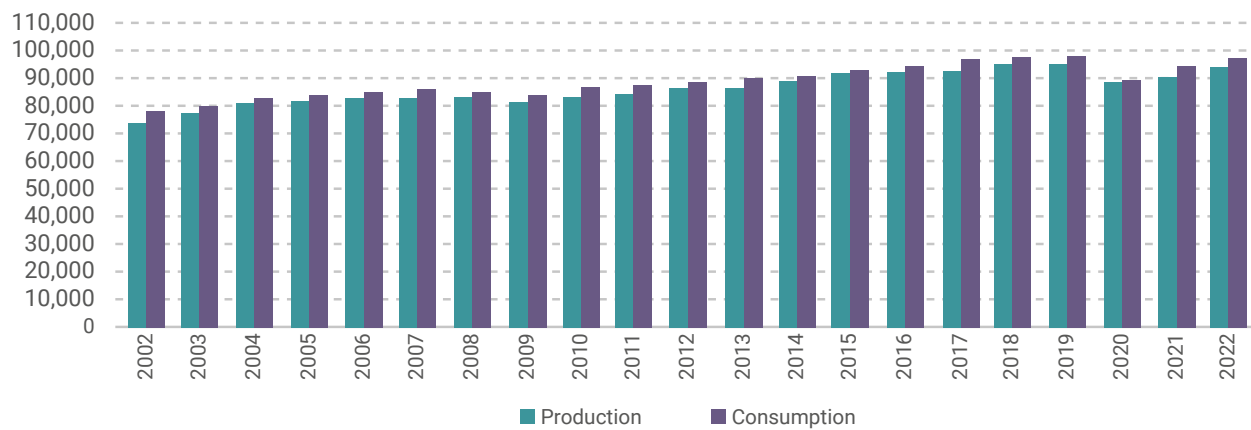
93.8 million barrels per day was the worldwide oil production in 2022

World oil production in 2022 was 93.8 million barrels per day, 4.2% higher than in 2021 (Chart 4), representing an increase of 3.8 million barrels per day in production in absolute numbers.

In 2022, the division of oil production among regions in the world was: Middle East (32.8%), North America (26.9%), Commonwealth

of Independent States (14.9%), Asia (7.7%), Africa (7.5%), South and Central America (6.8%) and Europe (3.3%). The main producing countries were the United States, Saudi Arabia and Russia, which together accounted for 43.8% of global production. **Brazil was the 9th country with the highest oil production in the world, with 3.1 million barrels per day.**

Chart 4- Oil production and consumption in the world (thousand barrels/day)



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.

3.1 million barrels per day was the Brazilian oil production in 2022, consolidating the country as the ninth largest producer in the world

Oil consumption follows a different distribution from production. In 2022, 97.3 million barrels per day were consumed worldwide, 3.1% more than in the previous year (Chart 4), representing an increase of 2.9 million barrels per day in consumption in absolute numbers.

In 2022, the division of oil consumption between the world's

regions was as follows: Asia (36.3%), North America (24.2%), Europe (14.5%), Middle East (9.7%), South and Central America (6.3%), Commonwealth of Independent States (4.8%) and Africa (4.3%). The main consumer countries were the United States, China and India, which together account for 39.7% of global consumption. **Brazil was the 8th**

country with the highest oil consumption in the world, with 2.5 million barrels per day.

Regarding natural gas, global production reached 4.0 trillion m³ in 2022 (chart 5). Production of this input observed a decrease of 9.6 billion m³ in the transition from 2021 to 2022, which represents a slight reduction of the order of 0.2%.

In 2022, natural gas production was divided between the

world's regions: North America (29.8%), Commonwealth of Independent States (19.9%), Middle East (17.8%), Asia (16.8%), Africa (6.2%), Europe (5.4%) and South and Central America (4.0%). The main producing countries were the United States, Russia and Iran, which together accounted for 45.9% of global production. **Brazil was the 32nd country with the largest production of natural gas in the world, with 23.0 billion m³ of natural gas.**

97.3 million barrels per day was the worldwide oil consumption in 2022

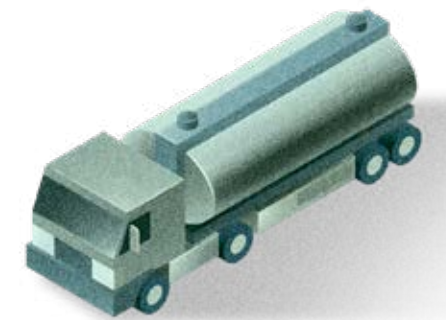


Division of oil production in the world

Middle East	32.8%
North America	26.9%
CIS	14.9%
Asia	7.7%
Africa	7.5%
South and Central America	6.8%
Europe	3.3%

Division of oil consumption in the world

Asia	36.3%
North America	24.2%
Europe	14.5%
Middle East	9.7%
South and Central America	6.3%
CIS	4.8%
Africa	4.3%

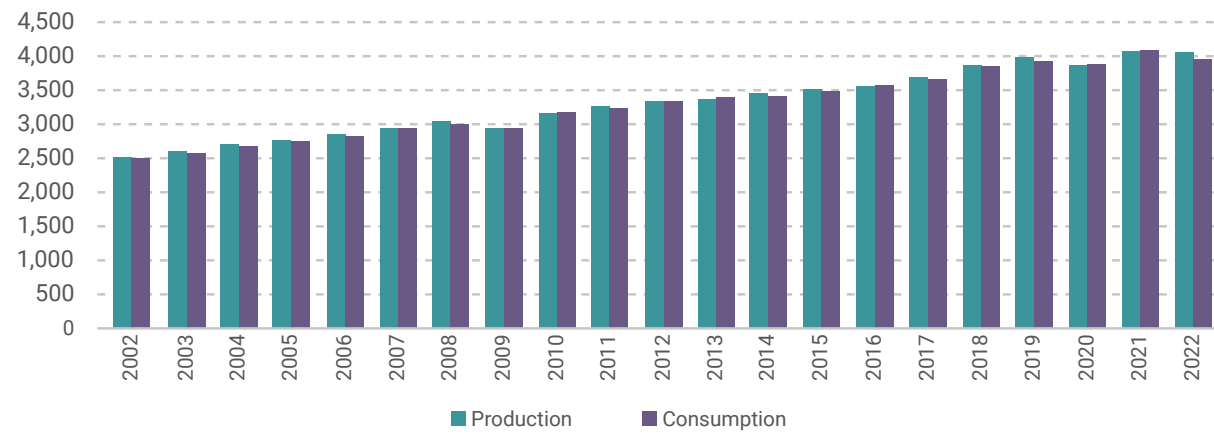


Natural gas consumption also follows a different distribution from production. 3.9 trillion m³ of natural gas were consumed worldwide in 2022, an amount 3.1% lower than

that recorded in the previous year. In absolute numbers, this reduction corresponds to 125.8 billion m³ less in global consumption per day.

2.5 million barrels per day was the Brazilian oil consumption in 2022, consolidating the country as the eighth largest consumer in the world

Chart 5 - Production and consumption of natural gas in the world (billions of m³)



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.

4 trillion m³ was the worldwide natural gas production in 2022

In 2022, the division of natural gas consumption between regions in the world was: North America (27.9%), Asia (23.0%), Middle East (14.2%), Commonwealth of Independent States (14.0%), Europe (12.7%), Africa (4.12%) and South and Central America (4.10%). The United States, Russia and China accounted for 42.2% of global natural gas consumption. Brazil was the 29th country with the highest consumption of natural gas in the world, with an expenditure of 32.0 billion m³ of the input.



Division of natural gas production in the world

North America	29.8%
CIS	19.9%
Middle East	17.8%
Asia: 16.8%	
Africa: 6.2%	
Europe: 5.4%	
South and Central America: 4.0%	

Division of natural gas consumption in the world

North America	27.9%
Asia	23.0%
Middle East	14.2%
CIS: 14.0%	
Europe: 12.7%	
Africa: 4.1%	
South and Central America: 4.1%	

23 billion m³ was the Brazilian natural gas production in 2022, consolidating the country as the 32nd largest producer in the world

1.3. Global oil and natural gas reserve

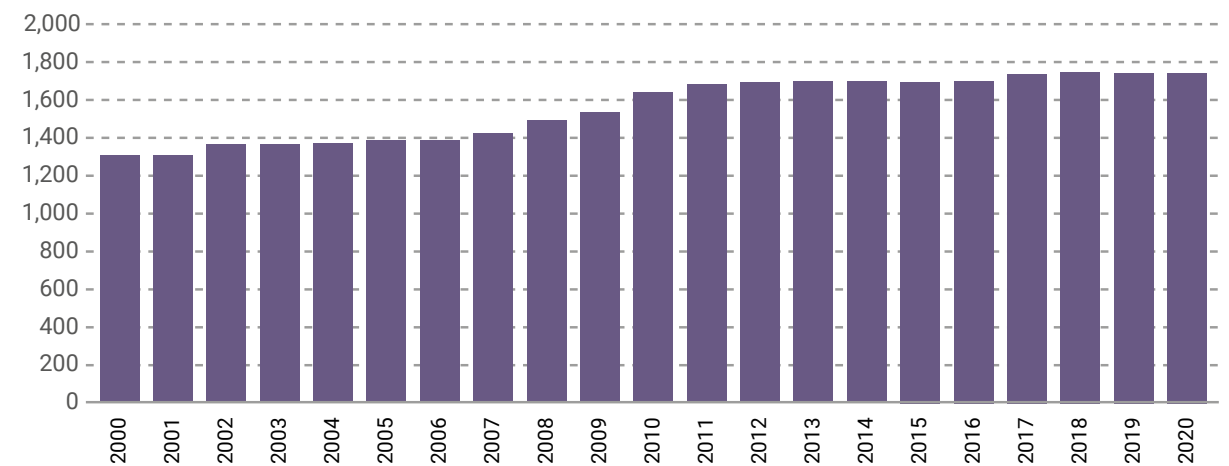
With regard to global oil and natural gas reserves, it is worth mentioning that the available data have not been updated for the years 2021 and 2022, so the most recent elements refer to the year 2020.

The world's total oil reserves¹ in 2020 were 1.73 trillion barrels,

practically stable compared to 2019, with a slight decrease of 0.1% (chart 6). In absolute terms, the reduction was 2.4 billion barrels. It should be noted that the last significant variation was in 2017 when there was an increase of 37.9 billion barrels of oil in global reserves.

1.73 trillion barrels was the world's total oil reserves in 2020

Chart 6 - Proven oil reserves in the world (billions of barrels)



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.

In 2020, the division of oil reserves between regions in the world was: Middle East (48.3%), South and Central America (18.7%), North America (14.0%), Commonwealth of Independent States (8.4%), Africa (7.2%), Asia (2.6%) and Europe (0.8%). Venezuela, Saudi Arabia and Canada accounted for 44.4% of the world's oil reserves. Brazil was the 16th country with the largest oil re-

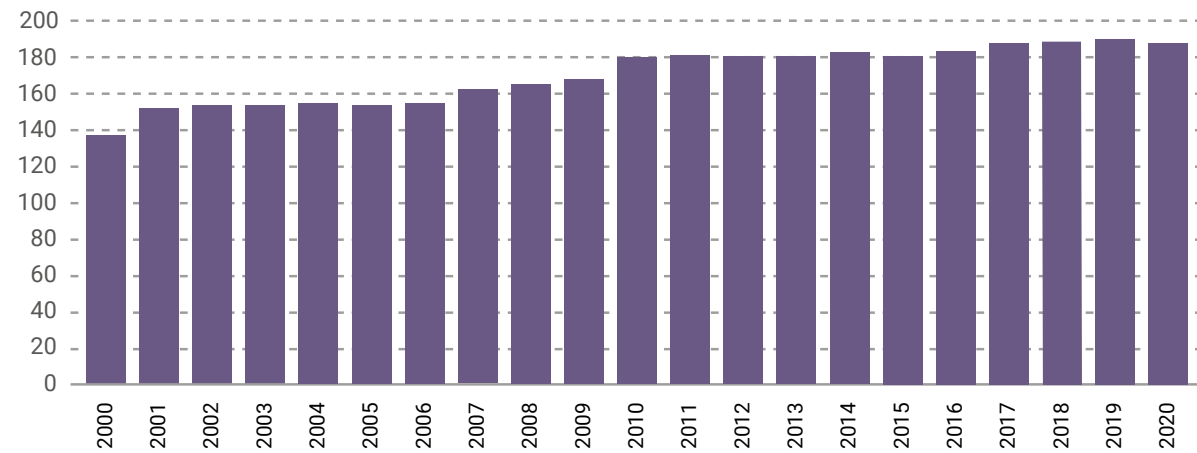
serves in the world, with 11.9 billion barrels of oil. Regarding natural gas, in 2020 reserves reached 188.1 trillion m³, 1.2% lower than in the previous year. In absolute terms, the drop was 2.2

1. The concept used was that of Proved Oil Reserves. Proved reserves are those that can be produced with a high level of guarantee.

11.9 billion barrels was the Brazilian's total oil reserves in 2020, consolidating the country as the 16th country with the largest oil reserves in the world

trillion m³ of natural gas (chart 7). The division of natural gas reserves among the regions in the world was: Middle East (40.3%), Commonwealth of Independent States (30.1%), Asia (8.8%), North America (8.1%), Africa (6.9%), South and Central America (4.2%), and Europe (1.7%). Russia, Iran and Qatar accounted for 50.1% of the world's total natural gas reserves. **Brazil was the 33rd country with the largest natural gas reserves in the world, with 348.5 billion m³ of natural gas.**

Chart 7- Natural gas reserves in the world (trillions of m³)



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.

348.5 billion m³ was the Brazilian's total natural gas reserves in 2020, consolidating the country as the 33rd country with the largest natural gas reserves in the world



Division of oil reserve in the world

Middle East	48.3%
South and Central America	14.0%
North America	14.0%

CIS: 8.4%
Africa: 7.2%
Asia: 2.6%
Europe: 0.8%

188.1 trillion m³ was the world's total natural gas reserves in 2020

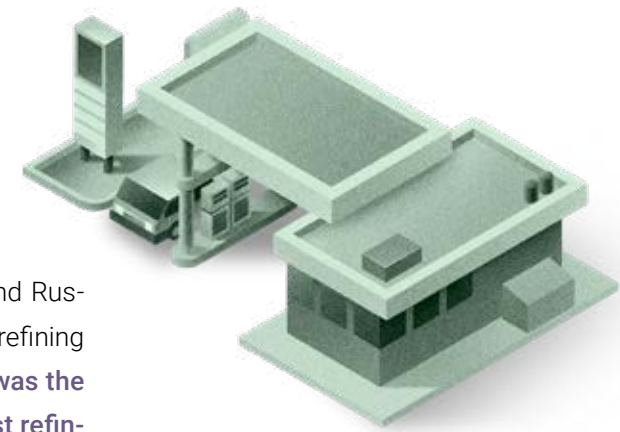


Division of natural gas reserve in the world

Middle East	40.3%
CIS	30.1%
Asia	14.0%

North America: 8.1%
Africa: 6.9%
South and Central America: 4.2%
Europe: 1.7%

1.4. Global Oil Capacity and Refining



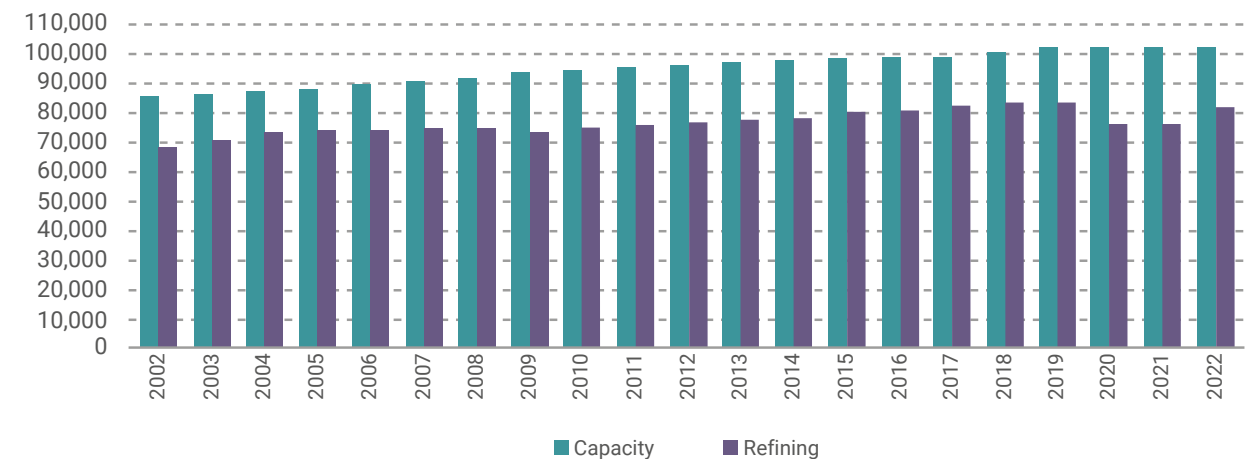
The world's installed refining capacity was 101.9 million barrels per day in 2022. There was an increase of 534,300 barrels per day, representing a growth of 0.53% compared to the previous year. Meanwhile, oil refining stood at 81.9 million barrels per day in 2022. There was an increase of 2.4 million barrels per day refined in the world, 3.1% higher than in the previous year (chart 8).

The refining capacity between regions in the world was: Asia (35.5%), North America (21.2%), Europe (14.8%), Middle East (10.8%), Commonwealth of Independent States (8.4%), South America and Central (6.1%) and Africa (3.2%).

The United States, China and Russia concentrate 41.4% of oil refining capacity worldwide. **Brazil was the 9th country with the highest refining capacity in the world, with 2.3 million barrels per day.**

Oil refining was divided as follows among the regions of the world: Asia (36.4%), North America (22.5%), Europe (15.1%), Middle East (11.0%), Commonwealth of Independent States (8.1%), South America and Central (4.5%) and Africa (2.3%). The United States, China and Russia accounted for 43.2% of the world's oil refining. **Brazil was the 10th largest oil refining country in the world, with 1.9 million barrels per day.**

Chart 8- Oil refining capacity in the world (thousand barrels/day)



Source: BP Statistical Review of World Energy | Elaboration: Industry Observatory/Findes.



THE ROLE OF NATURAL GAS IN BRAZIL IN A WORLD TRANSITIONING TO LOWER CARBON INTENSITY



Contribution of Empresa de Pesquisa Energética (EPE)



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We live in a globalized world that is increasingly interconnected socially, politically, economically, technologically, and environmentally. In this latter aspect, the effects of climate change experienced in recent decades have prompted a global consensus to seek alternatives for the development of a sustainable economy and environmental policies focused on an energy transition with low carbon intensity. The motto “decarbonization of energy matrices” has become an urgent objective for all governments, public institutions, and private entities around the globe. Decarbonization is en vogue!

The pursuit of decarbonization of energy matrices involves research, development, and technological innovation, digitalization in energy production and use, efficient use of energy resources, utilization of low-carbon sources, elec-

trification, and changes in consumer behavior. In a complex and multidisciplinary context, strategies are being formulated to reduce both local and global Greenhouse Gas (GHG) emissions, while not forsaking energy security, thus moving towards a fair and inclusive energy transition.

In this sense, the energy sector, in which natural gas is included, is responsible for the largest percentage of net GHG emissions in the world. Brazil has a greenhouse gas emissions profile that is completely distinct from the rest of the world, already possessing an energy matrix that is 47% renewable, whereas the world has only 14% (BEN, 2023). The national strategy in the process of decarbonizing its energy matrix should focus on hard-to-abate sectors such as transportation and industry, for example. In these segments, natural gas plays a fundamental role both in replacing more polluting fuels and as an energy security alternative, significantly contributing to GHG reduction.

This article aims to discuss the role of natural gas in Brazil as a fuel with great potential to contribute to the improvement of the Brazilian energy matrix aligned with the global decarbonization strategy, as a decarbonized future is not a future without hydrocarbons.

Energy Transition and Natural Gas in Brazil

A The energy transition is a historically lengthy and complex process. The current transition faces the additional challenge of avoiding global climate change at levels harmful to the planet and humanity. While the energy transition to a low-carbon economy is a global process, the decarboniza-

tion strategies to be developed by each nation must take into account their respective local contexts.

As mentioned in the Introduction, natural gas presents itself as a fuel alternative for the energy transition in Brazil, allowing for the substitution of other fossil fuels in the short term, complementation or substitution by biomethane and hydrogen in the medium to long term, with low risk of technological

lock-in. Currently, the governmental program “Gas to Employ” has, as one of its objectives, integrating natural gas into the national energy transition strategy to contemplate synergies and investments that favor the development of low-carbon solutions, such as biogas/biomethane, low-carbon hydrogen, industrial cogeneration, and carbon capture (MME, 2024).

Regarding long-term actions, a strategic guideline would be to promote the efficient development of the natural gas market and infrastructure, identifying future possible synergies with

emerging solutions, such as hydrogen and strategic industrial sectors.

A scenario of energy transition focusing on decarbonization is the first step towards a path that reaches the low-carbon market. Additionally, existing competitive advantages in Brazil, especially in the oil and gas industry (O&G), should be leveraged to build and finance others in the future, requalifying assets and migrating expertise. The migration of expertise (especially from the O&G sector technologies) is a path for both sustainable energy transition and an increasingly decarbonized market. Electrification is an important opportunity within this scenario, but it is not sufficient, requiring technological alternatives to compose the portfolio of projects for decarbonization. The path is not to compete sources, but to use them complementarily.

Final Considerations

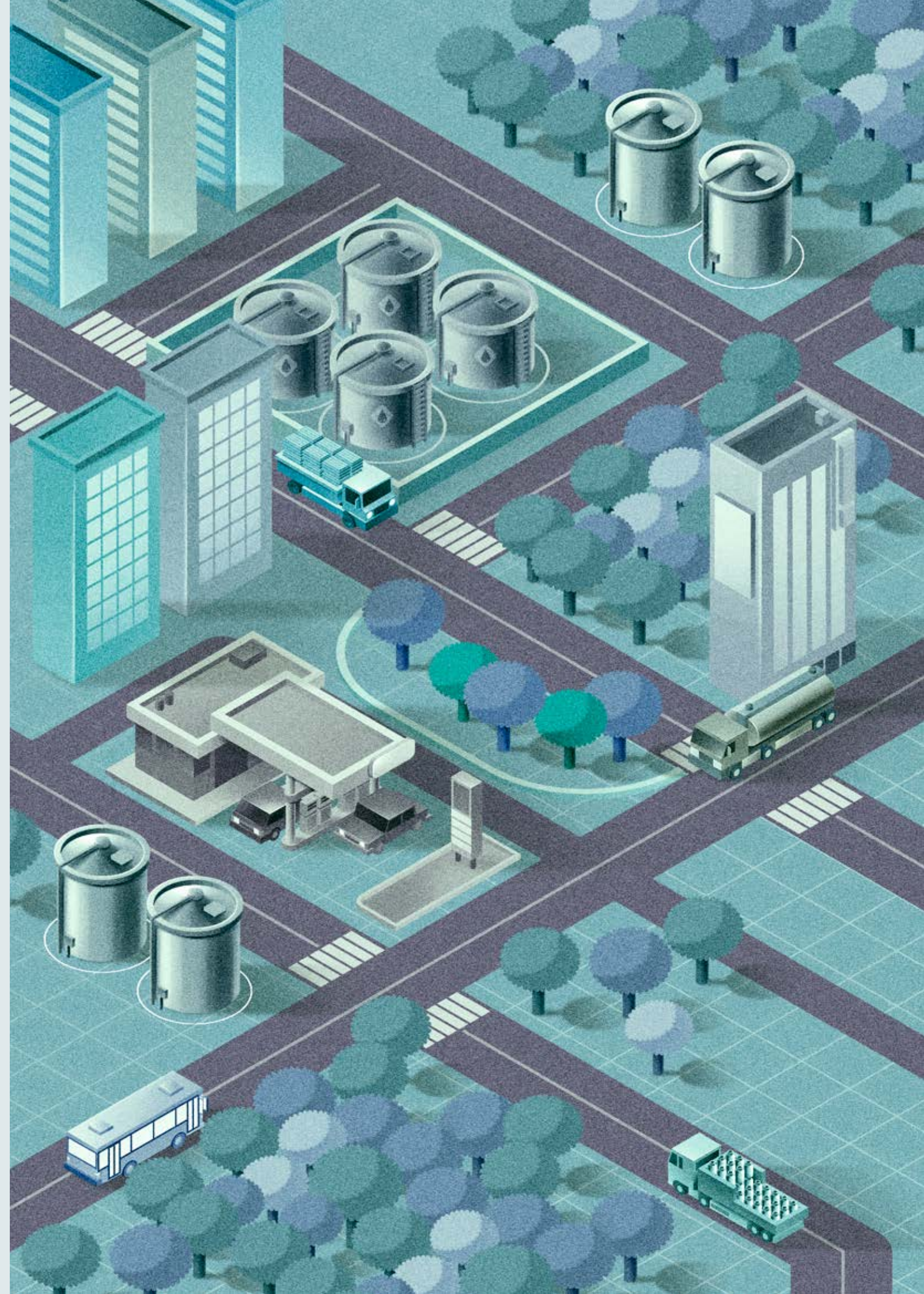
As presented during the discussions, there will be an increase in national natural gas production with the operation of large offshore volumes and numerous projects with smaller onshore volumes, enabling the construction of alternatives to expand the use of natural gas in the Brazilian energy matrix with a focus on reducing GHG emissions.

As a strategic guideline, the intention is to vigorously pursue the path towards energy production with a low carbon footprint, technological neutrality in alternatives that minimize GHG emissions, and to harmonize objectives of

sustainable development, energy transition, and energy security, leveraging the potential of resources and market and innovation opportunities for Brazil.

Natural gas could facilitate the transition to fuels with lower emissions (e.g., methane and hydrogen blends), zero emissions (e.g., biomethane), or even negative emissions (e.g., hydrogen produced from biomethane, with CCS).

Regulatory enhancement in the natural gas sector is important to provide even more legal certainty and predictability of rules for investments in the viability of this still-developing market’s great potential. With this, we can expand frontiers and synergies for the use of clean and renewable energies, as natural gas can contribute to the necessary energy security for optimizing the national energy matrix with a focus on reducing GHG emissions and decarbonization.



Chapter 2

EXPLORATION
AND PRODUCTION
OF OIL IN
ESPÍRITO SANTO

The physical configuration of oil and natural gas exploration and production (E&P) in the State of Espírito Santo is distributed between two sedimentary basins: part in the Espírito Santo Basin and part in the Campos Basin, where the area of the pre-salt in the region of confrontation with the state of Espírito Santo.

Offshore production accounts for the majority of the volume of O&G produced in Espírito Santo, having been responsible for 95.1% of oil production and 97.1% of natural gas production in 2023. There-

fore, the evolution of offshore extraction determines total production in the state, a panorama that tends to remain unchanged in the coming years.

In total, 28 oil companies operate in the state with fields in the production stage or in the production development stage. Petrobras continues to be the major player in Brazil and Espírito Santo, where it operates extraction in Parque das Baleias (Campos Basin) - responsible for the production of 80.3% of oil and 78.7% of natural gas offshore Espírito Santo.

2.1. Drilling activity in
Espírito Santo

A atividade perfuratória é realizada durante a fase exploratória, em que a petroleira possui como objetivo o descobrimento de jazidas de petróleo e/ou gás natural. Nesta etapa, são realizadas a aquisição de dados sísmicos, gravimétricos, The drilling activity is carried out during the exploratory phase, in which the oil company aims to discover oil and/or natural gas deposits. In this step, the acquisition of seismic, gravimetric, magnetometric, geochemical data and the drilling of the wells are carried out. The mapping of the evolution of well drilling is an indicator capable of evaluating the exploratory level of the areas in confrontation with Espírito Santo.

With drilling activity beginning in 1959, Espírito Santo has already recorded a total of 2,361 wells drilled, 75.5% of which are onshore and 24.5% offshore. Between 2003 and 2023, 573 onshore wells were drilled, with emphasis on the Fazenda Alegre, Inhambu, Jacutinga and Cancã fields. With the exception of the Jacutinga field, these areas make up the land fields with the highest production in the state. In 2023, 7 wells were drilled on land, 3 wells drilled by BGM (2 in block ES-T-506 and 1 in block ES-T-345), 2 wells drilled by Seacrest in the Inhambu field and another 2 wells drilled by Imetame in the Rio Ipiranga field. By March 2024, another 3 wells had



2,361

wells have been drilled in Espírito Santo since 1959



573

onshore wells were drilled in Espírito Santo between 2003 and 2023



415

offshore wells were drilled in Espírito Santo between 2003 and 2023

been drilled on land in the state, by the same three companies. One well was drilled in block ES-T-516 by BGM, another in the Inhambu field, by Seacrest and the third, in the Rio Ipiranga field, by Imetame.

Still onshore, at the end of February Seacrest Petróleo informed that it expects to drill up to 50 wells in the Inhambu field in 2024. The activity is part of the company's 300-well drilling program which, after drilling, expects to continue the ramp-up (production phase) in 2025. The expectation is that drilling will take place between the 3rd and 4th quarters of 2024. According to the oil company, the campaign will contribute to the expansion of production in 2024.

The offshore drilling activity recorded, between 2003 and 2023, a total of 415 wells drilled, especially the Jubarte field, the BC-60 Block, and

the Dolphin and Argonauta fields. In 2023, a total of 9 wells were drilled offshore, all in the Jubarte field, in the Campos basin, by Petrobras. By March 2024, 4 offshore wells have already been drilled, all by Petrobras. In the Jubarte field, 2 wells were drilled, in the Caxareu field, 1 well was drilled and in the ES-M-596 block, 1 well was drilled.

Regarding the drilling of block ES-M-596 (well 1- BRSA-1391-ESS), it is worth highlighting that, since 2018, Petrobras has drilled three other wells, without any signs of hydrocarbons. These drillings are part of the exploratory campaign aimed at the Andurá and Joelho prospects, with the potential for discovering oil and natural gas. This area was sold by Petrobras in the 11th Bidding Round (2013) and the first Exploratory Period (PE) ends in April 2024 and the second PE ends in April 2026.

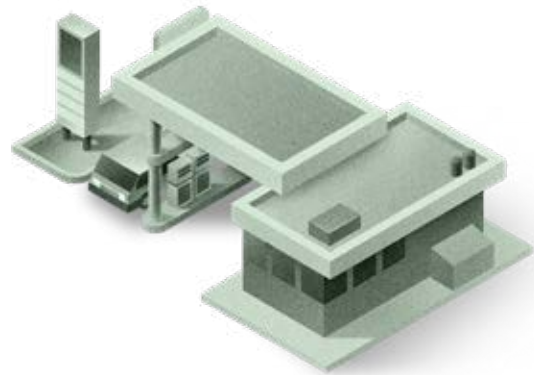
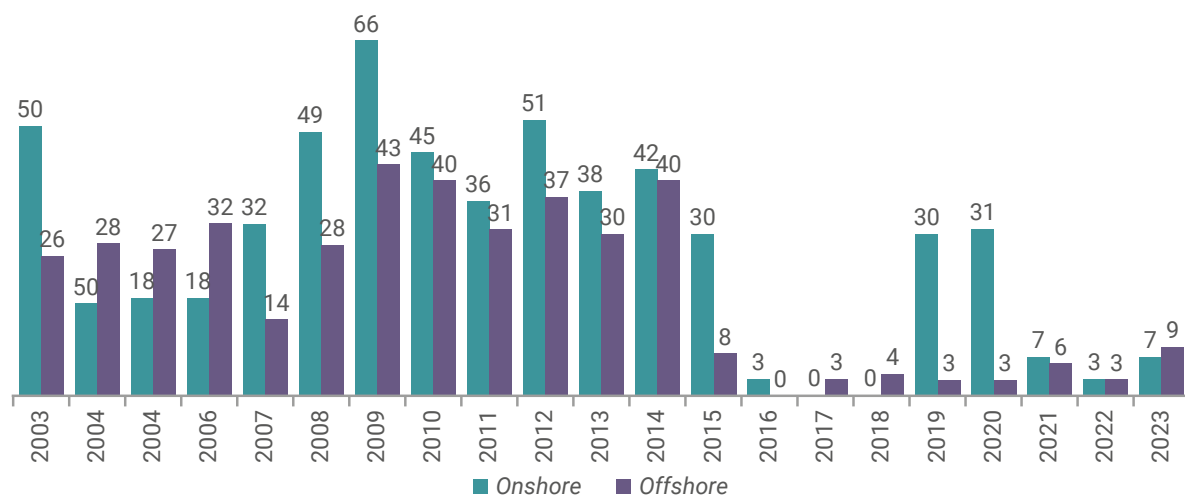


Chart 9 - Wells drilled in Espírito Santo (in units)

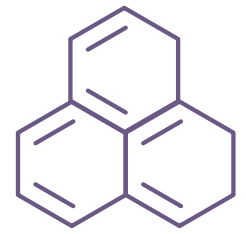


Source: ANP | Elaboration: Industry Observatory/Findes

2.2. Hydrocarbon declarations

If the drilling of wells results in the discovery of a reservoir, the oil company is obliged to issue a Notification of Discovery (ND), which must be sent to the ANP within 72 hours of finding evidence of hydrocarbons, indicating the occurrence of the organic compound or any other natural resources in the explored area. Since 1998, when the hydrocarbon declaration became an obligation, 449 declarations were issued in Espírito Santo, divided between onshore (50.8%) and offshore (49.2%).

Between 2003 and 2023, 359 hydrocarbon declarations were issued in the state. Of these, 186 (52% of the total) were onshore, with the Jacutinga (31), São Mateus Leste (20) and Cancã (18) fields standing out. Together, the three fields accounted for 37% of all declarations issued in the period. At sea, in the same period, 173 (48% of the total) hydrocarbon declarations were issued, with the Golfinho (36), Jubarte (26) and Argonauta (12) fields standing out. The three fields together accounted for 42% of the declarations in the period.



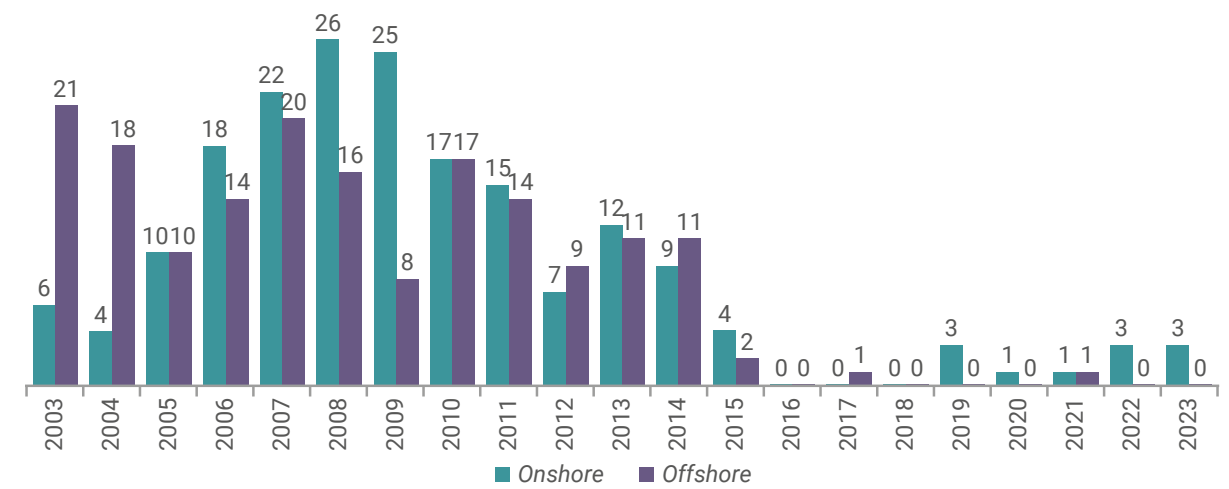
186 onshore hydrocarbon indicia statements

173 offshore hydrocarbon indicia statements

This was the amount of statements issued in Espírito Santo between 2003 and 2023.

In 2023, 3 declarations were issued in block ES-T-506, all by the BGM oil company.

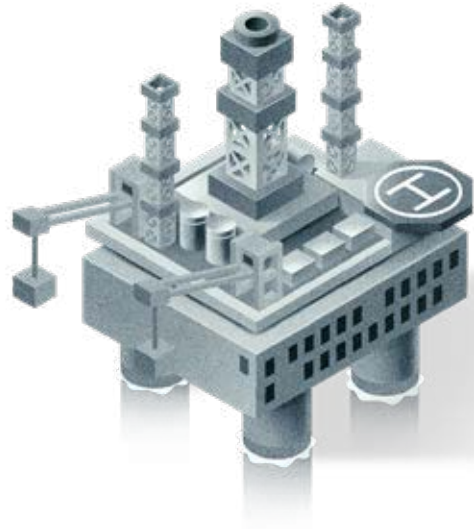
Chart 10 - Hydrocarbon evidence statements in Espírito Santo (in units)



Source: ANP | Elaboration: Industry Observatory/Findes

It is worth noting that, since 2022, only onshore hydrocarbon declarations have been issued in Espírito Santo. In 2022, 3 declarations were issued, all by the BGM oil

company: 1 in the Muriqui field, 1 in the lara field and 1 in block ES-T-506. In 2023, 3 declarations were issued in block ES-T-506, all by the BGM oil company.



The last offshore declaration in Espírito Santo was issued by Petrobrás in 2021, which announced the existence of natural gas in block ES-M-669. It is worth noting that this block was part of the campaign by Petrobras, Equinor and TotalEnergies to reach the pre-salt layer in the Espírito Santo basin and is currently operated only by Petrobras, which since 2022 has operated the Espírito Santo Basin concession with a 100% stake after the two other companies left the consortium that operated the block.



42 onshore statements of commerciality
20 offshore statements of commerciality

Essa foi a quantidade de declarações emitidas no Espírito Santo desde 1999

In 2023, four declarations were issued in Espírito Santo.:

1 Campo Muriqui BGM

1 Campo Lagoa Parda Imetame

1 Campo Águia Real Capixaba Energia

1 Campo Batuira Capixaba Energia

2.3. Declarations of commerciality

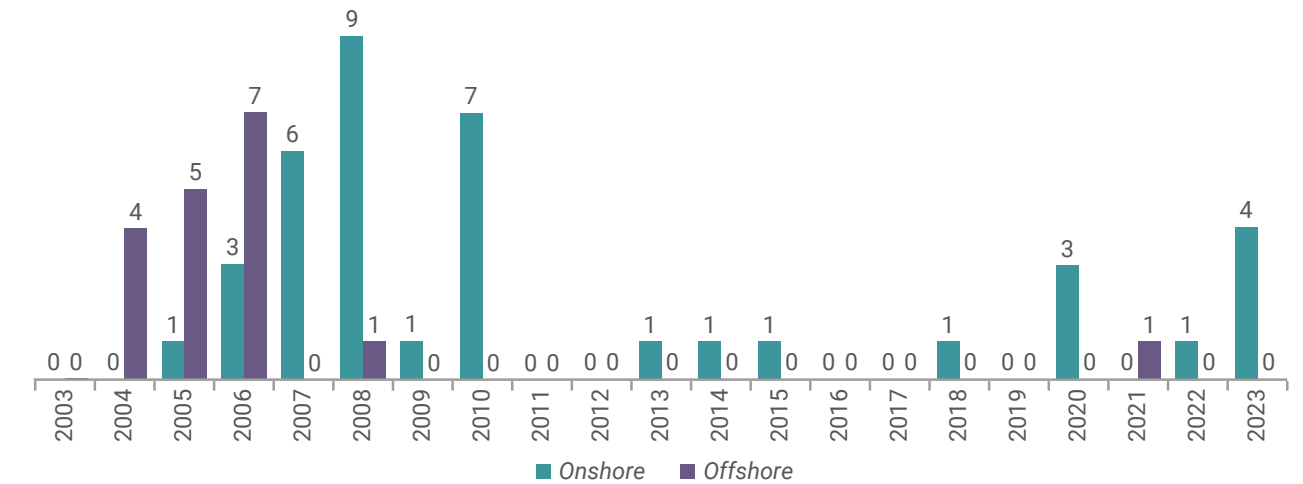
Declarations of commerciality are made once evidence of hydrocarbons has been notified. At this stage, the oil company verifies the economic viability of producing the deposits. If so, the operating company must issue a Declaration of Commerciality to the ANP, demonstrating its intention to produce oil and/or natural gas in the demarcated area. The Declaration of Commerciality marks the end of the exploration phase and the beginning of the production development phase of an area, with the creation of an oil and/or natural gas field.

In the state, all onshore. BGM and Imetame issued one declaration each, in the Muriqui and Lagoa Parda Sul fields, respectively. Capixaba Energia² issued two declarations in the Águia Real and Batuira fields, which are part of blocks ES-T-487 and ES-T-441, respectively, both acquired in the ANP's 14th Bid Round.

In the offshore environment, the last declaration of commerciality in Espírito Santo took place in 2021, when PRio issued a declaration for the Wahoo field - located in the Espírito Santo part of the Campos Basin. Regarding the field, PRIO plans to start production in the third quarter of 2024 and its schedule foresees the drilling of four producer wells and another two injector wells by 2025. The infrastructure already installed in the Frade field, also located in the Campos Basin, will be used to transport the gas via a tieback system.

Since 1999, 62 declarations of commerciality have been issued in Espírito Santo, divided between onshore (67.7%) and offshore (32.3%). In 2022, the onshore environment registered the only declaration of commerciality in Espírito Santo, in the Irara field, operated by BGM. In 2023, four declarations were issued in

Chart 11 - Declarations of commerciality in Espírito Santo (in units)



Source: ANP | Elaboration: Industry Observatory/Findes

2.4. Oil and natural gas reserves

In the transition from 2021 to 2022, Brazilian oil reserves³ recorded an increase of 10.6%, reaching 26.9 billion barrels of oil in 2022. This increase in reserves was mainly due to the increase in offshore reserves in Rio de Janeiro and Bahia. In Espírito Santo, over the same period, there was a 22.0% reduction in oil reserves, reaching 1.1 billion barrels of oil in 2022. Even with this reduction, Espírito Santo remained in third place among the states with the largest total oil reserves, behind Rio de Janeiro

(23.0 billion barrels of oil) and São Paulo (2.2 billion barrels of oil). Regarding natural gas, the transition from 2021 to 2022 registered an increase of 4.5% in Brazilian reserves, reaching an input reserve of 587.9 billion m³. This increase in reserves was mainly due to an increase in onshore reserves in the states of Alagoas and Bahia, as well as an increase in offshore reserves in Rio de Janeiro. In Espírito Santo, over the same period, there was a



1.1 billion

barrels was the oil reserve in Espírito Santo in 2022.

2. Capixaba Energia, formerly known as Imetame Lagoa Parda, is a joint venture between Imetame (50%) and EnP Energy Platform (50%), which has a portfolio of assets made up of blocks ES-T-441 (100%) and ES-T-487 (100%) and the Lagoa Parda Pole (made up of the Lagoa Parda, Lagoa Parda Norte and Lagoa Piabanha fields), all located in the Espírito Santo Basin.

3. The concept used was Total Oil Reserves. Total oil reserves are classified by the sum of proven, probable and possible reserves.



27.7 billion

m³ was the natural gas reserve in Espírito Santo in 2022.

23.4% reduction in reserves, reaching a total volume of natural gas of 27.7 billion m³ in 2022. With this reduction, Espírito Santo moved from third to fifth place among the states

with the largest total natural gas reserves, behind Rio de Janeiro (399.7 billion m³), Amazonas (46.0 billion m³), Maranhão (37.8 billion m³) and São Paulo (34.3 billion m³).

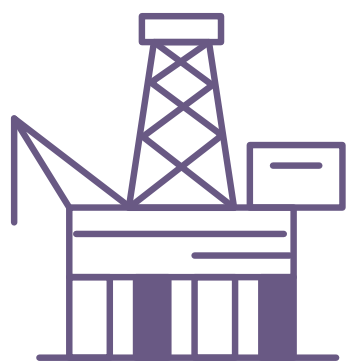
2.4.1. Offshore reserves in Espírito Santo

In 2022, Espírito Santo's offshore oil reserves fell by 23.9% compared to the previous year, reaching 1.04 billion barrels of oil (Chart 12). With this reduction, Espírito Santo once again recorded a drop in the volume of offshore reserves. It is worth noting that the state recorded consecutive reductions in the volume of offshore reserves between 2011 and 2020, growth in the transition to 2021 and, again, a reduction between 2021 and 2022. Despite the downturn, Espírito Santo remained the third state with the largest volume of offshore oil reserves, behind Rio de Janeiro (23.0 billion barrels of oil) and São Paulo (2.0 billion barrels of oil).

With regard to offshore natural gas,

of reserves in 2022, a reduction of 24.4% compared to the previous year (Chart 13). With this drop, the state fell from second to third place among the states with the largest offshore natural gas reserves, behind Rio de Janeiro (399.7 billion m³) and São Paulo (34.3 billion m³).

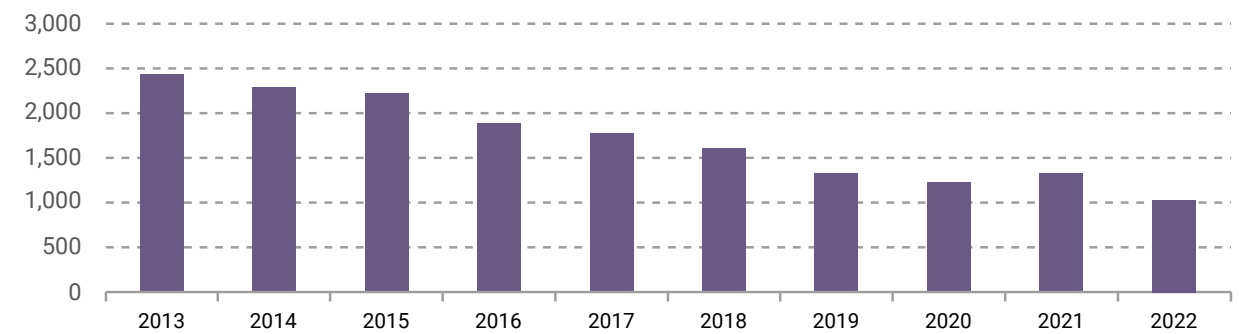
The indicator that assesses the useful life of reserves that will sustain production over time⁴ showed that Espírito Santo currently has a useful life of offshore oil reserves of 22 years, below the Brazilian indicator, which registered 24 years. In relation to natural gas, the indicator showed that Espírito Santo's reserves have a useful life of 22 years, higher than the national indicator, which registered 11 years.



1.04 billion barrels was the oil offshore reserve in Espírito Santo in 2022

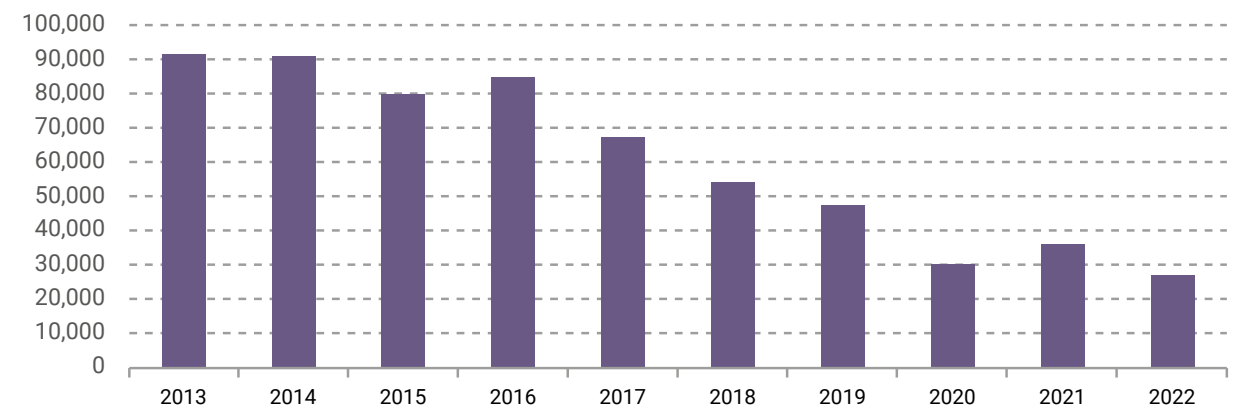
27.1 billion was the natural gas offshore reserve in Espírito Santo in 2022

Chart 12 Offshore oil reserves in Espírito Santo (in millions of barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 13 - Offshore natural gas reserves in Espírito Santo (million m³)



Source: ANP | Elaboration: Industry Observatory/Findes

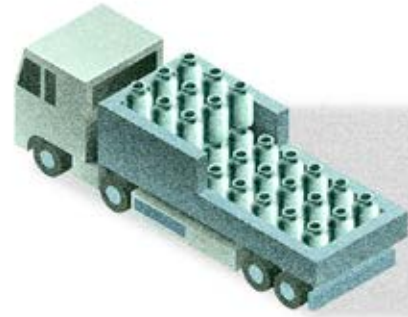
2.4.2. Onshore reserves in Espírito Santo

With regard to the onshore environment, in 2022, Espírito Santo's oil reserves increased by 28.5% compared to the previous year, reaching 63.4 million barrels of oil (Chart 14).

With this growth, the state gained a position among the states with the largest volumes of onshore oil reserves, ranking fourth behind Rio Grande do Norte (178.3 million bar-



4. The indicator is calculated using the ratio between oil and natural gas reserves and production. The higher the indicator, the greater the time available for the production of inputs.



rels), Bahia (165.5 million barrels) and Sergipe (160.4 million barrels).

In 2022, Espírito Santo's onshore natural gas reserves grew significantly, by 86.5% compared to the previous year, reaching a volume of 638 million m³ (Chart 15). With this growth, the state rose from 8th to 7th place among those with the largest volumes of the resource in the onshore environment. Among the states with the largest onshore natural gas reserves are: Amazonas (46.0 billion m³), Maranhão (37.8 billion m³), Bahia (16.7 billion

m³), Alagoas (12.7 billion m³), Rio Grande do Norte (3.7 billion m³) and Sergipe (708 million m³).

The indicator that assesses the useful life of reserves that will sustain production over time showed that Espírito Santo currently has a useful life of onshore oil reserves of 24 years, above the Brazilian indicator, which registered 23 years. In addition, the indicator for natural gas showed that Espírito Santo's reserves have a useful life of 32 years, also higher than the national indicator, which registered 16 years.



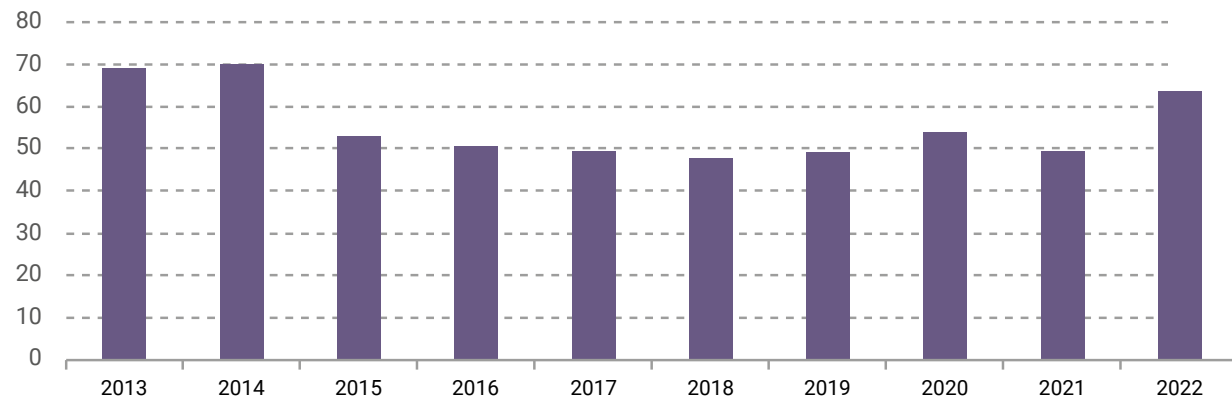
63.4 million

barrels was the oil onshore reserve in Espírito Santo in 2022.

638 million

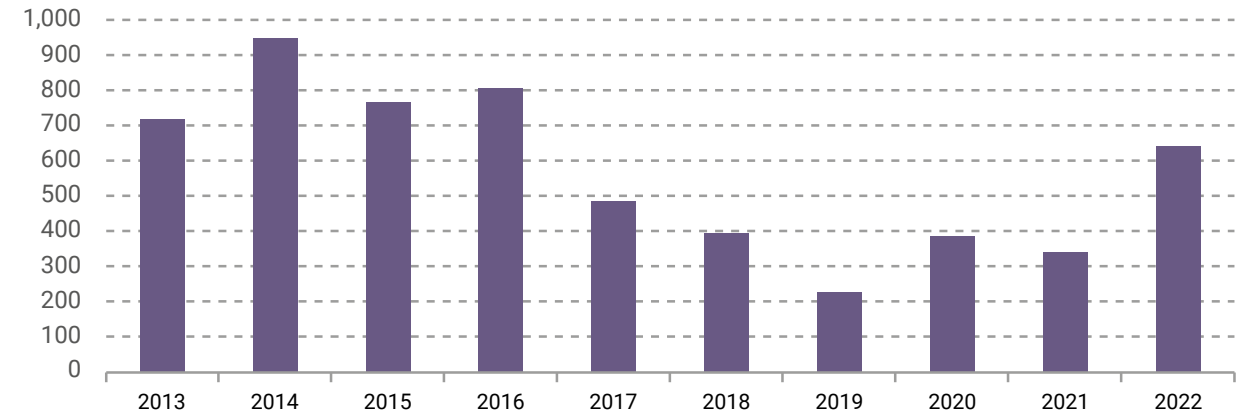
m³ was the natural gas onshore reserve in Espírito Santo in 2022.

Chart 14 - Onshore oil reserves in Espírito Santo (in million barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 15 - Onshore natural gas reserves in Espírito Santo (million m³)



Source: ANP | Elaboration: Industry Observatory/Findes

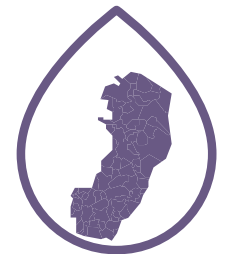
2.5. Total oil and natural gas production

In 2023, Brazilian oil production hit an all-time high and reached an average of 3.4 million barrels per day (bbl/d), 12.6% higher than in 2022. In 2023, Espírito Santo produced an average of 169,700 barrels of oil per day, 23.0% more than in the previous year (Chart 16). The state remained in third position with the highest oil production of all the federal units, behind Rio de Janeiro (2.9 million bbl/d) and São Paulo (248.1 thousand bbl/d). It is worth noting that, between 2011 and 2018, Espírito Santo occupied second place among the largest oil-producing states. The position was lost in 2019 to São Paulo, which saw a notable increase in its pre-salt production.

Regarding natural gas, in 2023 the average Brazilian production was 150 million cubic meters per

day (m³/d), 8.7% higher than that recorded in 2022. In Espírito Santo, 4.2 million m³ were produced per day, a volume 22.5% higher than that recorded in the previous year (Chart 17). The value places the state of Espírito Santo in fifth place among the states with the highest average daily production of natural gas, behind Rio de Janeiro (108.4 million m³/d), Amazonas (14.3 million m³/d), São Paulo (14.1 million m³/d), and Bahia (4.3 million m³/d).

The explanation for the increase in both oil and natural gas production in Espírito Santo in 2023 is mainly due to three factors. The first is related to higher production in the Jubarte and Golfinho fields, both offshore, where the former can be explained by the resumption of



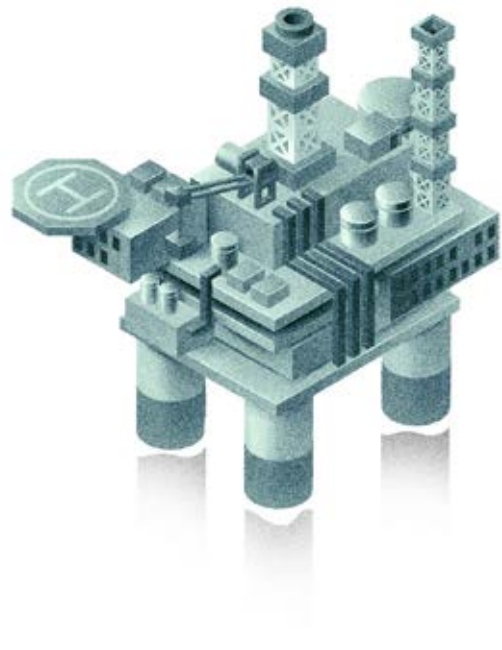
169.7 thousand

barrels per day was the oil production in Espírito Santo in 2023



4.2 million

m³ per day was the natural gas production in Espírito Santo in 2023

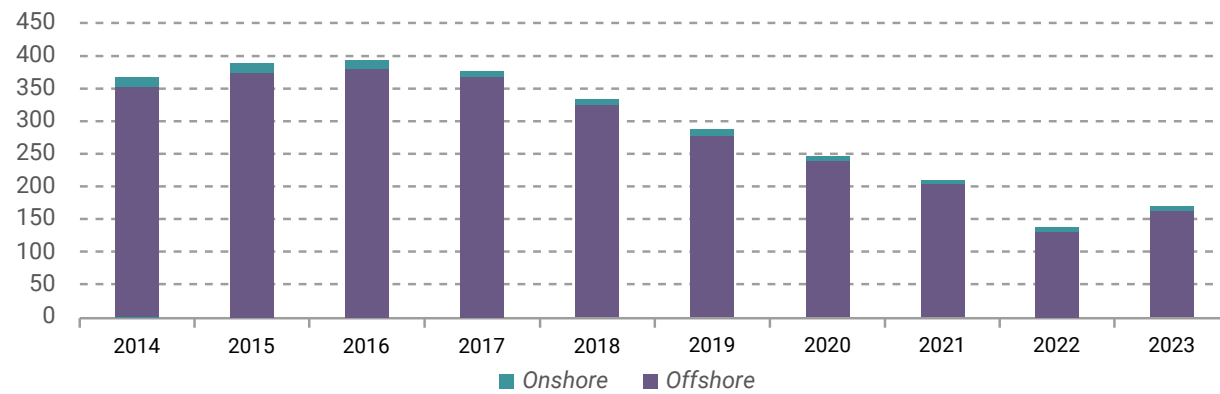


operations of the FPSO Cidade de Anchieta, and the latter after BW Offshore took over operations of the assets sold by Petrobras. The second factor relates to the recovery of production in the onshore environment in the northern region of Espírito Santo, caused by Petrobras' divestment program in the region and the regulatory incentives promoted by the ANP. As for the third factor, it is related to the resumption of production in the Abalone Field, part of Parque

das Conchas, by Shell Brasil. The development of the field is part of the company's deep water exploration project, operationalized by FPSO Espírito Santo.

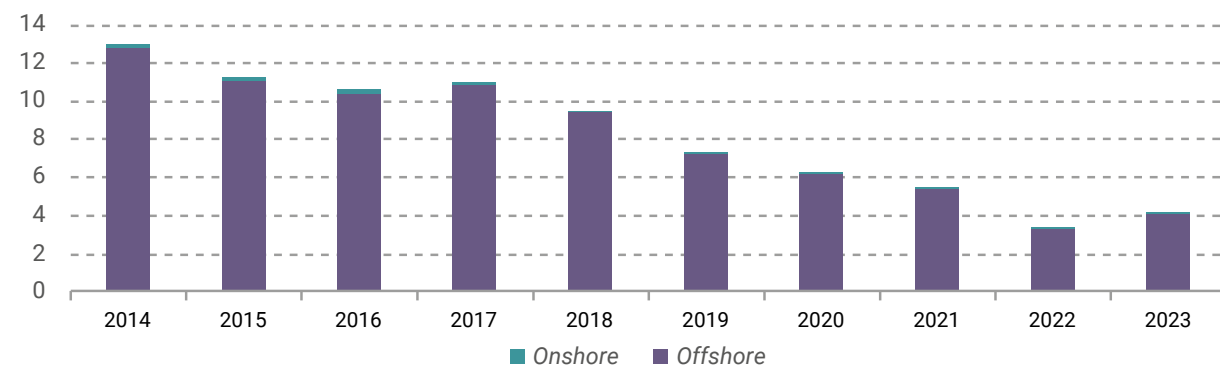
It's worth noting that in 2023, Espírito Santo's O&G production reversed the downward trend seen in recent years. For oil, the state has seen consecutive decreases in production since 2017, while for natural gas the retractions have occurred since 2018.

Chart 16 - Total oil production in Espírito Santo (thousand barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 17 - Total natural gas production in Espírito Santo (million m³)



Source: ANP | Elaboration: Industry Observatory/Findes

2.5.1. Offshore oil and natural gas production

In 2023, average offshore oil production in Espírito Santo was 161.4 thousand barrels of oil (bbl/day), 23.5% higher than the previous year. Regarding natural gas, in 2023 the average production in Espírito Santo was 4.1 million m³/day, 21.1% higher than that recorded in the previous year.

As for oil, the increase in production can be explained mainly by the resumption of production in wells in the pre-salt layer. Between 2021 and 2022 there was a 51.1% drop in this production, while in 2023 the 29.6% growth contributed significantly to the increase in offshore oil production in Espírito Santo. With regard to natural gas, the increase in production is also explained mainly by the resumption of production in wells in the pre-salt layer which, after falling by 47.2% between 2021 and 2022, saw growth of 24.8% in the transition to 2023.

The production of offshore oil and natural gas in Espírito Santo can be divided into three parts, according to its location. The first two are located in the Campos Basin, in the producing fields of Parque das Baleias⁵ and Parque das Conchas⁶. The third part is located in the producing fields of the Espírito Santo Basin⁷.

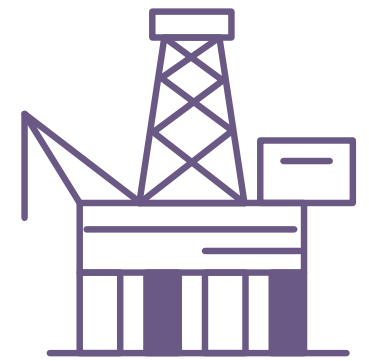
In the transition from 2022 to 2023, Parque das Baleias recorded an increase of 24.9% and 26.2% in oil and natural gas production, respectively. The area produced 129.4 thousand barrels of oil per day (Chart 18) and 3.2 million m³ of natural gas per day (Chart 19), making it responsible for producing 80.3% of the oil and 78.7% of the natural gas offshore Espírito Santo.

Parque das Conchas, on the other hand, recorded a 10.9% and 25.2% increase in oil and natural gas production between 2022 and 2023, respectively. The park produced 26,000 barrels of oil (Chart 18) and 282,400 m³ of natural gas (Chart 19), making it responsible for producing 16.1% of the oil and 7.0% of the natural gas offshore Espírito Santo.

5. In 2019, the ANP and Petrobras signed an agreement involving the park's reservoirs for the purpose of paying royalties and special participations. The agreement considered only a reservoir called Novo Campo de Jubarte, which included the areas between Jubarte, Baleia Azul, Baleia Franca, parts of Cachalote, Mangangá and Pirambu. The agreement made it possible to approve a new Development Plan for the New Jubarte Field, with the extension for another 27 years for the production phase.

6. Comprising the Abalone, Argonauta and Ostra fields.

7. Composed of the Cação, Camarupim, Camarupim Norte, Canapu, Cangoá, Golfinho and Peroá fields.



offshore

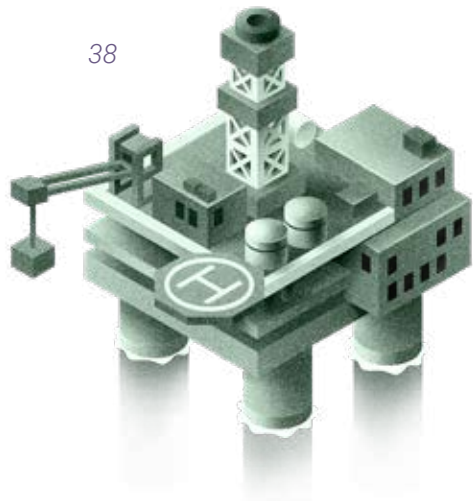
161.4 thousand

barrels per day was the oil production in Espírito Santo in 2023

4.1 million

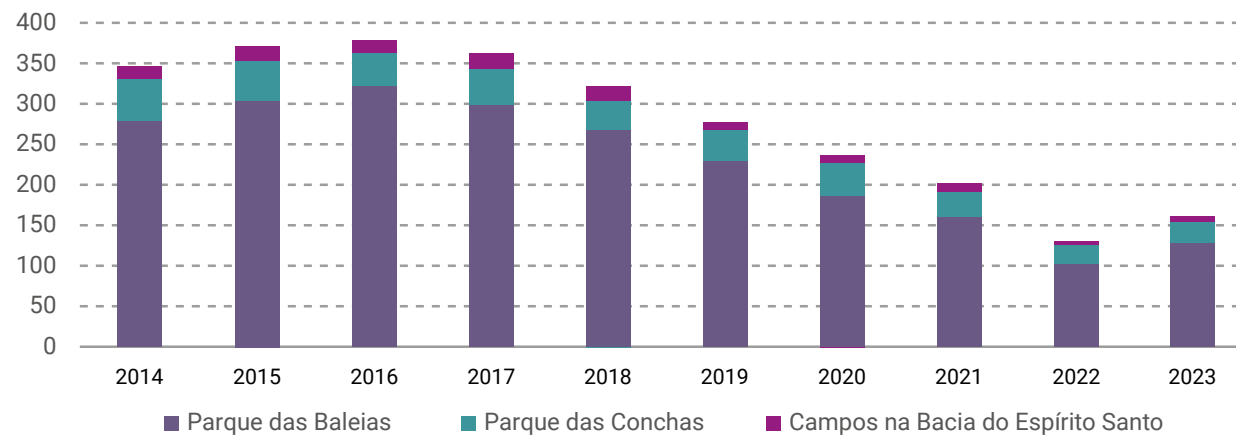
m³ per day was the natural gas production in Espírito Santo in 2023





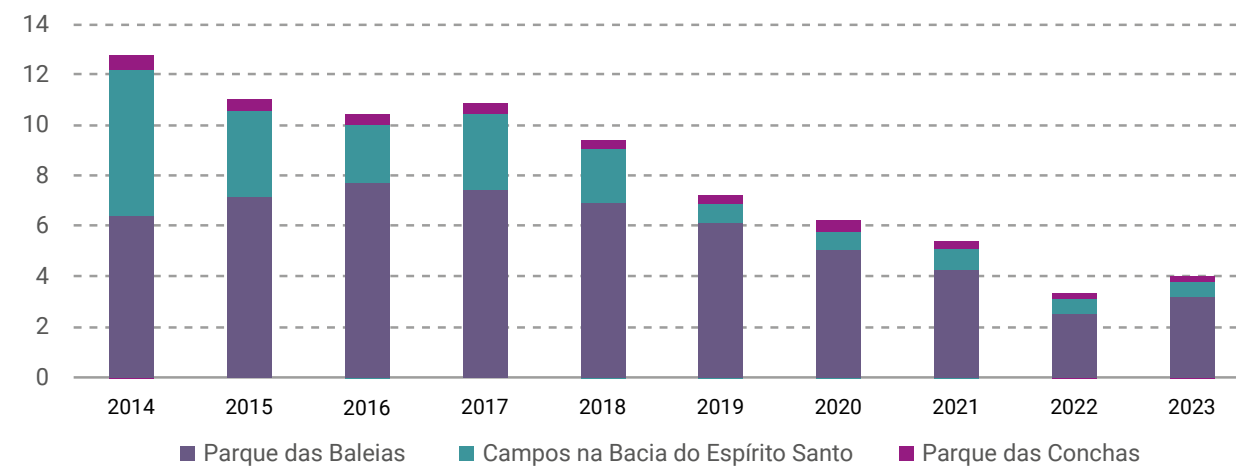
Finally, the producing fields in the Espírito Santo Basin recorded an increase in oil production and a drop in natural gas production between 2022 and 2023. For oil, the increase was 57.3%, reaching a production of 5.8 thousand barrels per day (Chart 18). As for natural gas, the decrease was 3.3%, reaching production of 582.7 thousand m³ per day (Chart 19).

Chart 18 - Offshore oil production in Espírito Santo by location (thousand barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 19 - Natural gas production in Espírito Santo by location (million m³)



Source: ANP | Elaboration: Industry Observatory/Findes

2.5.2. Onshore oil and natural gas production

In 2023, average onshore oil production in Espírito Santo was 8.4 thousand barrels of oil per day (bbl/day), 17.9% higher than the previous year. As for natural gas, in 2023 Espírito Santo's production more than doubled compared to 2022, reaching an average of 121.2 m³/day, 102.3% higher than the previous year.

Regarding the division by location, 92.9% of onshore oil production in Espírito Santo was concentrated in ten producing fields: Fazenda Alegre (38.3%), Cancã (11.6%), Inhambu (10.4%), Fazenda São Rafael (7.1%), Fazenda Santa Luzia (6.0%), Jacutinga (5.5%), Lagoa Parda (4.8%), Fazenda São Jorge (4.4%), São Mateus Leste (2.8%) and São Mateus (2.5%). Among them, the production growth between 2022 and 2023 of the Inhambu (+527.4 bbl/day), Jacutinga (+297.9 bbl/day) and São Mateus Leste (+231.3 bbl/day) fields, all operated by Seacrest Petróleo, should be highlighted.

Onshore natural gas production in Espírito Santo is concentrated in ten producing fields, which together account for 97.2% of total production. The fields are: São Mateus Leste (47.1%), Fazenda Alegre (13.5%), Fazenda Santa Luzia (11.4%), Fazenda São Rafael (7.1%), Lagoa Parda (6.7%), Rio São Mateus (5.4%), Rio Ipiranga (2.8%), Cancã (1.6%), Jacutinga (0.9%) and Lagoa Parda Norte (0.85%).

With regard to the significant increase in onshore oil (+17.9%) and natural gas (+102.3%) production in Espírito Santo in 2023, it is worth mentioning the importance of the productive recovery in the northern region of the state, caused mainly by Petrobras' divestment program in the region and the regulatory incentives promoted by the ANP. In this sense, the role of the new oil companies operating in the state stands out, with four companies concentrating 99.6% of oil production and 99.9% of onshore natural gas production in 2023 (table 1).



onshore

8.4 thousand barrels per day was the oil production in Espírito Santo in 2023

121.2 thousand m³ per day was the natural gas production in Espírito Santo in 2023



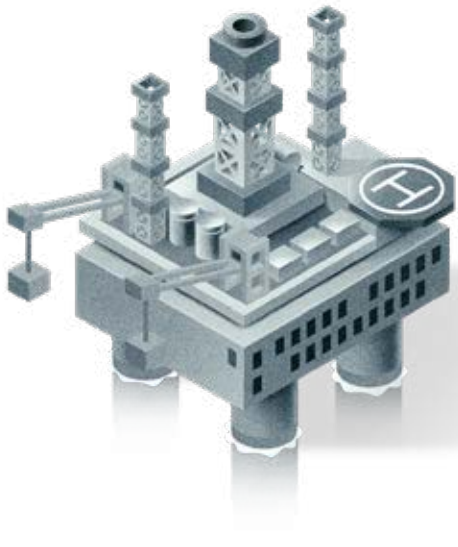
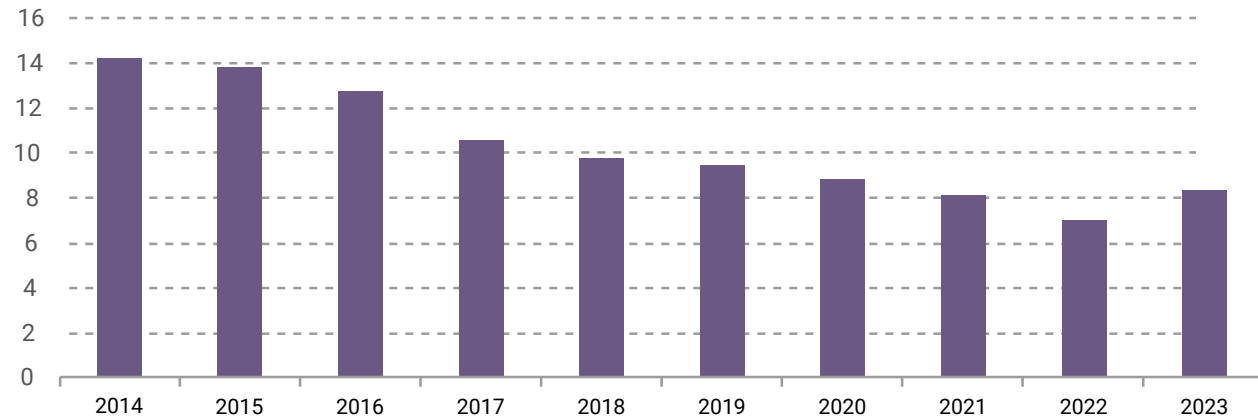


Table 1 - Share of the main operating companies in onshore O&G production in Espírito Santo in 2023

Company	Oil	Natural Gas
Seacrest Petróleo	91.0%	89.4%
Capixaba Energia	5.2%	7.6%
Imetame	1.7%	2.8%
BGM	1.7%	0.2%
Mandacaru Energia	0.25%	0.02%
Vipetro	0.14%	0.02%

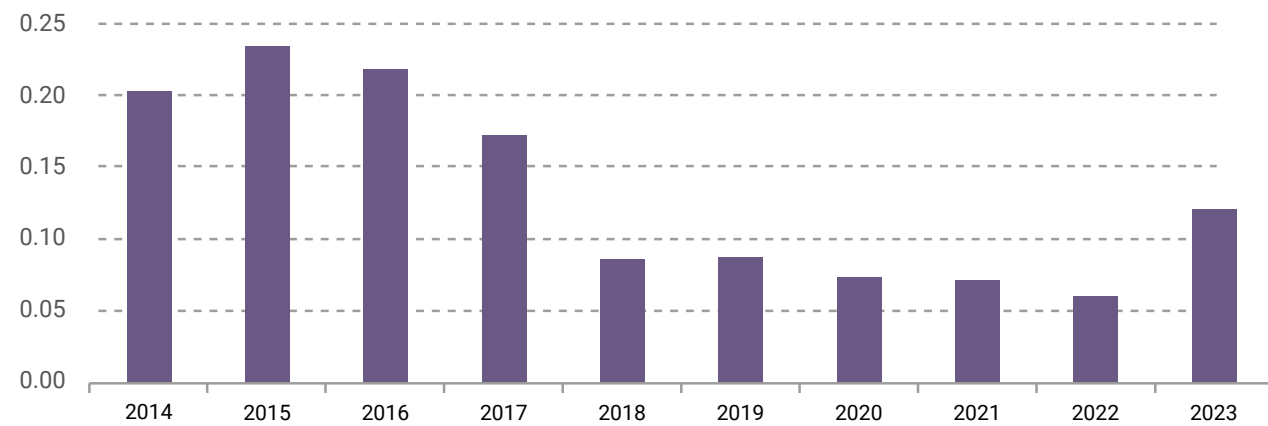
Source: ANP | Elaboration: Industry Observatory/Findes.

Chart 20 - Onshore oil production in Espírito Santo (thousand barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 21 Onshore natural gas production in Espírito Santo (million m³)



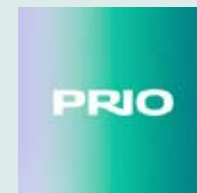
Source: ANP | Elaboration: Industry Observatory/Findes



PRIO INVESTMENTS STRATEGIES FOR DEVELOPING THE LOCAL SUPPLY CHAIN

Jean Carlos Calvi

Executive Manager of Drilling and Subsea at PRIO



Contribuição da PRIO

PRIO's journey began with the opening up of the market and the development of exploration and production of mature fields in Brazil. With this new sector developing, companies, jobs, higher royalty revenues and new demands on suppliers have emerged. Where oil production is more challenging, the search for efficiency and results is also fiercer, which ends up bringing dynamism and new challenges to the market.

With more companies mirroring PRIO's operating style, new and old suppliers are finding opportunities for growth, but also the need to change the way they

work. Orders are being placed on a smaller scale, with more agility, less bureaucracy, more focus on results and on reducing costs throughout the process. On the other hand, these companies have a high demand for operational continuity projects. The mature field requires more services to maintain production, so it stimulates the supply chain more.

Wahoo and our arrival in Espírito Santo

One of PRIO's most recent flagship projects is Wahoo, located in the Campos Basin in Espírito Santo state, which stands out for being a pioneer in Latin America due to its complexity and innovation. To make its production economically viable, PRIO opted for the strate-

gy of interconnecting its operations subsea - by means of a 35 km tie-back - connecting Wahoo's wells to the FPSO Valente, which is responsible for production in the Frade field.

In order to carry out a underwater project of this magnitude - in a way that brings economic return for the company, safety, sustainability for the operation and the environment - it was necessary to have a supply chain that was able and willing to meet the demands and complexities of the process, both in terms of structure, technology, cost and time.

And in order to put this bold and innovative project into practice,

we invested in the supply chain in two ways: firstly, by attracting foreign companies with experience in similar projects, now established in Brazil and ready to serve the entire oil and gas industry; and secondly, by developing local suppliers, training them for differentiated, high-quality deliveries.

Even before the field starts operating, the project has already generated more than BRL 1 billion in investments in the local supply chain. The industry has had to evolve to meet PRIO's demand and this will leave a legacy for future clients of these companies, which are reinventing themselves and developing expertise to also be a benchmark in the sector.

Case Prysmian and new suppliers

Wahoo started by demanding something unprecedented: 30 km umbilical cables, the longest in the country until then. In order to put the plan into practice, a lot of research was carried out and the need arose to have a single production of a few units of this umbilical, without splices (which generate implementation and maintenance costs and greater risks for the process). This equipment will be responsible for carrying the electrical, hydraulic and chemical structure that controls underwater production.

To this end, a partnership was formed with Prysmian, a global leader in cable solutions and energy systems. The company expanded the structure and jobs at its plant in Vila Velha to initially handle a contract worth around

BRL 460 million, as well as making adjustments to the size of the material produced. With this, we were able to bring gains to both parties, guaranteeing a quality product and generating expertise to be shared with other companies in the sector.

In addition to Prysmian, PRIO enabled other companies to enter and develop in the state, such as Deepsea, Shawcor and Vallourec. They brought their technical capacity and know-how from global projects to meet the demands for underwater equipment such as manifolds, carbon steel pipeline pipes and thermal insulation material to guarantee the flow of production.

In addition to the large equipment manufacturers mentioned above, a number of local service providers are also needed for the project, such as welding, boilermaking, port wharf, road transportation, ferrying, lifting to ship equipment and materials for the construction of the Wahoo field. This whole chain continues to develop and now serves other companies in the sector.

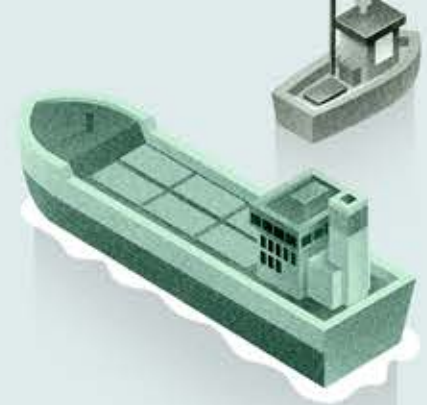
Sustainability, evolution of the sector and legacy

In all, PRIO is investing around BRL 4.5 billion in the project, around 80% of which is spent on contracting and developing supplier companies. Over the course of its production, the Wahoo field is expected to produce up to 40,000 barrels of oil per day, generating more than BRL 3 billion in royalties for the state and the federal government.

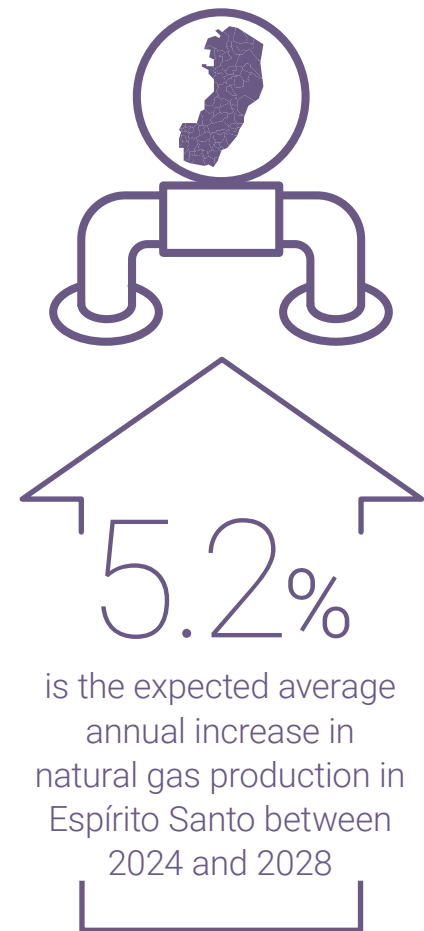
This investment is directly associated with a legacy for the region that is not only economic, but also

sustainable. We are talking about a project that has a bias towards reducing diesel consumption (requiring fewer vessels in the process), more safety for processes and people, and which contributes to an evolution in the energy industry.

We believe that this transformation in the domestic market could attract more and more companies of different sizes to make new projects like this viable. We are committed to continuing to play a key role in introducing new companies, methods and practices that add value to the energy sector. We believe that in this way we are together building a more promising and responsible future for everyone.



Frade (FPSO/Operation to which the Wahoo field will be integrated)



2.6. Production projection

For the second year running, Findes, through the Industry Observatory, is presenting projection scenarios for oil and natural gas production in Espírito Santo, divided into offshore and onshore environments. The aim of this effort is to provide greater predictability for agents in the sector, enabling them to anticipate scenarios and guide the actions of public and private authorities.

The methodology used to calculate the projection of oil and natural gas production in Espírito Santo uses accounting rules to capture the production trend with a focus on the regional supply of the input. Based on a detailed analysis of the hydrocarbon supply profile, related to the exploration and production phases of each field, operator and platform, the figures were projected up to the year 2028. In addition, the calculations were made in order

to reproduce the historical production patterns of each producing well in the state.

Between 2024 and 2028, oil production is expected to register an average annual increase of 5.1%, reaching a production volume of 218.4 barrels per day in the last projected year. For natural gas, an increase of 5.2% is projected in average annual production between 2024 and 2028, reaching a production of 5.5 million m³ per day by the end of the period.

Between the middle of the last decade and 2022, Espírito Santo maintained an accelerated downward trend in oil and natural gas production. In 2023, the state saw a recovery in production, both onshore and offshore. While relative stability is expected for 2024, the next two years should see faster growth for both oil and natural gas.

2.6.1. Projection of offshore production in Espírito Santo

Offshore production represents the majority of the total volume of oil and natural gas produced in Espírito Santo. The evolution of extraction at sea is responsible for most of the state's production and, for the coming years, it is

expected that this configuration will not be changed. Offshore oil production is expected to grow by 4.8% between 2024 and 2028, reaching an average production of 203.4 barrels per day at the end of the period. For natural

gas, an increase of 4.6% is projected between 2024 and 2028, reaching an average daily production of 5.0 million m³ in the final year (Chart 22).

Offshore oil and natural gas production in Espírito Santo is concentrated in Parque das Baleias and Parque das Conchas. In 2022, production reached its lowest level since 2009, for both oil and natural gas, mainly due to the natural decay of producing fields and operational problems.

It is expected that the process of natural decay in production will continue to have a negative impact on performance in the short term, which is the main reason for the expected weak variation in production in 2024. A more consistent change is expected for 2025 and 2025, when Petrobras intends to put the new Maria Quitéria platform (FPSO) into operation in Parque das Baleias and PRIO is expected to increase the volumes extracted in the Wahoo field, where production is expected to start in 2024.

Another factor responsible for the increase in volumes of oil and gas extracted from 2025 onwards concerns the sale, by Petrobras, of the operation of mature assets. The strategy tends to improve the performance of these producing fields, since the new owners are

investing in revitalizing and extending the useful life of these concessions - a process that was not part of the state-owned company's plans. In this regard, the acquisition of Polo Peroá by 3R Petroleum and the acquisition of the Golfinho, Canapu, Camarupim Norte and Block BM-ES-23 fields by BW Energy stand out. Based on the production potential of the fields operated, increases in the volumes produced by both companies were projected for the period under analysis.

With regard to the projected drop in oil and natural gas extraction from 2027 onwards, this is mainly due to the expectation that the volumes added by FPSO Maria Quitéria (Petrobras) and the Wahoo field (PRIO) will decline during this period. Charts 22 and 23 show the recent evolution and projection of offshore production in Espírito Santo until 2028.

8. The Maria Quitéria FPSO will be installed in Parque das Baleias (Jubarte Field) in 2025 and will have a maximum processing capacity of 100 thousand barrels of oil and 5 million m³ of natural gas per day. The platform will be the first fully electric one in Brazil.

9. The production will be done through the interconnection of the Wahoo and Frade fields, which is also operated by PRIO. The wells will be connected to the Valente FPSO, already located in the Frade field in Rio de Janeiro. The company estimates an average productivity of 10 thousand bbl/d per well and that total production will reach 40 thousand bbl/d.

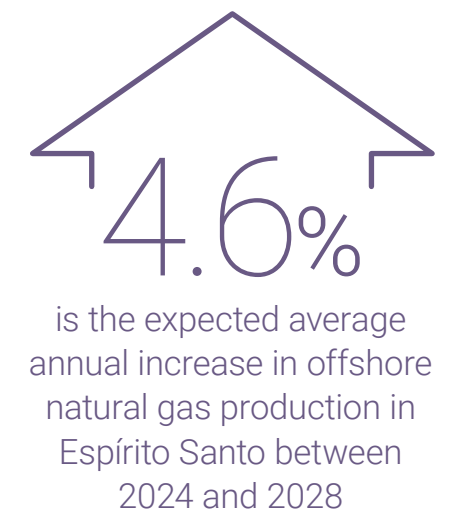
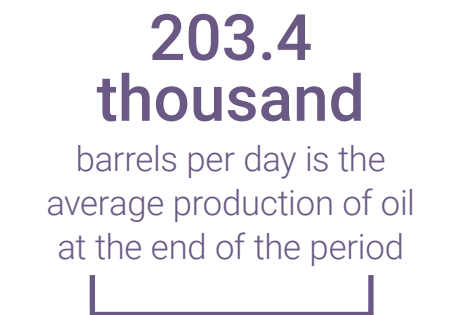
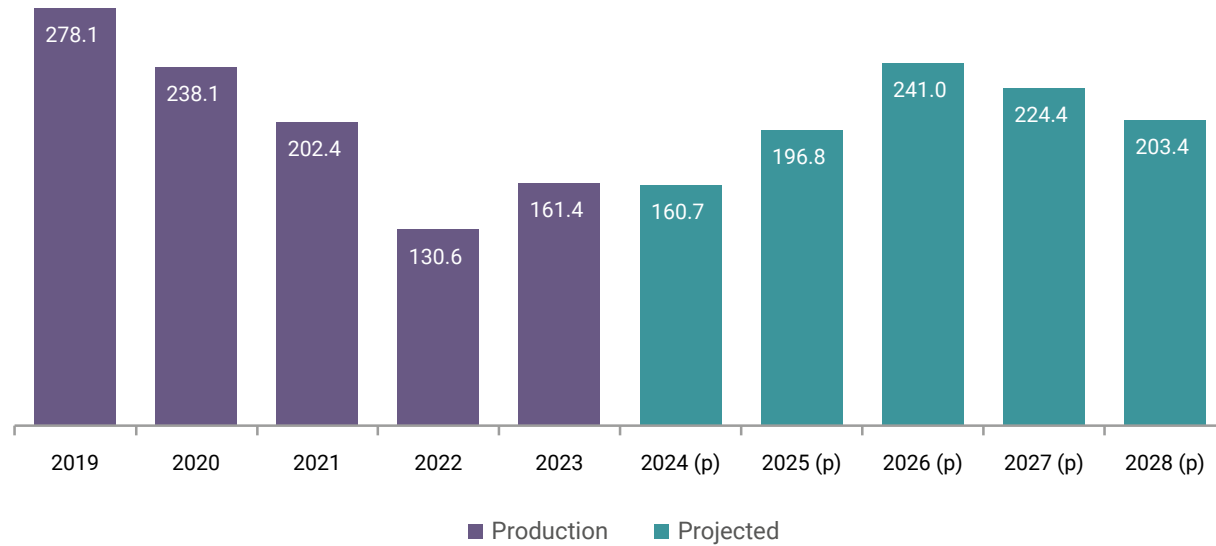
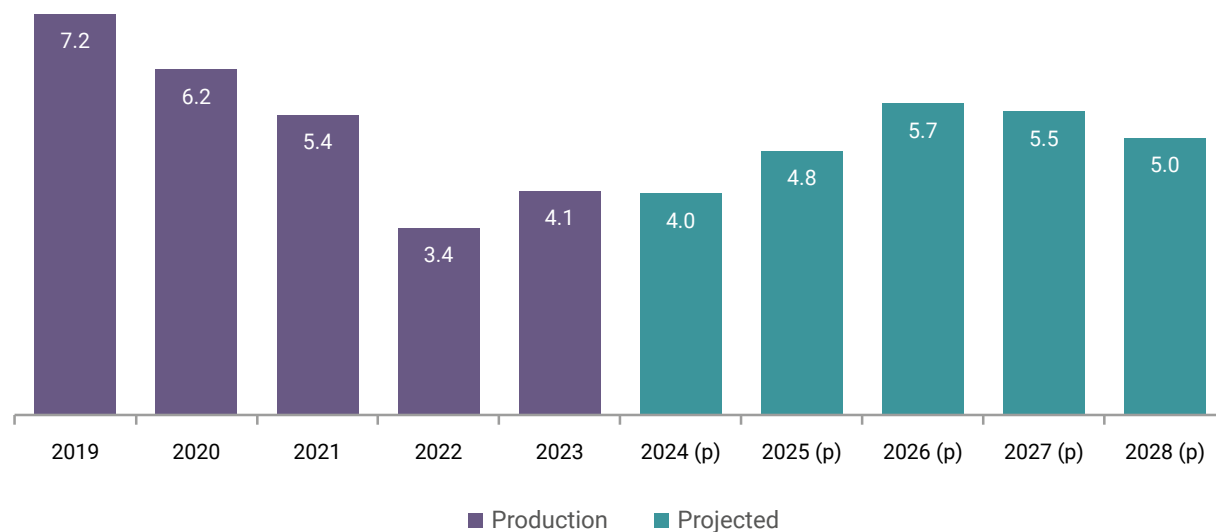


Chart 22 - Projected offshore oil production in Espírito Santo (thousand bbl/day)

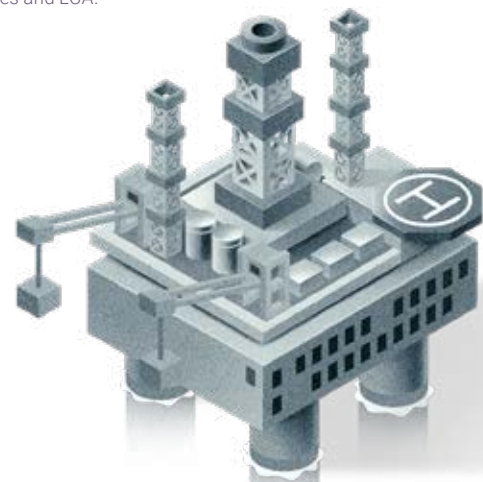


Elaboration: Industry Observatory/Findes and LCA.

Chart 23 - Projection of offshore natural gas production in Espírito Santo (millions of m³/day)



Elaboration: Industry Observatory/Findes and LCA.



2.6.2. Projection of onshore production in Espírito Santo

Onshore production accounts for a minority of the total oil and natural gas produced in Espírito Santo. Even so, the activity is of great importance to the regional socio-economic development of the producing municipalities, especially in terms of generating jobs and income. Between 2024 and 2028, onshore oil production is expected to grow by an average of 8.6% per year, reaching an average production of 15.0 thousand barrels per day in the final year. For natural gas, an average annual expansion of 12.8% is projected between 2024 and 2028, reaching an average daily production of 470.5 thousand m³ at the end of the period.

Until 2022, onshore production saw a downward trend due to the main fields being mature and mostly operated by Petrobras, which had no focus on developing these operations. The year 2023 was marked by a recovery in onshore production caused mainly by Petrobras' divestment program, which transferred the company's assets to other oil companies. It is noteworthy that despite the less representative volume in total production, onshore extraction has a greater diversity of fields, operators and production units.

Over the next few years, a significant increase in onshore production in Espírito Santo is expected due to three main factors. The first is related to new operators, who should continue to invest in revitalizing, extending the useful life and expanding concessions - which tends to improve the performance of producing fields. The second factor concerns the various indications of hydrocarbons and declarations of commerciality registered in the state since 2020 (mentioned at the beginning of the chapter). The third factor refers to the acquisitions of onshore blocks in the last ANP bidding rounds, signaling future increases in the number of projects in Espírito Santo territory.

It is also worth mentioning the growth plans of Seacrest Petróleo, which has become the most important player in onshore production in Espírito Santo and currently accounts for 91.0% of oil production and 89.4% of onshore gas production. The company, which has ambitious growth plans, expects to triple production in 2025 (compared to 2023) and more than quadruple it in the long term.

Charts 24 and 25 show the recent evolution and projection of offshore production in Espírito Santo until 2028.

8.6%

is the expected average annual increase in onshore oil production in Espírito Santo between 2024 and 2028

15.0 thousand

barrels per day is the average production of oil at the end of the period

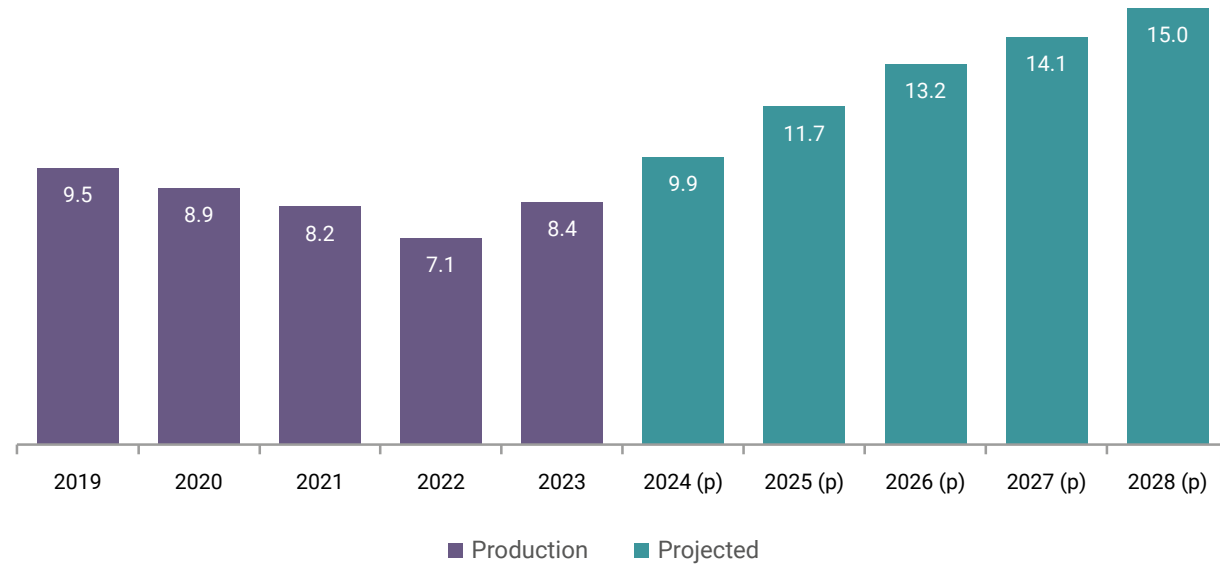
12.8%

is the expected average annual increase in onshore natural gas production in Espírito Santo between 2024 and 2028

470.5 thousand

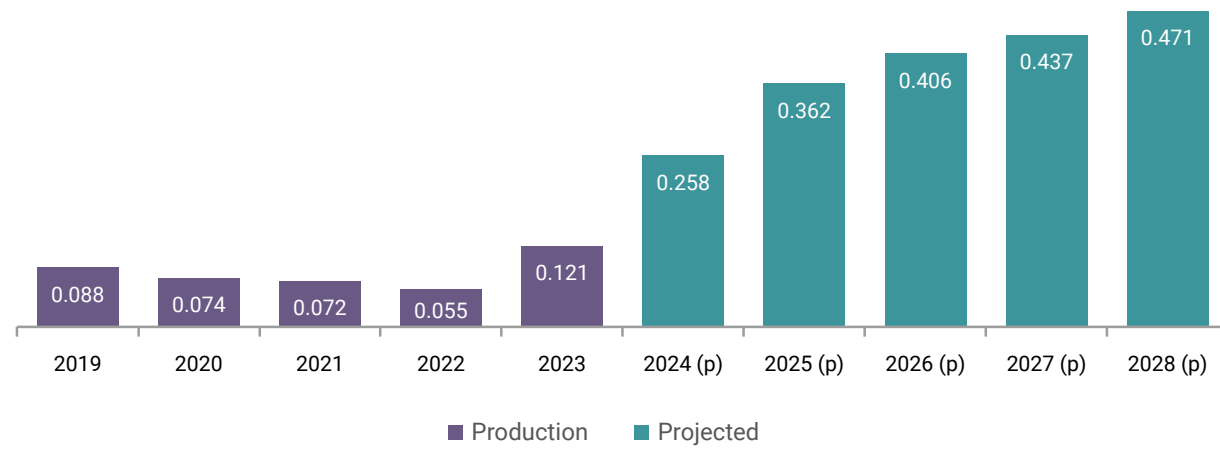
m³ per day is the average production of natural gas at the end of the period

Chart 24 - Projection of onshore oil production in Espírito Santo (thousand bbl/day)

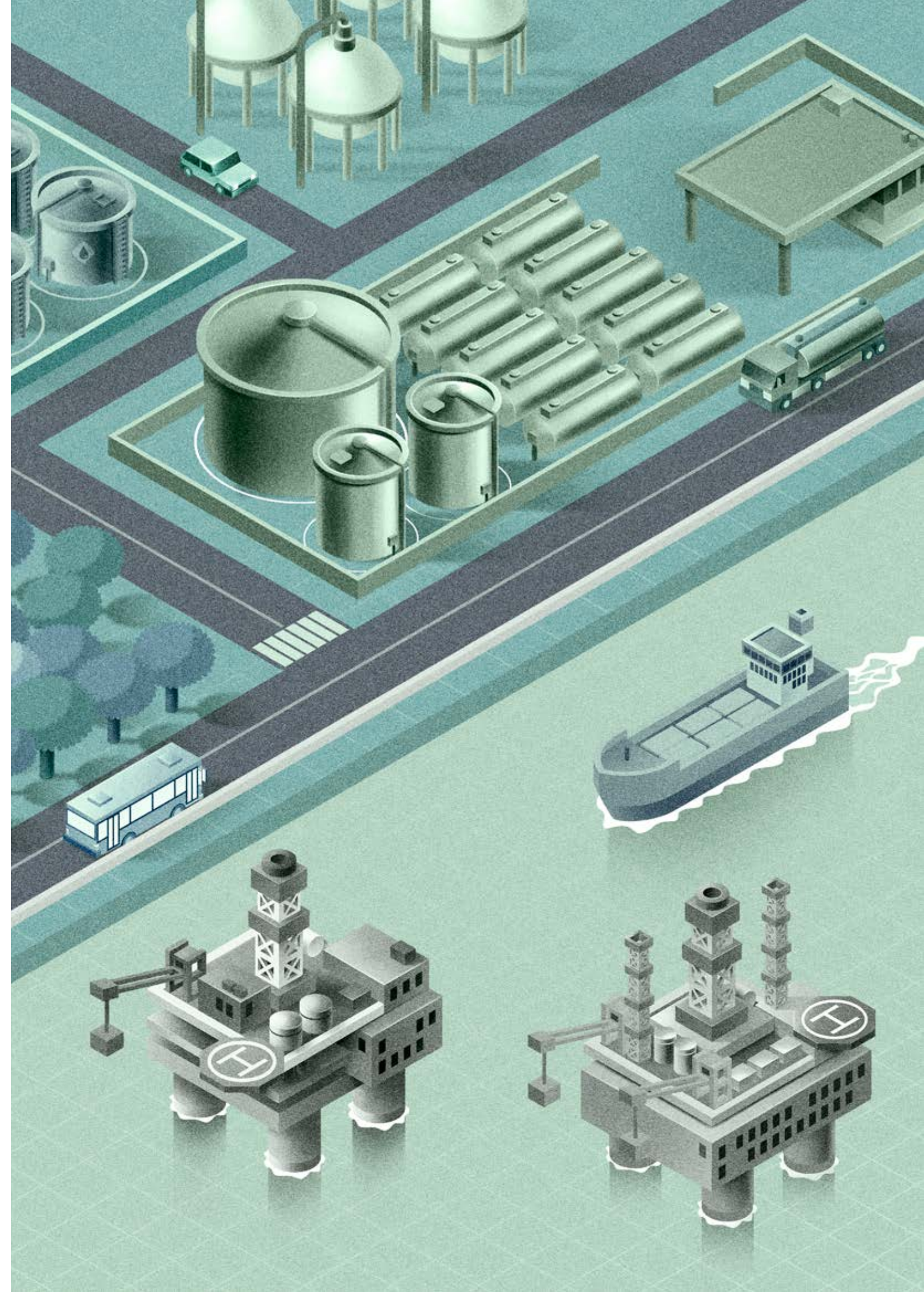


Elaboration: Industry Observatory/Findes and LCA.

Chart 25 - Projection of onshore natural gas production in Espírito Santo (millions of m³/day)



Elaboration: Industry Observatory/Findes and LCA.



Chapter 3

ECONOMIC
REFLECTIONS

Oil and natural gas exploration and production are activities that generate a series of demands for specialized goods and services, thus creating a dynamic and multifaceted market around them. From the initial prospecting phase to extraction and refining, each stage of this process requires a wide range of products and services, including drilling equipment, cutting-edge monitoring and control technology, specialized transportation, engineering and geological consulting services, among others.

This expansion also drives the creation of skilled jobs in various areas, from engineers and specialized technicians to logistics and environmental management professionals. In ad-

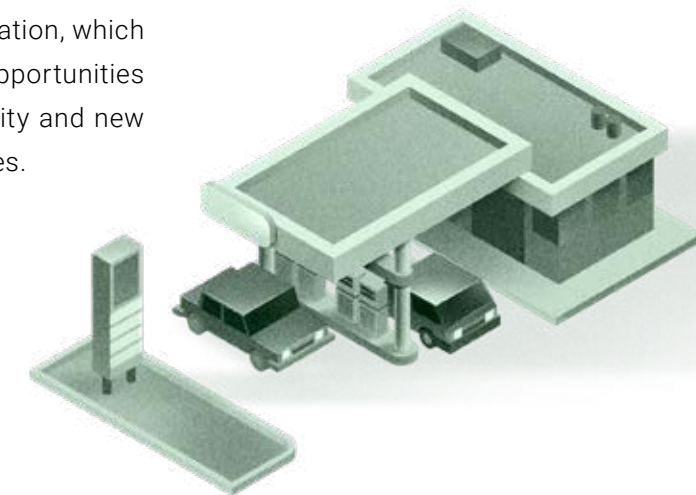
dition, the investments needed to sustain exploration and production operations contribute to the economic growth of the regions involved, stimulating income generation there.

Another important aspect is the financial impact of this activity. Companies involved in oil and natural gas exploration are subject to financial compensation schemes that include the payment of royalties and special participations. In addition, encouraged by the discovery of new techniques and operational processes, the oil and natural gas sector has invested heavily in research and innovation, which provides a range of opportunities to increase productivity and new business opportunities.

3.1. Companies and jobs in the productive chain of the O&G sector

In the context of the State of Espírito Santo, the oil sector chain can be segmented into five links: (i) exploration and production (E&P), also known as upstream, which consists of the activities of extraction and production of O&G; (ii) derivatives, which are the activities related to the processing of oil and natural gas;

(iii) supply, which consists of the transformation and commercialization of O&G products; (iv) petrochemical, which is a branch of the chemical industry that uses oil and natural gas as an input; and (v) supply chain, in which industrial activities that provide specific products and services for E&P activities are inserted.



565

companies in Espírito Santo operating in the oil and natural gas production chain in 2022

11.285

formal employees were employed in Espírito Santo in the oil and natural gas production chain in 2022

Table 2 - Number of companies and jobs in the production chain of the Oil and Natural Gas (O&G) sector in Espírito Santo - 2022

Chain links	Companies	Share (%)	Jobs	Share (%)
E&P	37	6.5	1,723	15.3
Oil derivates	4	0.7	68	0.6
Petrochemicals	6	1.1	165	1.5
Supply	50	8.8	784	6.9
Supply Chain	468	82.8	8,545	75.7
Total	565	100.0	11,285	100.0

Source: Ministry of Labor and Social Security | Elaboration: Industry Observatory/Findes

Distribution of companies in Espírito Santo operating in the P&G production chain:

Supply Chain	82.8%
Supply	8.8%
E&P	6.5%
Petrochemicals	1.1%
Oil derivates	0.7%

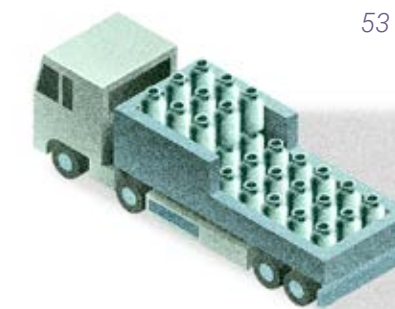
In 2022, the production chain of the O&G sector had 565 companies and 11,285 direct jobs in Espírito Santo (table 2). This total of companies represented 2.2% of all national companies in the segment and 0.6% of all companies in the state. The total number of employees represented 2.5% of all national workers in the segment and 1.1% of all workers in Espírito Santo.

Due to the multidisciplinary nature required to operate in the oil and gas industry, the composition of the workforce in this sector is diverse, including a wide variety of occupations, different age groups and varying levels of qualification. Table 3 presents the worker profile of the complete O&G chain.

In 2022, the production chain in the O&G sector employed 508 occupations, among the main ones: welder (5.8%), administra-

The companies were distributed as follows: 82.8% in the supply chain; 8.8 in supply; 6.5% in Exploration and Production (E&P); 1.1% in petrochemical companies and 0.7% in oil derivatives. Workers were allocated as follows: 75.7% in the supply chain; 15.3% in Exploration and Production (E&P); 6.9% in supply; 1.5% in petrochemical companies; 0.6% in oil derivatives companies.

tive assistant (4.1%), machine maintenance mechanic (4.0%), truck driver (2.9%), office assistant (2.8%), production line feeder (2.8%). In terms of age, 34.2% of workers in the Espírito Santo O&G chain were aged between 30 and 39 (3,865) and 38.8% of employees were over 40 (4,382). Regarding the education of workers in 2022, 61.9% had completed high school, 15.5% had completed higher education and 0.5% had a master's degree and doctorate.



As a result of the qualifications of its employees, in 2022 the average monthly salary of the O&G sector in Espírito Santo was BRL 6,307.0 and that of Brazil

was BRL 6,820.4. These values were higher than the total average monthly remuneration of the state (BRL 3,533.0) and the country (BRL 3,861.1).

Table 3 - Characteristics of the labor market in the O&G chain in Espírito Santo - 2022

	ES	BR	ES/BR %
MAIN OCCUPATIONS			
Welder	660	17,987	3.7
Administrative Assistant	466	16,639	2.8
Machine maintenance mechanic	448	8,138	5.5
Truck Driver	323	14,713	2.2
Office Assistant	315	13,918	2.3
Production Line Feeder	286	18,874	1.5
Steel structure preparer	282	3,149	9.0
Occupational safety technician	275	6,927	4.0
Metal structure assembler	272	9,992	2.7
Storekeeper	270	6,436	4.2
AGE GROUP			
10 to 14	2	53	3.8
15 to 17	134	2,021	6.6
18 to 24	1,427	48,155	3.0
25 to 29	1,475	56,291	2.6
30 to 39	3,865	146,014	2.6
40 to 49	2,826	119,232	2.4
50 to 64	1,447	70,762	2.0
65 or more	109	7,370	1.5
SCHOOLING			
Illiterate	18	805	2.2
Up to 5th Incomplete	80	5,438	1.5
5th Complete Elementary School	84	5,062	1.7
6th to 9th Elementary School	314	14,226	2.2
Complete Elementary School	628	29,253	2.1
Incomplete High School	976	22,556	4.3
Complete High School	6,982	257,150	2.7
Incomplete Higher Education	403	23,497	1.7
Complete Higher Education	1,747	89,107	2.0
Master's Degree	49	2,380	2.1
Doctorate	4	424	0.9
AVERAGE NOMINAL WAGE			
Average Wage	R\$ 6,307.0	R\$ 6,820.4	-

Source: Ministry of Labor and Social Security | Elaboration: Industry Observatory/Findes

3.2. Government Participations

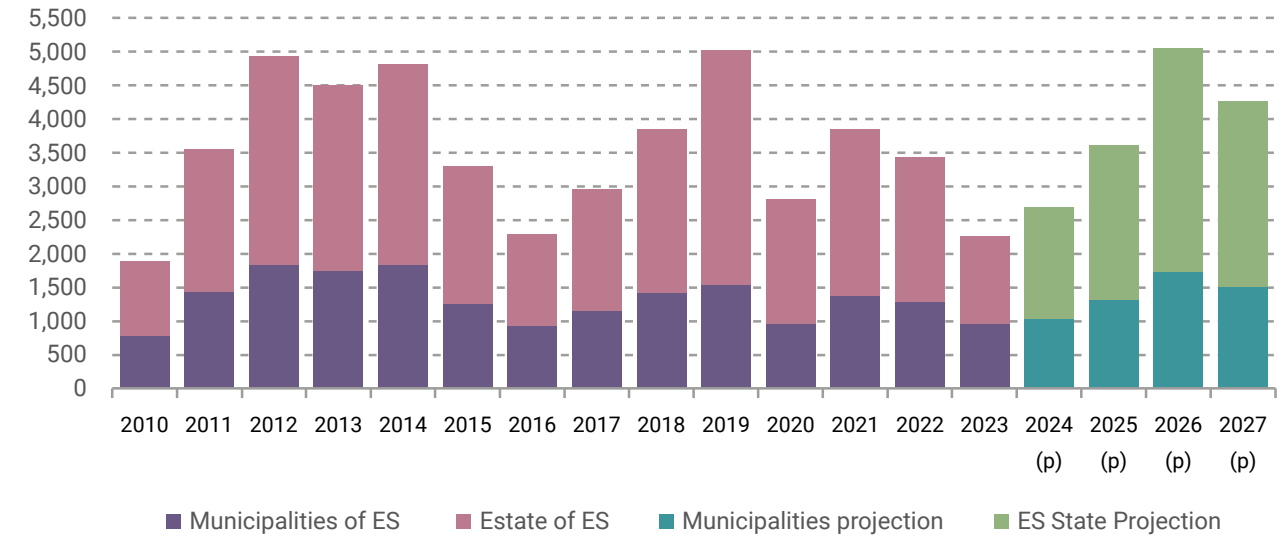
Government participations are financial compensation paid by oil companies as consideration for the exploitation of a natural finite resource. Government holdings can be divided between Royalties and Special Participation (SP).

Royalties are a financial compensation calculated through the application of a rate provided for in the contract, ranging from 5% to 15%, on the billing of the producing well. Special Participations (PE) are financial compensation paid by oil companies that own highly productive fields. That is, it is an extraordinary payment related to the level of production of an area. The calculation of the amount to be paid in SP occurs through the application of progressive rates on the net revenue from the quarterly production of each field.

In 2023, Brazilian oil and natural gas production paid BRL 92.4 billion in government participation¹⁰, 25.1% lower than what was recorded in the previous year, already discounting the effects of inflation. This compensation was intended for the Federal Government, the states and the municipalities. The composition of these payments in the country was: 58.1% in royalties and 41.9% in special participations.

In Espírito Santo, the total of government participations was BRL 2.3 billion in 2023, 34.4% less than in 2022. There was a payment of BRL 1.5 billion for Royalties and BRL 0.8 billion for Special Participations. The state received the third highest collection of government participations, behind Rio de Janeiro (BRL 42.3 billion) and São Paulo (BRL 4.0 billion). Government participations destined for the state government totaled BRL 1.3 billion (a real drop of 40.9% compared to 2022) and those destined for the municipalities of Espírito Santo totaled BRL 977 million (a real drop of 23.3% compared to 2022).

Chart 26 - Revenue from government participations (royalties and PE) in Espírito Santo (BRL million)

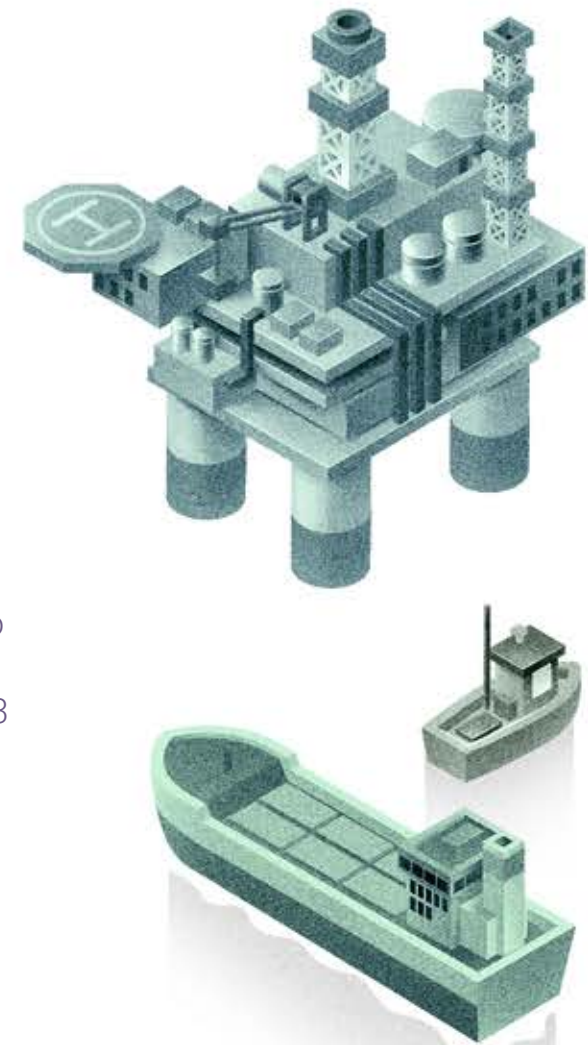


Source: ANP | Elaboration: Industry Observatory/Findes
Constant values – IPCA [National Extended Consumer Price Index] accum. Jan-Dec 2023



BRL 92.4 billion
were paid for the production of oil and natural gas to Brasil in **government participations** in 2023

BRL 2.3 billion
were paid for the production of oil and natural gas to Espírito Santo in **government participations** in 2023



10. This amount does not consider amounts paid for signing bonuses and occupancy or area retention fees.



17%

was the drop in the price of a barrel of oil between 2022 and 2023

price of a barrel of oil | 2023

WTI oil barrel

US\$ 77.8

Brent oil barrel

US\$ 82.1



The explanation for this decline is due to three factors. The first of these concerns the drop in the international price of a barrel of oil. In 2023, the prices of WTI and Brent oil barrels reached averages of USD 77.8 and USD 82.1, respectively, which represent falls of 17% compared to the averages recorded in 2022. The second factor is associated with the appreciation of the exchange rate in 2023. The exchange rate conversion in 2023 was BRL 4.99 to USD 1.00, below the average rate recorded

in 2022, which was BRL 5.16 to USD 1.00.

The third factor is due to the completion, in 2022, of the installments paid by Petrobras in relation to the agreement reached in 2018 between the ANP, the Espírito Santo State Government and Petrobras. This agreement provided for the payment of retroactive installments referring to the amount of Special Participations due to the connection of the areas between Jubarte, Baleia Azul, Baleia Franca, parts of Cachalote, Mangangá and Piram-

Table 4 - Revenue from government participations (royalties and PE) in Espírito Santo (BRL million)

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Total Government Interests	Cities in ES	770	1,435	1,824	1,735	1,845	1,258	906	1,130	1,410	1,527	970	1,367	1,274	977
	Estate of ES	1,131	2,114	3,111	2,767	2,961	2,048	1,377	1,844	2,444	3,499	1,852	2,494	2,169	1,283
	Total Brazil	45,785	51,026	59,219	56,473	59,101	36,997	25,178	41,983	70,391	71,266	56,895	85,755	123,390	92,385
	% of Brazil	4.2	7.0	8.3	8.0	8.1	8.9	9.1	7.1	5.5	7.1	5.0	4.5	2.8	2.4
Royalties	Cities in ES	645	1,182	1,366	1,369	1,454	982	742	882	1,050	880	666	954	929	815
	Estate of ES	630	1,100	1,279	1,301	1,398	942	722	852	1,006	911	637	842	788	635
	Total Brazil	21,048	25,850	29,403	28,957	30,921	20,894	16,794	21,084	31,046	29,862	27,797	41,856	61,860	53,648
	% of Brazil	6.1	8.8	9.0	9.2	9.2	9.2	8.7	8.2	6.6	6.0	4.7	4.3	2.8	2.7
Special Participation	Cities in ES	125	253	458	367	391	277	164	248	359	647	304	413	345	162
	Estate of ES	500	1,014	1,832	1,466	1,563	1,106	655	992	1,438	2,588	1,215	1,651	1,381	648
	Total Brazil	24,737	25,176	29,815	27,516	28,180	16,103	8,384	20,899	39,346	41,403	29,098	43,900	61,530	38,737
	% of Brazil	2.5	5.0	7.7	6.7	6.9	8.6	9.8	5.9	4.6	7.8	5.2	4.7	2.8	2.1

Source: ANP | Elaboration: Industry Observatory/Findes
Constant values – IPCA [National Extended Consumer Price Index] accum. Jan-Dec 2023

bu, comprising a single reservoir, the New Jubarte Field.

According to ANP projections, between 2024 and 2027, government revenues from oil and gas exploration within Espírito Santo's areas of influence are expected to grow by an average of 19.4% per year, reaching a total revenue of BRL 4.3 billion in 2027 (Chart 22). It is expected that the collection of royalties will reach BRL 2.0 billion and the collection of special participations will reach BRL 2.3 billion in 2027.

19,4%

is the expected average annual increase in government revenues from oil and gas exploration within Espírito Santo's areas of influence

Total revenue expected in 2027

BRL 4,3 bilhões



11. WTI is the price of West Texas oil traded on the New York Stock Exchange.

12. Brent is the price of oil extracted from the North Sea and traded on the London Stock Exchange.

THE NEW JUBARTE FIELD AGREEMENT

On January 30, 2024, the ANP and Petrobras signed an agreement on the collection of government contributions relating to oil production in the Jubarte Field, for the periods August 2009 to February 2011 and December 2012 to February 2015. This agreement ends a dispute that has been under discussion since February 2016.

The Espírito Santo Finance Department (SEFAZ-ES) found a sudden change in the scale that measures the density of oil-derived liquids in the Jubarte field and the state government, through SEFAZ-ES, asked the ANP to immediately adopt administrative measures with a view to properly calculating and collecting the correct amounts owed by Petrobras as royalties and special participation.

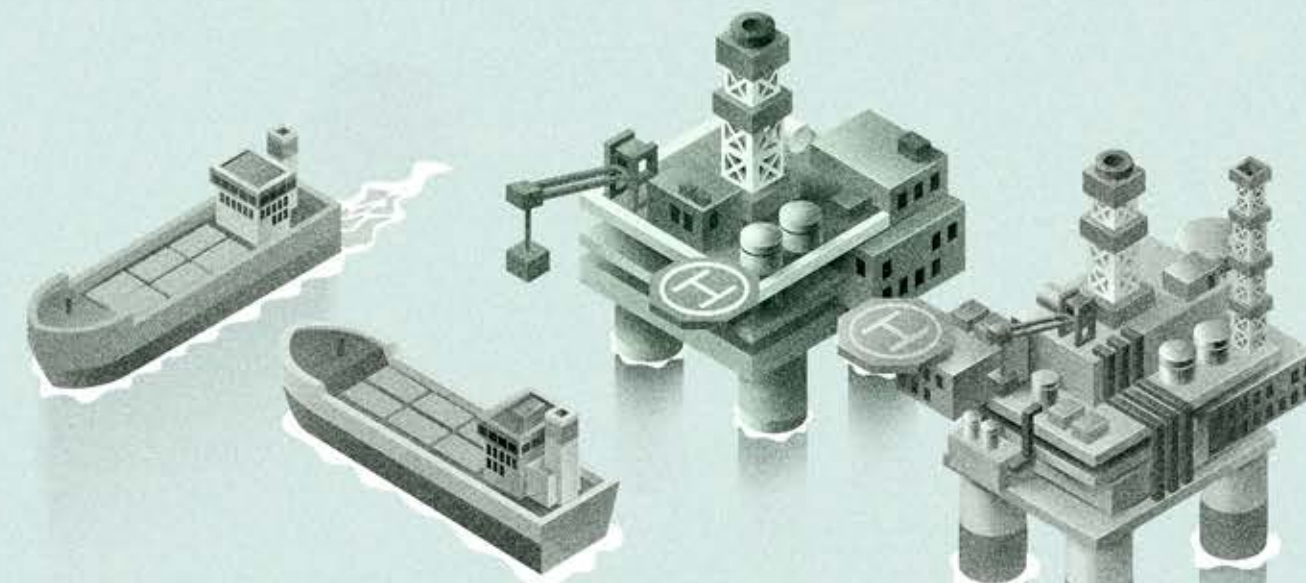
According to the ANP, these government participations have not been collected due to Petrobras' failure to update the True Boiling Point (TBP) curve of the Jubarte Field stream, which has an impact on the reference price of oil¹³ used to calculate government participations.

With the signing of the agreement between Petrobras and the ANP to close the lawsuit involving the recalculation of government shares, the producing municipalities, the State of Espírito Santo and the Federal Government will receive an amount of BRL 833 million, updated until December 2023, which will be adjusted by the Selic rate until the date of payment of the initial installment. Of this amount, 35% will be paid in cash and the rest will be paid in 48

installments adjusted by the Selic rate. The terms of this agreement were submitted for public consultation and hearing and approved by the ANP's Board of Directors, the Ministry of Mines and Energy (MME) and the Federal Attorney General's Office (AGU).

According to SEFAZ-ES, the state of Espírito Santo is expected to receive more than BRL 420 million from the agreement, which involves the payment of BRL 833 million. Of this total, BRL 289 million will go to the state treasury and BRL 132 million to the municipalities of Espírito Santo over the next four years. The Espírito Santo state government expects to pay BRL 101 million in March 2024 (35% of the amount in cash) to the state treasury and a further 48 monthly installments of approximately BRL 4.0 million, adjusted by the Selic rate.

It should be noted that this is not the first agreement involving the reservoirs of the Jubarte Field. On April 4, 2019, an agreement was signed, the result of a request from the Espírito Santo govern-



ment to the ANP, involving the areas between Jubarte, Baleia Azul, Baleia Franca, parts of Cachalote, Mangangá and Pirambu, all belonging to the Campos Basin, with the aim of considering only one reservoir for the purposes of calculating royalties and special participation.

The state government's request was aimed at earning the Special Participation due to the state. The agency, by means of Board Resolution 69, determined that the fields should be merged to form a single reservoir. In response, Petrobras contested the decision and appealed to arbitration. After successive attempts, in 2018 Petrobras and the ANP agreed to suspend the procedure and intensified efforts to reach an agreement. In the end, the agreement considered a single reservoir, called the new Jubarte Field, which now generates special participation, as envisaged by the Espírito Santo State government.

Between April 2019 and November 2022, the state of Espírito Santo received a total of BRL 1.8 billion from the New Jubarte¹⁴ Field agreement. Of this amount, approximately BRL 1.5 billion was paid to the state government and BRL 370 million was distributed among the municipalities of Itapemirim, Marataízes, Piúma and Presidente Kennedy. As a result, there was an expansion of the SP payment to Espírito Santo from 2019 to 2022¹⁵.

It is worth noting that part of the funds from this 2019 agreement was allocated to the Espírito San-

to Sovereign Fund (Ordinary Law No. 11.002/2019), converted into Complementary Law No. 914/2019, and to the State Fund for the Financing of Works and Strategic Infrastructure for the Development of the State of Espírito Santo, made effective in Ordinary Law No. 11.002/2019.

13. The reference price for oil is calculated based on the physical and chemical characteristics of the oil stream. For each field, the true boiling points, known as the TBP curve, are analyzed, defining the light, medium and heavy fractions that exist in each type of oil. Based on the fractions, the oil in a stream is valued using derivative prices from the international market.

14. With the signing of the 2019 agreement, Petrobras (concessionaire of the unified fields) assumed a retroactive liability of BRL 3.6 billion in Special Participation, having paid BRL 1.5 billion in cash and the rest divided into 42 months. In all, the company paid BRL 3.8 billion between April 2019 and November 2022, taking into account the monetary corrections due. These amounts were distributed among the state of Espírito Santo (BRL 1.5 billion), the municipalities bordering the new field (BRL 370 million) and the Federal Government (BRL 1.8 billion).

15. One of the explanations for the drop in the value of government shares in Espírito Santo in 2023 was due to the end of payment of the amounts involving the 2019 New Jubarte Field agreement.

US\$ FOB
813.9
million
was exported by the oil and natural gas industry of Espírito Santo

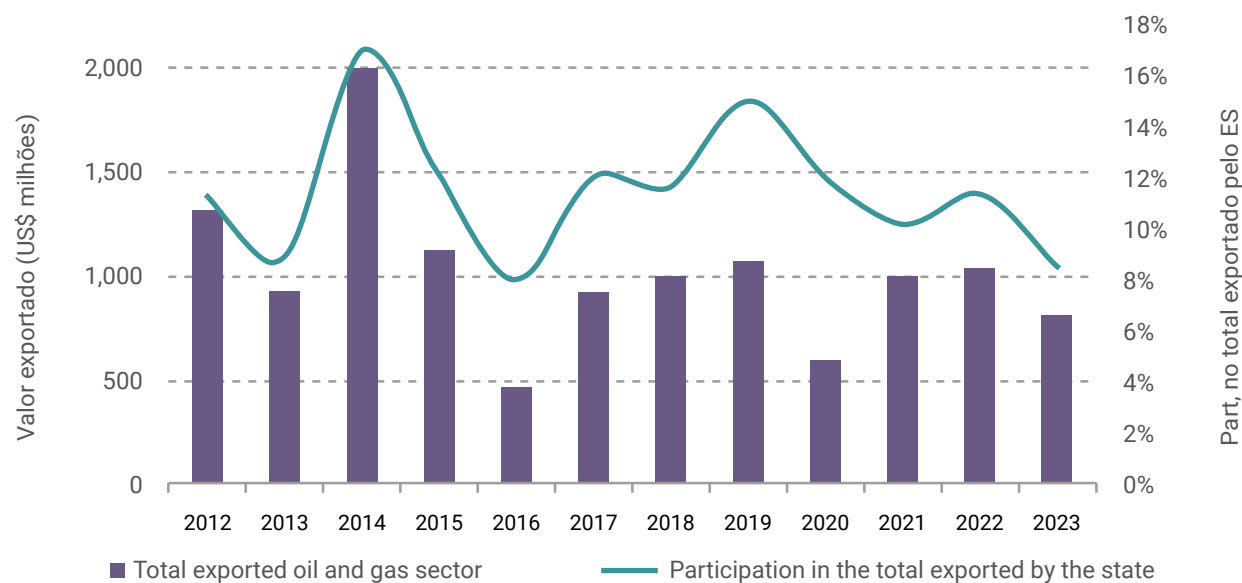
3.3. External sector

In 2023, the oil and natural gas sector in Espírito Santo exported USD FOB 813.9 million, representing 1.4% of all the sector's foreign sales in Brazil and 8.6% of the state's total foreign sales. With this performance, the sector lost share in Espírito Santo's exports (Chart 27), due to a 21.9% reduction in the value exported by the sector from 2022 to 2023.

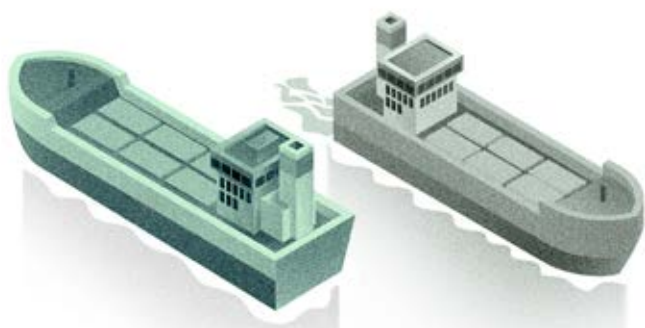
This reduction can be attributed to a 12.2% reduction in the quantity of oil exported, in addition to the drop in the international price of the input

in 2023. During the period, the price of a barrel of oil fell by 18.4% for Brent¹⁶ and 17.0% for WTI¹⁷. These falls can be attributed to three main factors: i) the reduction in international demand, ii) the normalization of the price of the commodity after the shocks caused by the Russian-Ukrainian war in 2022, when the barrel surpassed the USD 100 mark and iii) the increase in the global supply of the input by Iran and the United States, which balanced out the effects of the production cuts made by the OPEC+ countries.

Chart 27 - Oil exports in Espírito Santo (in USD million FOB) and share of oil exports in total Espírito Santo exports (%)



Source: Funcex | Elaboration: Industry Observatory/Findes



Despite this result, exports from the oil and natural gas sector were responsible for being the third segment with the highest export value in the state in 2023, behind only the metallic mineral extraction and metallurgy sectors. The sector's exports range from crude oil, through coke and oil derivatives, to petrochemical products.

Foreign sales of crude oil by Espírito Santo totaled USD FOB 735.9 million in 2023, representing 90.4% of the total exported by the Espírito Santo oil and natural gas sector in the year. Between 2022 and 2023, crude oil exports fell 24.2%, largely explained by the reduction in the price of a barrel of oil. The destinations for crude oil from Espírito Santo were: Malaysia (79.3%), Canada (7.9%), the Netherlands (5.4%), Singapore (3.8%) and Sweden (3.6%).

Exports of coke and petroleum products totaled USD FOB 74.8 million, 9.2% of the total exported by the Espírito Santo oil and natural gas sector in 2023. Compared to 2022, exports of coke and petroleum products rose by 5.7%, due to the increase in fuel oil exports. The main destinations for coke and petroleum products from Espírito Santo were: Panama (74.5%), the Marshall Islands (24.4%) and Cyprus (1.1%).

Finally, foreign sales of the products that make up the petrochemicals segment reached USD FOB 3.2 million, 0.4% of the total exported by the Espírito Santo oil and natural gas sector in 2023. Between 2022 and 2023, exports of petrochemical products grew by 136.7%, due to the increase in exports of thermoplastic resin products (polyamide) and thermosetting resin products (unsaturated polyesters and epoxy resins). The main destinations for coke and petroleum products from Espírito Santo were: Colombia (61.4%), Argentina (20.1%), Italy (8.1%), Uruguay (6.4%) and Paraguay (1.8%).

With regard to imported products, Espírito Santo's oil and natural gas sector imported USD FOB 154.4 million in 2023, 18.4% more than in the previous year. The total imported by the sector in the state represented 0.3% of the sector's foreign purchases in the country, and 1.6% of the state's total imports. The main segment of note is imports of petrochemical products, especially organic chemicals, thermoplastic resins and elastomers.

16. Brent is the price of oil extracted from the North Sea and traded on the London Stock Exchange.

17. WTI is the price of West Texas oil traded on the New York Stock Exchange.

US\$ FOB
735.9
million
was exported in crude oil by Espírito Santo in 2023

US\$ FOB
74.8
million
was exported in coke and petroleum products by Espírito Santo in 2023

US\$ FOB
3.2
million
was exported in petrochemical segment by Espírito Santo in 2023

US\$ FOB
154,4
million
was imported by the oil and natural gas sector in Espírito Santo in 2023

Table 5 - Exports from the oil and natural gas sector in Espírito Santo (USD million)

Period	Total exported		Oil and Natural Gas		Coke and petroleum products		Petrochemical Products	
	Total ES	% ES/BR	Total ES	% ES/BR	Total ES	% ES/BR	Total ES	% ES/BR
2010	900.9	3.6%	899.2	5.5%	0.0	0.0%	1.7	0.0%
2011	1,512.3	4.5%	1,510.6	7.0%	0.0	0.0%	1.7	0.0%
2012	1,322.8	4.0%	1,322.3	6.5%	0.0	0.0%	0.5	0.0%
2013	933.8	3.8%	931.6	7.2%	0.0	0.0%	2.1	0.0%
2014	2,006.4	7.4%	2,000.7	12.2%	0.0	0.0%	5.7	0.1%
2015	1,130.7	5.9%	1,128.5	9.6%	0.1	0.0%	2.1	0.0%
2016	466.7	2.8%	465.1	4.6%	0.0	0.0%	1.6	0.0%
2017	924.2	3.8%	919.9	5.5%	0.0	0.0%	4.4	0.1%
2018	1,004.2	2.9%	960.0	3.8%	38.5	0.9%	5.7	0.1%
2019	1,075.0	3.1%	1,014.5	4.2%	58.8	1.0%	1.7	0.0%
2020	599.0	2.1%	566.9	2.9%	30.4	0.6%	1.7	0.0%
2021	1,002.5	2.3%	988.3	3.2%	11.9	0.2%	2.3	0.0%
2022	1,042.5	1.7%	970.4	2.3%	70.8	0.5%	1.4	0.0%
2023	813.9	1.4%	736	1.7%	74.8	0.6%	3.2	0.1%

Source: Funcex | Elaboration: Industry Observatory/Findes

3.4. Research, Development and Innovation (ANP RD&I Clause)

The research, development and innovation (RD&I) clause is contained in the oil and natural gas exploration and production contracts of oil companies operating in the country. This clause determines the application of a percentage on the gross revenue of fields with large production. The amounts generated from this measure are invested in RD&I projects that can

be carried out by the oil company itself, by Brazilian companies or by accredited institutions throughout the country.

Between 1998 and 2023, the RD&I clause generated approximately BRL 30.2 billion in obligations in Brazil, with Petrobras being responsible for BRL 24.4 billion (80.8%) of these funds. Specifically in 2023,

Table 6 Imports from the oil and natural gas sector in Espírito Santo (USD million)

Period	Total imported		Oil and Natural Gas		Coke and petroleum products		Petrochemical Products	
	Total ES	% ES/BR	Total ES	% ES/BR	Total ES	% ES/BR	Total ES	% ES/BR
2010	374.1	1.0%	0.0	0.0%	46.3	0.4%	327.8	2.6%
2011	421.0	0.8%	0.0	0.0%	17.1	0.1%	403.9	2.8%
2012	405.0	0.8%	0.0	0.0%	34.6	0.2%	370.4	2.6%
2013	281.6	0.5%	0.0	0.0%	37.8	0.2%	243.8	1.6%
2014	256.3	0.4%	0.0	0.0%	35.5	0.2%	220.8	1.4%
2015	271.4	0.8%	0.0	0.0%	67.0	0.7%	204.3	1.6%
2016	160.0	0.7%	0.0	0.0%	33.8	0.4%	126.2	1.2%
2017	175.5	0.6%	0.0	0.0%	81.1	0.6%	94.4	0.8%
2018	164.1	0.5%	0.0	0.0%	46.3	0.3%	117.8	0.8%
2019	166.1	0.5%	0.0	0.0%	51.6	0.4%	114.4	0.8%
2020	174.9	0.7%	0.0	0.0%	85.6	1.0%	89.2	0.7%
2021	136.2	0.3%	0.0	0.0%	30.4	0.2%	105.9	0.6%
2022	130.5	0.2%	0.0	0.0%	22.5	0.1%	107.9	0.5%
2023	154.4	0.3%	0.0	0.0%	40.0	0.2%	114.5	0.6%

Source: Funcex | Elaboration: Industry Observatory/Findes

the year in which the clause completed 25 years of operation, the amount generated in obligations by the clause in the country was BRL 3.9 billion, a reduction of 12.1% compared to the same period in the previous year.

In Espírito Santo, in the period from 2001 to 2023, the clause generated BRL 2.4 billion in obligations, which represents 8.0% of the funds generated in the country for the period. For 2023, BRL 175.6 million were generated in obligations from the clause in the state, which means a drop of 4.4% compared to 2022.

Regarding the number of projects, between 1998 and March 2024, 14,014 projects were developed in Brazil, financed with funds from the obligations generated by the RD&I clause. Specifically, in 2023, 652 projects were financed using the resource, representing an increase of 10.0% compared to the number of projects financed in 2022.

In Espírito Santo, between 2000 and February 2024, 102 projects were developed, financed with funds from the obligations generated by the RD&I clause. Of these projects, 98 were carried out, or

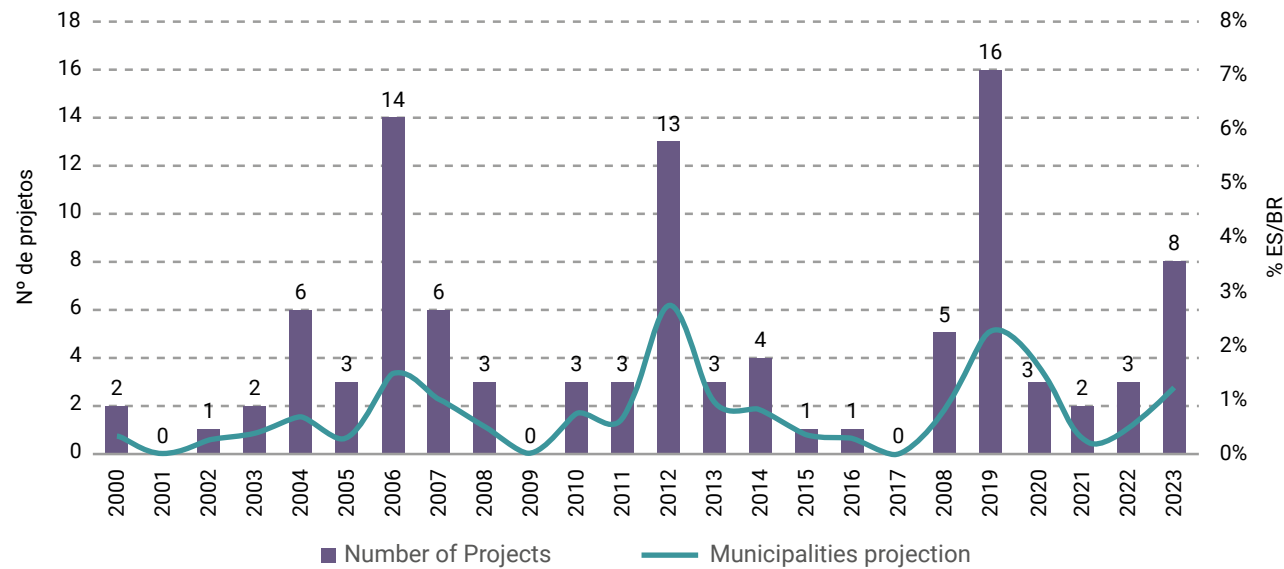


BRL 30.2 billion

were generated by the RD&I clause for research throughout Brazil between 1998 and 2003

are currently being carried out, by Santo covered the areas of supply research, biofuels, exploration and production, natural gas and The projects developed in Espírito Santo covered the areas of supply research, biofuels, exploration and production, natural gas and cross-cutting themes.

Chart 28 - Initiated projects that received funding from the RD&I clause in Espírito Santo (number of projects)



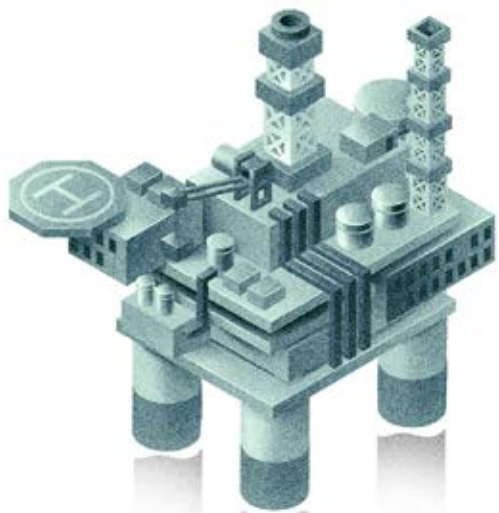
Source: ANP. Elaboration: Industry Observatory/Findes

In 2023, 8 projects involving resources from the RD&I clause were started in Espírito Santo, with investments totaling BRL 48.8 million. Of the total number of projects, 7 have UFES as the executing institution (in its different laboratories) and 1 has IFES (Vila Velha). Table 7 shows the projects started in Espírito Santo in 2023 using resources from the RD&I clause.

Project number 1 (Table 7), started at IFES in Vila Velha, aims to acquire and install infrastructure, i.e. equipment to

study the physical and chemical properties of oil, such as the characterization and ageing of asphalt. This project will boost the institution's research and development capacity. The value of the investment is BRL 12.4 million.

LabPetro at UFES has two projects starting in 2023. The first of them is interested in studying environmental impacts, with a focus on analyzing the influence of weathering changes on fresh oil in offshore spill accident scenarios,



including numerical simulation analysis of oil dispersion, with an expected investment of BRL 10.4 million (project 2 in table 7). The second project started at LabPetro deals with experimental development in the area of biofuels, based on assessing the impact of adding biodiesel and vegetable oil to marine fuels, with an estimated investment of BRL 1.7 million (project 8 in table 7).

The project initiated at UFES's NEMOG (Center for Studies in Flow and Measurement of Oil and Gas) focuses on the study of natural gas, more specifically the development of a test protocol using technologies that measure the flow of multiphase flows (MPFM), operating in pre-salt conditions (project 3 in table 7). The protocol aims to improve the reliability of flow meters, i.e. MPFMs. The value of the investment is BRL 5.8 million.

Two projects have been started at the UFES Center for Thermo-Sciences for the Petroleum Industry. The first aims to improve the laboratory infrastructure for research and development of additives that will reduce drag in turbulent multiphase flows (project 2 in table 7). In other words, additives that are able to reduce the friction of the oil in the pipe during

the flow of oil production, with an investment of BRL 3.9 million. The second project is also related to flow methods and processes. This project aims to characterize hydrophobic DLC (Diamond-like carbon) coatings that are resistant to erosion, since corrosion and fouling in valves and pipes is something that is constantly being researched and problems solved in the oil sector. The investment amount is BRL 3.0 million (project 6 in table 7).

Finally, two other projects that received funding from the RD&I clause belong to the Telecommunications Laboratory at UFES. The first studies the development and increase in the level of technological maturity of the optical fiber profiler for platform applications, with an investment of BRL 3.5 million (project 5 in table 7). The second consists of expanding the physical installation that will support profiler research, as well as other research with applications in the oil and gas area, with an investment of BRL 2.5 million (project 7 in table 7).

18. LabPetro (Laboratory for Research and Development of Methodologies for Oil Analysis) is a supplementary body of the Exact Sciences Center at UFES, and is located at the University's headquarters in Vitória - ES. LabPetro has laboratories, research rooms and other infrastructures that promote teaching and research in the oil and natural gas sector.



BRL 2,4 billion

were generated by the RD&I clause for research throughout Espírito Santo between 1998 and 2003

102

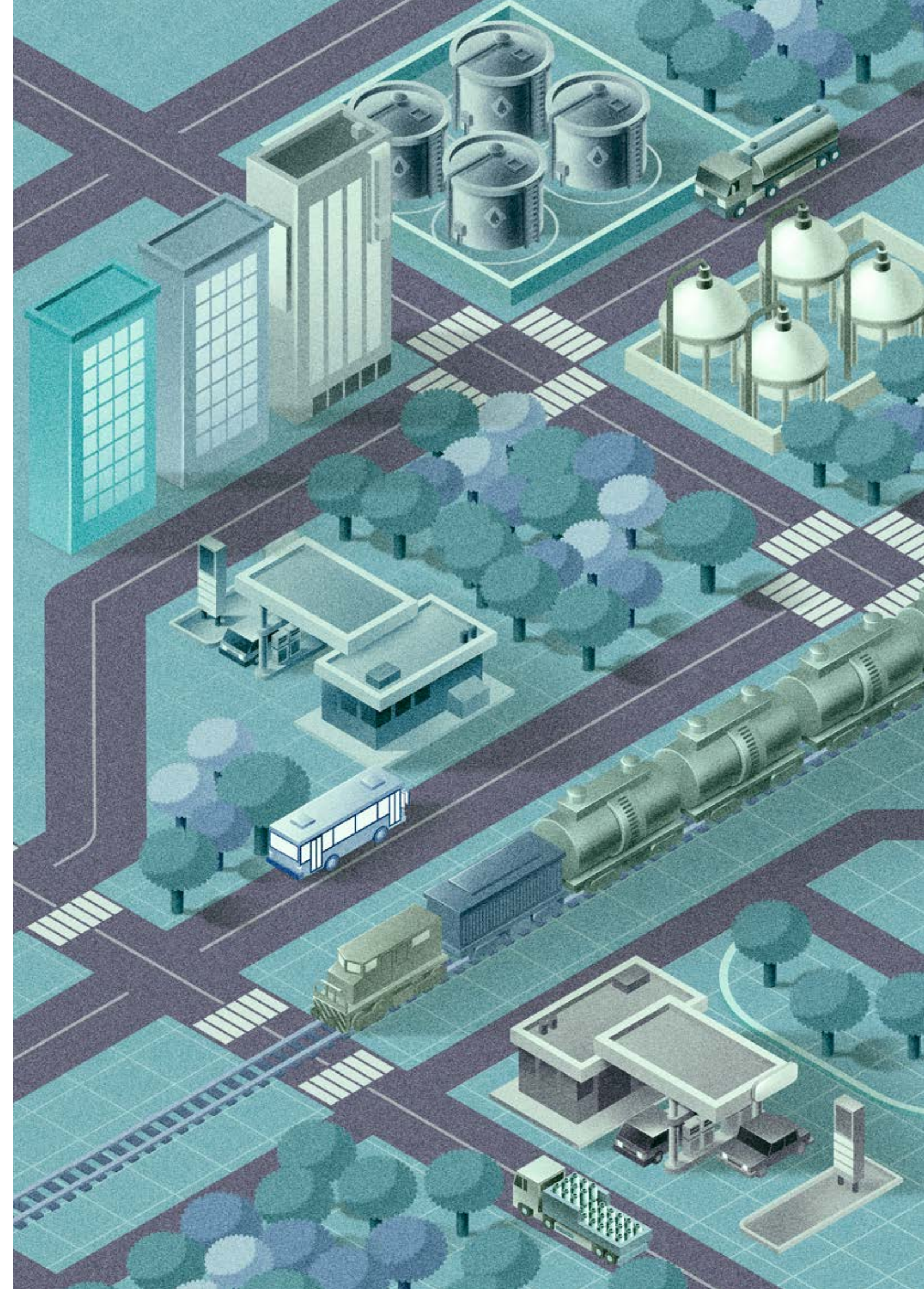
was the total of research projects funded by the RD&I clause in Espírito Santo between 2000 and 2023

98	UFES
2	IFES
1	UCL
1	Mogai Tecnologia

Table 7 - Description of projects with resources from the RD&I clause in Espírito Santo in 2023

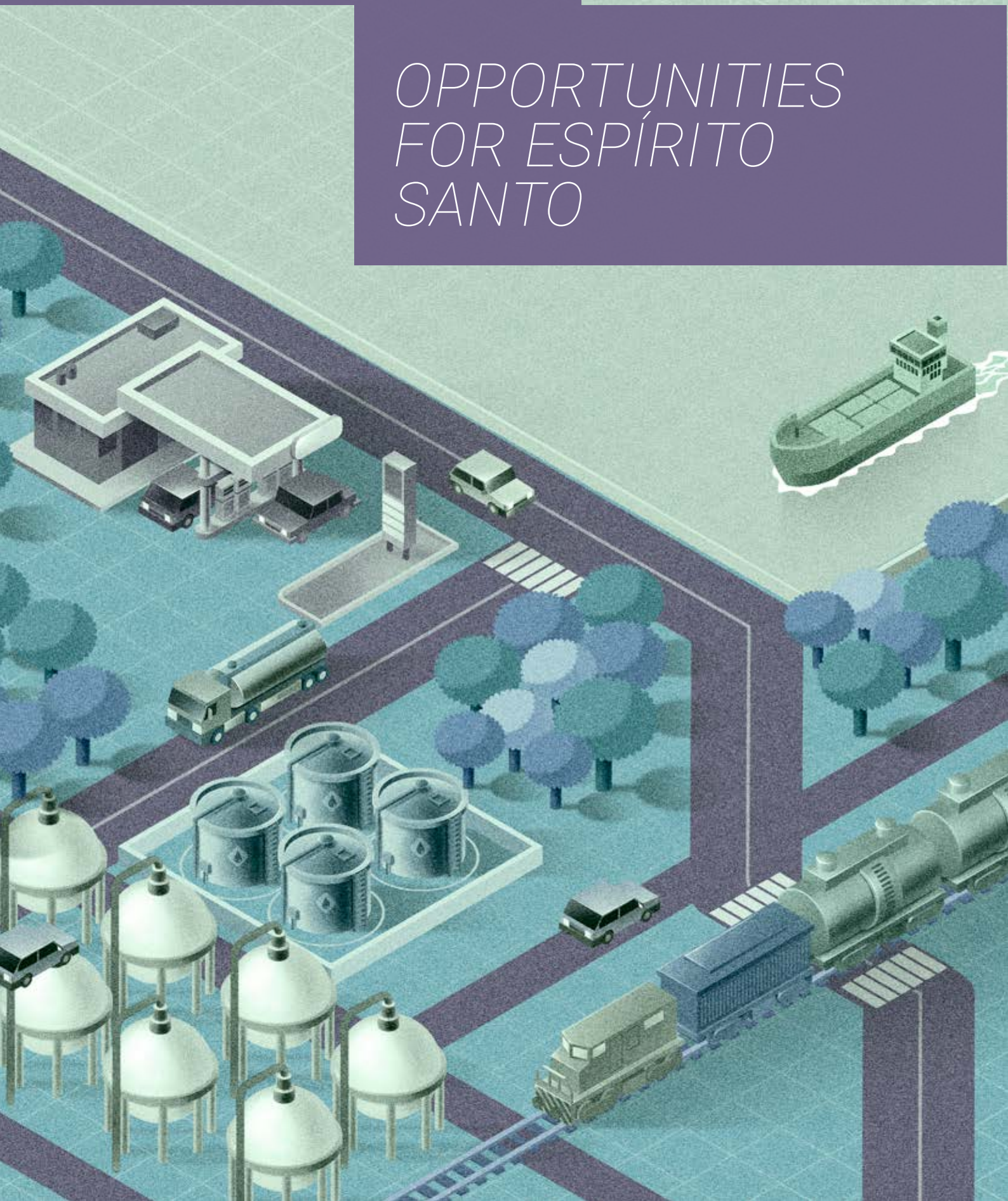
Project number	Project title	Responsible Company	Type of Project	Executors - Research Unit	Clause value (million BRL)
1	Infrastructure to study the characterization and aging of asphalt and the aggregation of asphaltenes	Petrobras	Infrastructure	IFES - Petroleomics	12.4
2	Influence of weathered oil characteristics on numerical modeling of leaks	Petrobras	Environmental research	UFES - LabPetro	10.4
3	Development of methodologies to verify the performance of flow meters in multiphase flow operating under subsea conditions in the Pre-salt.	Petrobras	Applied research	UFES - Oil and Gas Flow and Measurement Studies Center - NEMOG	5.8
4	Infrastructure for studying drag reduction in turbulent multiphase flows	Petrobras	Infrastructure	UFES - Thermosciences Center for the Petroleum Industry	3.9
5	Fiber optic profiler for FPSO tanks	Petrobras	Prototype or pilot unit	UFES - UFES Telecommunications Laboratory	3.5
6	Erosion Resistant Antifouling DLC Coatings for Petroleum Production Valves and Pipes	Petrobras	Applied research	UFES - Thermosciences Center for the Petroleum Industry	3.0
7	Fiber optic profiler civil infrastructure cooperation term for FPSO tanks	Petrobras	Infrastructure - new building or addition of area	UFES - Telecommunications Laboratory	2.5
8	Microbiological evaluation of mixtures of marine fuels with biofuels	Petrobras	Experimental development	UFES - LabPetro	1.7

Source: ANP. Elaboration: Industry Observatory/Findes



Chapter 4

OPPORTUNITIES FOR ESPÍRITO SANTO



4.1. Announced Investments

According to an investment survey carried out by the Industry Observatory/Findes¹⁹, it is estimated that Espírito Santo will receive BRL 36.9 billion in investments in the oil and natural gas sector by 2028. A total of 12 projects were identified in the state, mainly involving Petrobras, PRio, Seacrest e BW Energy. Among the main investments are PRIO's Wahoo field project, Seacrest's expansion project in the Cricaré and Norte Capixaba poles, the BW Energy project to revitalize the Golfinho field and Camarupim and the Integrated project intend to install the FPSO Maria Quitéria - Brazil's first electric platform - in 2025.

PRIO completed the process of acquiring the Wahoo field (located in the Espírito Santo portion of the Campos Basin and acquired from BP) in March 2021. In December of the same year, it registered the declaration of commerciality for the area. The company's schedule foresees the drilling of four producer wells and two injector wells. To make its production economically viable, PRIO opted for the strategy of interconnecting its operations subsea - by means of a 35 km tie-back - connecting Wahoo's wells to the FPSO Valente, which is responsible for production in the Frade field. However, before operations can begin, PRIO is still awaiting the license to be granted by Ibama. In all, PRIO is investing around BRL 4.5

billion in the project, around 80% of which is spent on contracting and developing supplier companies.

Seacrest purchased the assets of the Cricaré hub and the Norte Capixaba hub from Petrobras, in 2021 and 2022, respectively. By 2027, Seacrest intends to drill 300 wells with the aim of confirming the potential of the assets and expanding production. Of this total, around R\$400 million will be invested in 2024, with the drilling of 50 wells.

BW Energy will drill two wells in the Golfinho Field. With the interconnection of gas from Camarupim to the FPSO Cidade de Vitória, planned to be completed by 2030, the company intends to increase natural gas production. Furthermore, the company recently received approval from the ANP to continue until March 2025 its assessment of the 6 natural gas discoveries in the block BM-ES-23 (Parque dos Doces).

In turn, the Parque das Baleias Integrated Project (IPB) aims to increase the oil and gas recovery factor by optimizing the current drainage network, with the interconnection of 17 wells to the new platform vessel (FPSO) Maria Quitéria - nine of which are oil producers and eight water



BRL 36.9 billion

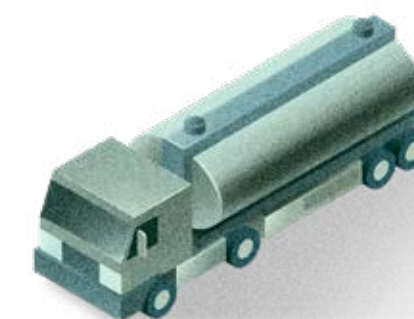
is the expected amount of investments in Espírito Santo in the oil and natural gas sector by 2028

12

projects were identified in the state

Follow the main investing companies:

- Petrobras**
- PRio**
- Seacrest**
- BW Energy**



¹⁹. All investment projects were mapped to public data sources.

injectors. The platform ship is expected to enter production in 2025. The vessel is undergoing work in China and will be chartered to Petrobrás by Yinson. At the beginning of 2024, the Brazilian Environmental Institute (Ibama) issued the preliminary license for the Parque das Baleias Integrated Project, valid for five years. Table 8 summarizes the main

projects raised by the Industry Observatory for the oil and natural gas sector in Espírito Santo for the next five years.

Table 8 summarizes the main projects raised by the Industry Observatory for the oil and natural gas sector in Espírito Santo for the next five years.

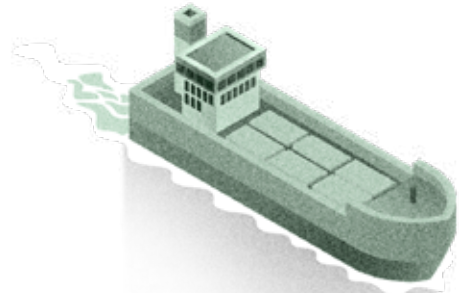


Tabela 8 - Principais projetos de investimento anunciados no setor de P&G no Espírito Santo para os próximos 5 anos (2024-2028)

Investor	Project	Municipality	Valor (em milhões R\$)
Petrobras	Development of the New Jubarte Field, comprising the Jubarte, Baleia Azul, Baleia Franca, Cachalote and Pirambu areas.	Anchieta, Piúma, Itapemirim, Marataízes and Presidente Kennedy	25,100.0
PRio	The Wahoo project includes the drilling of four production wells and two injectors, as well as the connection between the wells and the Frade FPSO	Presidente Kennedy	4,500.0
Seacrest Petróleo	The company intends to invest in revitalizing the fields in the Cricaré and Norte Capixaba poles	Conceição da Barra, Jaguaré, Linhares and São Mateus	2,000.0
BW Energy	Investments in the operations of the Golfinho and Camarupim poles in the Espírito Santo Basin	Aracruz, Fundão, Serra and Vitória	4,000.0
Shell	Development and Production of the fields on the South Coast of Espírito Santo	Anchieta, Piúma, Itapemirim, Marataízes and Presidente Kennedy	1,000.0
Imetame	Investment to expand onshore oil and gas production in the Rio Ipiranga field. At the field's maximum capacity, production should total 2.5 thousand barrels of oil and 40 thousand m ³ of gas per day	Linhares	150.0
ESGÁS (Energisa)	Energisa Group to invest in expanding natural gas distribution in Espírito Santo	Espírito Santo	100.0
Prysmian Group	Expansion of production capacity at the Vila Velha plant, dedicated to the manufacture of umbilical cords	Vila Velha	50.0

Investor	Project	Municipality	Valor (em milhões R\$)
Elysian	The mining company Elysian won 10 onshore blocks in the Permanent Offer	Linhares, São Mateus And Conceição da Barra	16.0
Seacrest, Imetame and EnP Ecosystemas	The consortium formed by the companies won two oil and gas exploration blocks in the Espírito Santo Basin (ES-T-399 and ES-T-528).	Espírito Santo	2.1
Capixaba Energia (joint venture entre Imetame and EnP Energy Platform)	Operation of the onshore fields of the Lagoa Parda Pole, with investments to develop the discoveries of blocks ES-T-441 and ES-T-487	Linhares	-
3R Petroleum and DBO Energia	Investment in the areas of the Peroá, Cangoá Poles and the BM-ES-21 block (Malombe Discovery), all in the Espírito Santo Basin	Aracruz and Linhares	-
Total			36,918.1

Source: ANP, IJSN, Petrobras, ESGAS and Brasil Energia. Elaboration: Observatory of Industry.

4.2. Sale of O&G assets

Petrobras' Divestment Plan aims to reduce the company's debt and maximize investments in assets with higher profitability, focused on operating, for example, in the exploration and production of oil and natural gas in deep and ultra-deep waters. Since 2015, the company has started the process of selling a set of assets related to the exploration and production of oil and natural gas.

In September 2023, Petrobras informed the market of the closure of all divestment processes that

had not yet reached the stage of signing sales contracts, due to new strategic elements approved by the company's Board of Directors.

In Espírito Santo, during the Petrobras divestment program, 56 assets were offered with 89.3% having been sold. In offshore, 14 areas were offered with 57.1% of the assets with the sale completed and in onshore, 42 areas were offered with 100.0% of the assets with the sale completed. Table 9 lists the assets and status of each project.

56

assets offered in Espírito Santo during the Petrobras divestment program

89.3%

with sale completed

Table 9 Monitoring the sale of O&G assets in Espírito Santo

Company	Basin	Teaser	Location	Assets	Quantity of assets	Confronting Municipality	Status	Partner	
Petrobras	Espírito Santo Basin	Norte Capixaba Center	Onshore	100% of the fields of Cancã, Cancã Leste, Fazenda Alegre, Fazenda São Rafael and Fazenda Santa Luzia. In addition to the fields, the North Capixaba Terminal (TNC) was offered.	6	Linhares, São Mateus and Jaguaré	Sold	Seacrest Capital	
		Espírito Santo Basin	Offshore	50% participation in block ES-M-596_R11 and 40% participation in blocks ES-M-598, ES-M-671, ES-M-673 and ES-M-743	5	Vitória	Binding Phase (sale not made until September/2023)	Potential	
		Águas Profundas ES	Offshore	100% of Golfinho, Canapu, Camarupim and Camarupim Norte fields and 65% of BM-ES-23 block	5	Linhares	Sold	BW Energy	
		Espírito Santo Basin	Onshore	50% stake in blocks ES-T-506 and ES-T-516	2	Linhares	Sold	Cowan Petróleo e Gás	
		Peroá Cluster	Offshore	100% of the fields of Peroá, Cangoá and Malombe	3	Linhares	Sold	3R Petroleum, DBO Energia and OP Energia	
		Polo Cricaré	Onshore	100% of the fields of Biguá, Cacimbas, Campo Grande, Córrego Cedro Norte, Córrego Cedro Norte Sul, Córrego das Pedras, Córrego Dourado, Fazenda Cedro, Fazenda Cedro Norte, Fazenda Queimadas, Fazenda São Jorge, Guriri, Inhambu, Jacutinga, Lagoa Bonita, Lagoa Suruaca, Mariricu, Mariricu Norte, Rio Itaúnas, Rio Preto, Rio Preto Oeste, Rio Preto Sul, Rio São Mateus, São Mateus, São Mateus Leste, Seriemá and Tabuiaíá	31	São Mateus, Conceição da Barra and Jaguaré	Sold	Karavan Oil and Seacrest Spe Cricaré S.A.	
				Gas treatment unit of Cacimbas					
				Lagoa Suruaca collection and treatment station					
				Fazenda Cedro collection and treatment station					
				São Mateus collection and treatment station					
	Lagoa Parda Center	Onshore	100% of the Lagoa Parda, Lagoa Parda Norte and Lagoa Piabanha fields	3	Linhares	Sold	Imetame and EnP Energy Platform		
	Campos Basin	Campo Catuá	Offshore	100% of the Catuá field	1	Anchieta	In binding phase	-	

Fonte: Petrobras, Brasil Energia e Observatório da Indústria.

Elaboração: Observatório da Indústria/Findes

4.3. Permanent Offer

The Permanent Offer is a concession model in which exploration blocks and areas with marginal accumulations are offered. It consists of the continuous offer of fields that have been returned or are in the process of being returned, exploratory blocks offered in previous bids that were not won or returned to the ANP, as well as new exploratory blocks in onshore basins under study by the Agency.

In December 2021, the National Energy Policy Council (CNPE) authorized the ANP to define and bid for blocks in any onshore or offshore basins in a Permanent Offer, under the concession regime, as well as bid for fields that have been returned or are in the process of being returned, including areas located in the pre-salt polygon or in strategic areas.

As this is an ongoing process, the bidding instruments can be changed over time. In this sense, in December 2023 CNPE Resolution 11/2023 established new guidelines for defining Local Content²⁰ in the next bidding cycles under the concession and production sharing regime, within the scope of the Permanent Offer. The Resolution established that the minimum mandatory local content to be required

in the next PB cycles will be 50% for onshore blocks (for the exploration and development phases); and 30% for offshore blocks in the exploration phase. In the development stage, the percentages for offshore blocks will be 30% for well construction; 40% for the collection and disposal system; and 25% for the stationary production unit.

In view of the change, the current bidding notices remain revoked for the opening of new cycles, while new versions of the notices in line with the new guidelines established in the CNPE resolution have not been published.

Currently, 955 blocks with exploratory risk and the Japiim area are available for declaration of interest. These blocks are located in 65 sectors of 17 sedimentary basins, of which 394 are in onshore basins and 561 are in offshore basins. In addition to these, 1,177 blocks are being studied under the concession regime, located in 65

20. P&G exploration and production contracts include a local content clause, which determines that part of the goods and services acquired for exploration and production activities in Brazil must be national. It also establishes a preference for hiring Brazilian suppliers whenever their offers are equivalent to those of the other suppliers invited to submit bids.

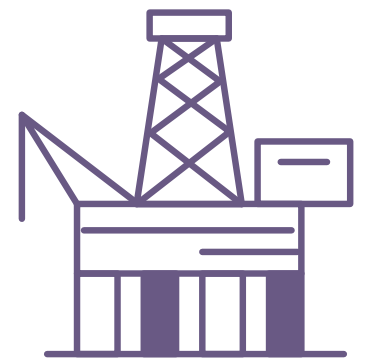
955

blocks with exploratory risk and the Japiim area are available for declaration of interest in Brasil



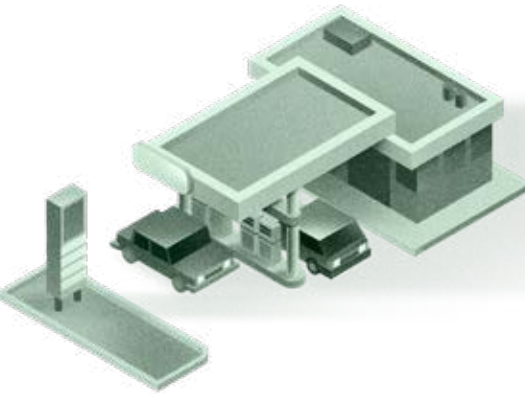
394

blocks are in onshore basins



561

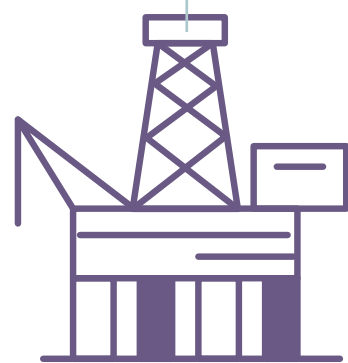
blocks are in offshore basins



sectors of 19 sedimentary basins and 15 areas with marginal accumulations located in 5 onshore basins: Espírito Santo, Potiguar, Recôncavo, Sergipe-Alagoas and Tucano Sul. The areas under study will be available for the Permanent Offer when the environmental opinions are finalized and the public hearing, promoted by the ANP, is held.



26 blocos em bacias terrestres



26 blocos em bacias marítimas

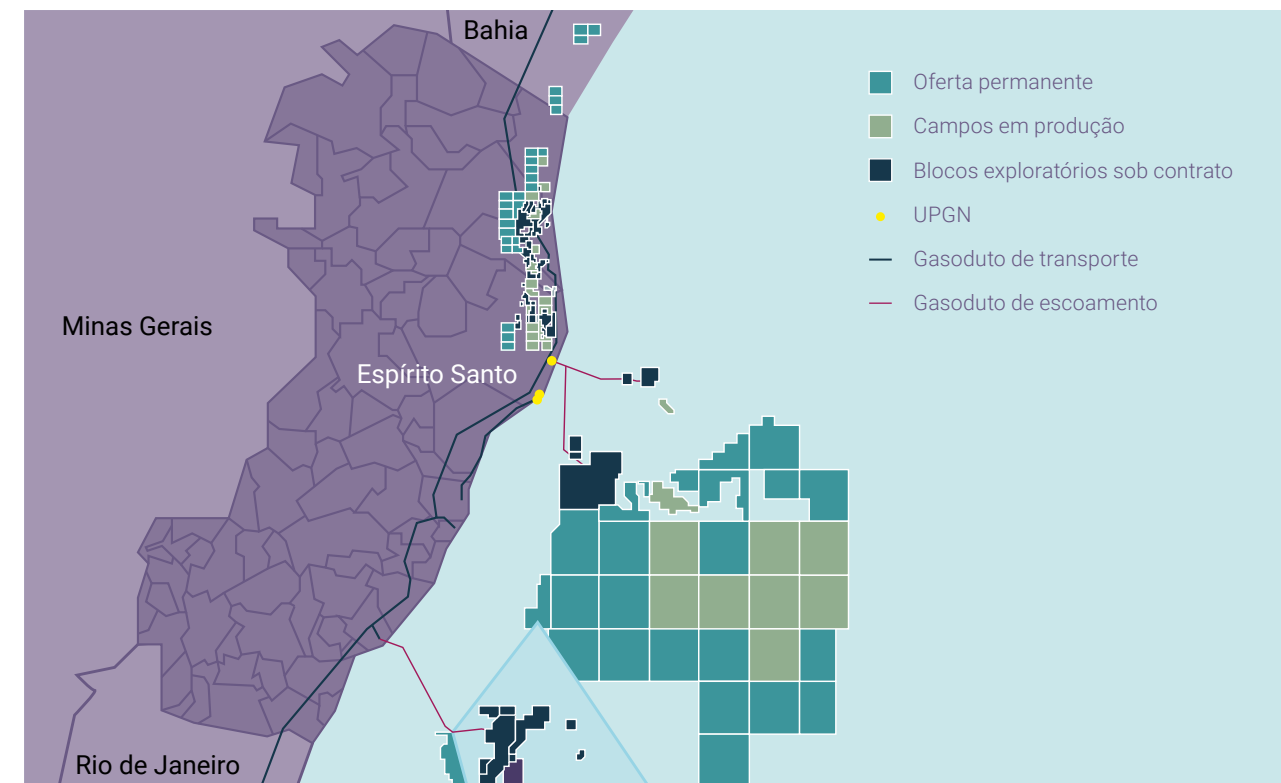
52 blocos estão disponíveis para declaração de interesse para a Oferta Permanente no Espírito Santo

In Espírito Santo, 52 exploration blocks are available for declaration of interest, 26 of which are onshore and 26 offshore. These areas have received few drillings in the past and, therefore, are associated with greater exploratory risk due to the scarcity of information. Figure 1 shows the exploratory blocks available for declaring interest in the permanent offer in Espírito Santo. In addition to these, a total of 41 exploratory blocks are under study in Espírito Santo, all terrestrial (figure 2), and 6 areas with marginal accumulations (figure 3).

In December 2023, the ANP held a public session to present bids for the 4th Cycle of the Permanent Offer. A total of 192 exploration blocks were awarded in Brazil, spread across the Pelotas, Potiguar, Santos, Paraná, Espírito Santo, Tucano, Amazonas, Recôncavo and Sergipe-Alagoas basins.

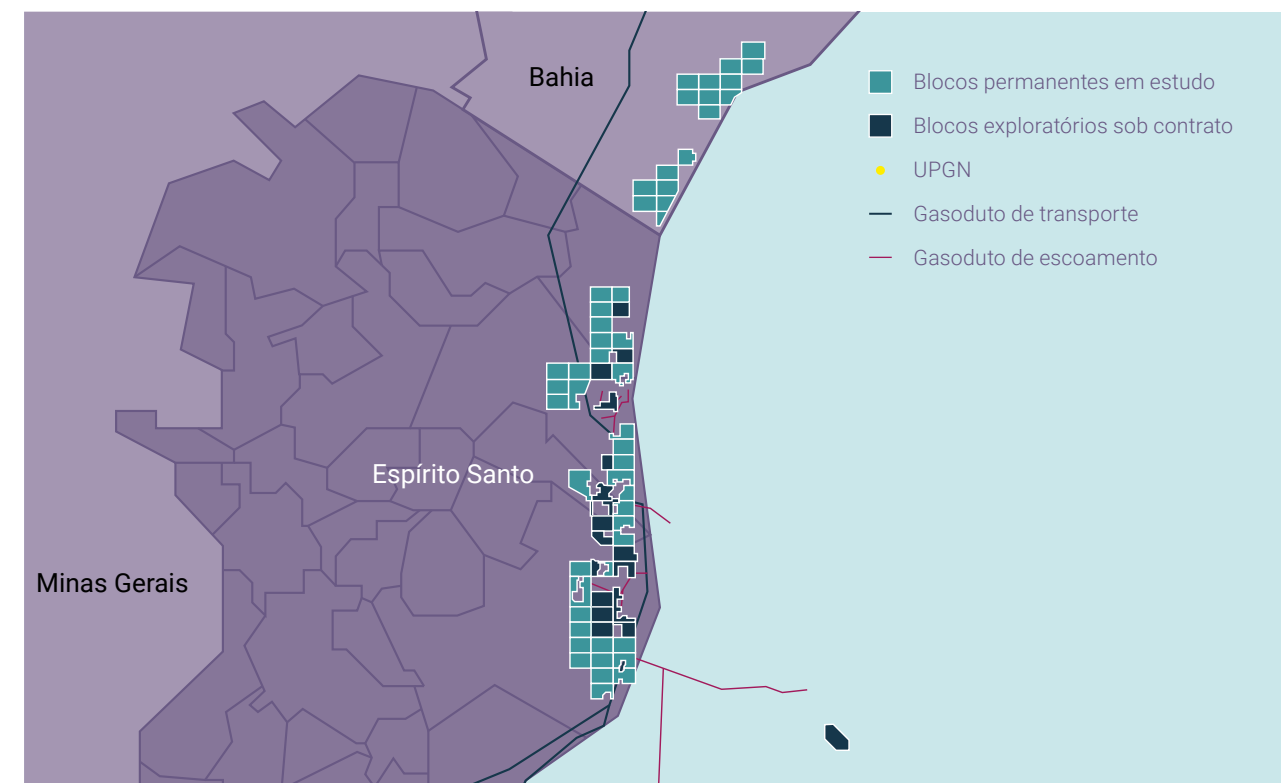
The total amount raised by the ANP with the signature bonuses corresponds to a premium of 179.7% over the minimum amount required for the exploration areas. Overall, the winning bids committed to BRL 2.01 billion in investments in the exploration phase. In the Espírito Santo Basin, 10 exploration blocks were awarded, totaling a minimum investment in the exploration phase of BRL 16.0 million. The blocks were distributed between the companies Elysian and Imetame, which won the auction (Table 10).

Figure 1 - Exploratory blocks available for declaration of interest in the Permanent Offer in Espírito Santo



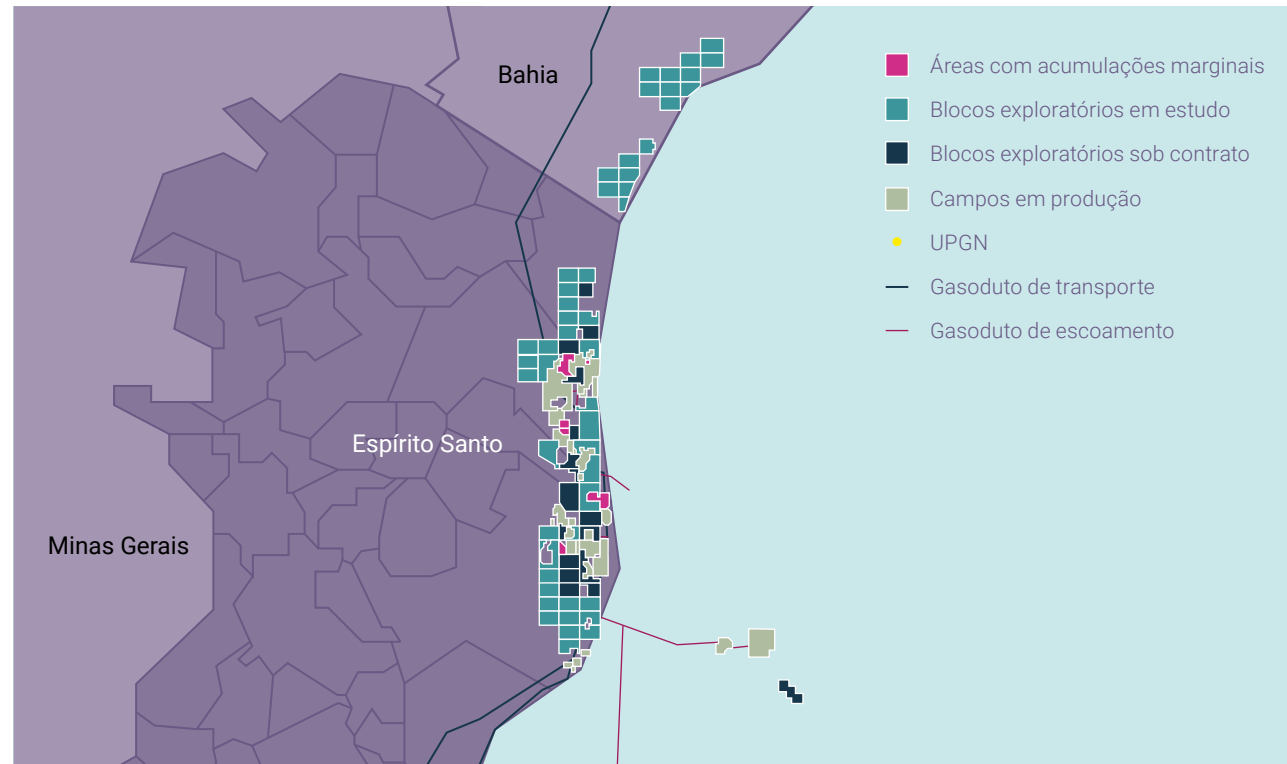
Source: ANP. Elaboration: Industry Observatory/Findes.

Figure 2 - Exploratory blocks under study for declaration of interest in the Permanent Offer in Espírito Santo



Source: ANP. Elaboration: Industry Observatory/Findes.

Figure 3 - Areas with marginal accumulations under study for declaration of interest in the Permanent Offer



Source: ANP. Elaboration: Industry Observatory/Findes.

Table 10 - Exploratory blocks in the Espírito Santo Basin awarded in the ANP's 4th Permanent Offer Cycle

Block auctioned	Winning company/consortium	Signature bonus (BRL)
ES-T-226	Elysian	51,000.00
ES-T-380	Elysian	51,000.00
ES-T-389	Elysian	51,000.00
ES-T-398	Elysian	51,000.00
ES-T-399	Elysian	51,000.00
ES-T-407	Elysian	51,000.00
ES-T-408	Elysian	51,000.00
ES-T-408	Imetame	50,118.00
ES-T-504	Elysian	51,000.00
ES-T-504	Imetame	50,118.00
ES-T-514	Elysian	51,000.00
ES-T-525	Elysian	51,000.00

Source: ANP. Elaboration: Industry Observatory/Findes.

4.4. Facility Decommissioning

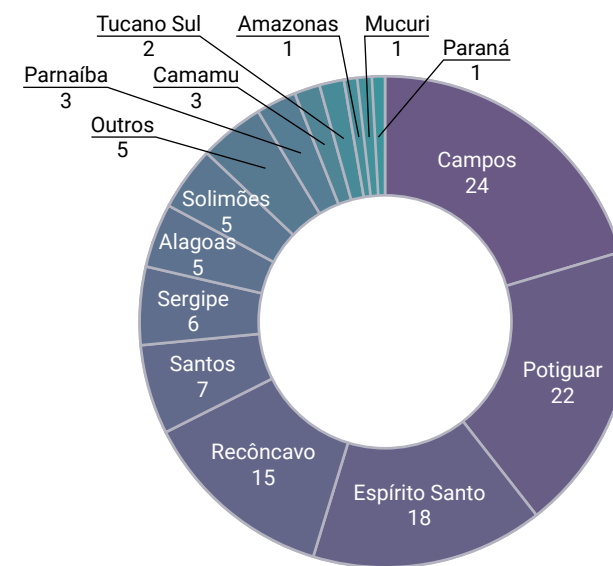
The decommissioning of facilities is the safe destination of oil and natural gas exploration and production structures after the end of their production phase. Among the activities are: the removal of facilities; the razing of wells; the proper disposal of materials, waste and tailings; and the environmental recovery of the area. The ANP approves the definitive interruption of the facilities after all possibilities of exploration and production of the area have been exhausted.

By 2023, the ANP had 117 Facility Decommissioning Program (PDI) processes in Brazil, of which 89

were approved (of which 52 refer to the onshore environment, 34 refer to the maritime environment and 3 were classified as undetermined). In addition to those approved, a further 14 processes were classified as received, 8 were classified as on hold and 6 were closed.

The Campos Basin has the largest number of PDIs in the country (24 PDIs), followed by the Potiguar Basin (22 PDIs) and the Espírito Santo Basin (18 PDIs) (Graph 29). Specifically, regarding the approved programs, in total, at least 14 basins in the country had PDI's approved by the ANP until 2023. Among them, 18 plans were located in the Espíri-

Chart 29 - Distribution of Facility Decommissioning Programs (PDI)



Source: ANP. Elaboration: Industry Observatory/Findes

117

Facility Decommissioning Program (PDI) processes in Brazil by 2023

89	approved
14	received
8	on hold
6	closed

19

Facility Decommissioning Program (PDI) processes have been approved for the state of Espírito Santo by 2023

18	in the Espírito Santo basin
1	in the Campos basin

BRL 1.82 billion

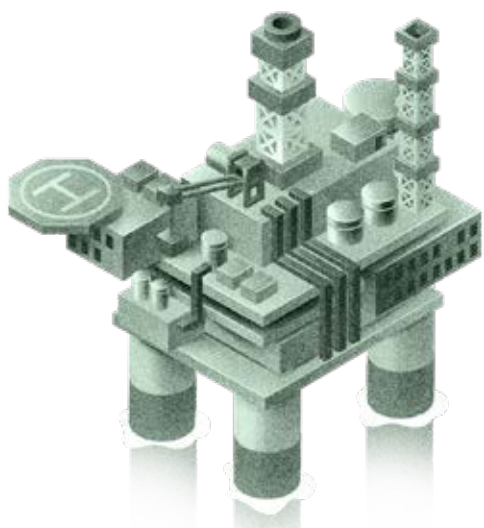
in investment will be generated by the decommissioning from 2024 to 2027

BRL 1.1 billion

in the Espírito Santo basin

BRL 704.4 million

in the Campos basin



to Santo Basin, 18 in the Campos Basin, 12 in the Potiguar Basin, 9 in the Recôncavo Basin and 32 in 11 other basins.

For the state of Espírito Santo, 19 PDIs have been approved up to 2023, 18 for the Espírito Santo basin (all onshore) and 1 for the Campos basin, with the decommissioning of FPSO Capixaba (table 9).

FPSO Capixaba is located in the Jubarte field, which in turn is in the Parque das Baleias. SBM Offshore, the company that operates the platform, which belongs to Petrobras, said that the unit will be transported to Denmark in 2024. In the country, the platform's final destination will be recycling, under an agreement signed between SBM and Modern American Recycling Services Europe. Despite this decommissioning, Petrobras is stimulating the renewal of the Jubarte Field with the forecast of starting operations of a new FPSO, the FPSO Maria Quitéria, in 2025. In addition, the company claimed that it is continuing with studies for new production units in this and other fields.

In addition to those approved, Espírito Santo has a PDI that was received in 2023 by the ANP, but has not yet been approved. This PDI refers to the decommissioning of FPSO Espírito Santo, which is located in Parque das Conchas and is connected to 4 fields: Argonauta, Ostra, Abalone and Massa.

The operator responsible for the platform is Shell.

After all the infrastructure decommissioning activities have been carried out, the oil company submits the Facilities Decommissioning Report (RDI) to the ANP, which will check and analyze compliance with the PDI and its activities and then approve or reject the RDI. In 2023, the ANP approved 6 RDIs in Brazil, 1 of which refers to Campo Albatroz, located in the Espírito Santo Basin. The field operator is the company Petrosyenergy, whose production activities in that field began in 2015.

Throughout Brazil, the decommissioning of 3,738 wells will generate BRL 51.6 billion in investment over the period from 2024 to 2027. For Espírito Santo, the decommissioning of 375 wells will generate BRL 1.82 billion in investment from 2024 to 2027, of which BRL 1.1 billion in the Espírito Santo Basin and BRL 704.4 million in the Campos Basin (the part that falls to the state).

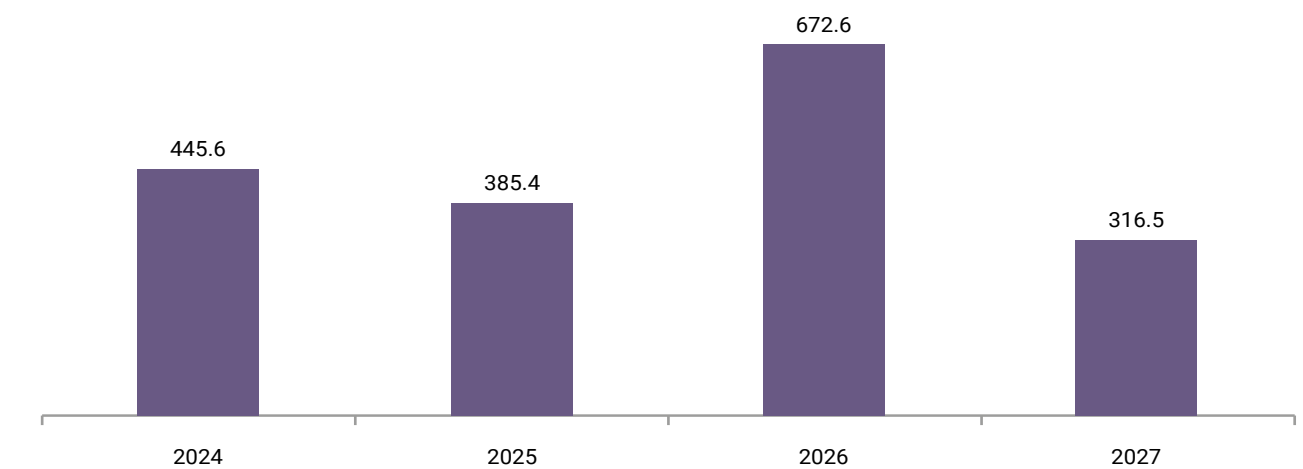
This total amount will be applied to permanent abandonment activities (68.2%), line removal (19.6%), demobilization of oil exploration units (UEP) (3.6%), removal of other equipment in the subsea system (3.3%), dragging of wells (2.1%), removal of facilities associated with onshore production units (1.6%) and environmental recovery (1.6%).

Table 11 - List of Decommissioning Programs (PDI) approved and received in the State of Espírito Santo

Environment	Basin	PDI	Company	Situation
Land	Espírito Santo	Albatroz	Petrosyenergy	Approved
	Espírito Santo	Barra do Ipiranga	Petrobras	Approved
	Espírito Santo	Corruíra	Petrobras	Approved
	Espírito Santo	Garça Branca	Central Resource	Approved
	Espírito Santo	Jacupemba	Petrobras	Approved
	Espírito Santo	Lagoa do Doutor	Vipetro	Approved
	Espírito Santo	Lagoa Parda Sul	Petrobras	Approved
	Espírito Santo	Mariricu Oeste	Petrobras	Approved
	Espírito Santo	Mosquito	Petrobras	Approved
	Espírito Santo	Mosquito Norte	Petrobras	Approved
	Espírito Santo	Nativo Oeste	Petrobras	Approved
	Espírito Santo	Rio Barra Seca	Petrobras	Approved
	Espírito Santo	Rio Ibiribas	Petrobras	Approved
	Espírito Santo	Rio Itaunas Leste	Petrobras	Approved
	Espírito Santo	Rio Mariricu	Petrobras	Approved
Sea	Campos	FPSO Espírito Santo	Shell	Received
	Campos	FPSO Capixaba	Petrobras	Approved

Source: ANP. Elaboration: Industry Observatory/Findes

Graph 30 - Planned Investments for the PDI Facility Decommissioning Programs in Espírito Santo (in millions BRL) - 2024 to 2027



Source: ANP. Elaboration: Industry Observatory/Findes



OIL AND GAS IN ESPÍRITO SANTO: TOWARD A SUSTAINABLE FUTURE

Eduarda Lacerda

General Manager of Petrobras Business Unit in Espírito Santo



Contribuição
da Petrobras

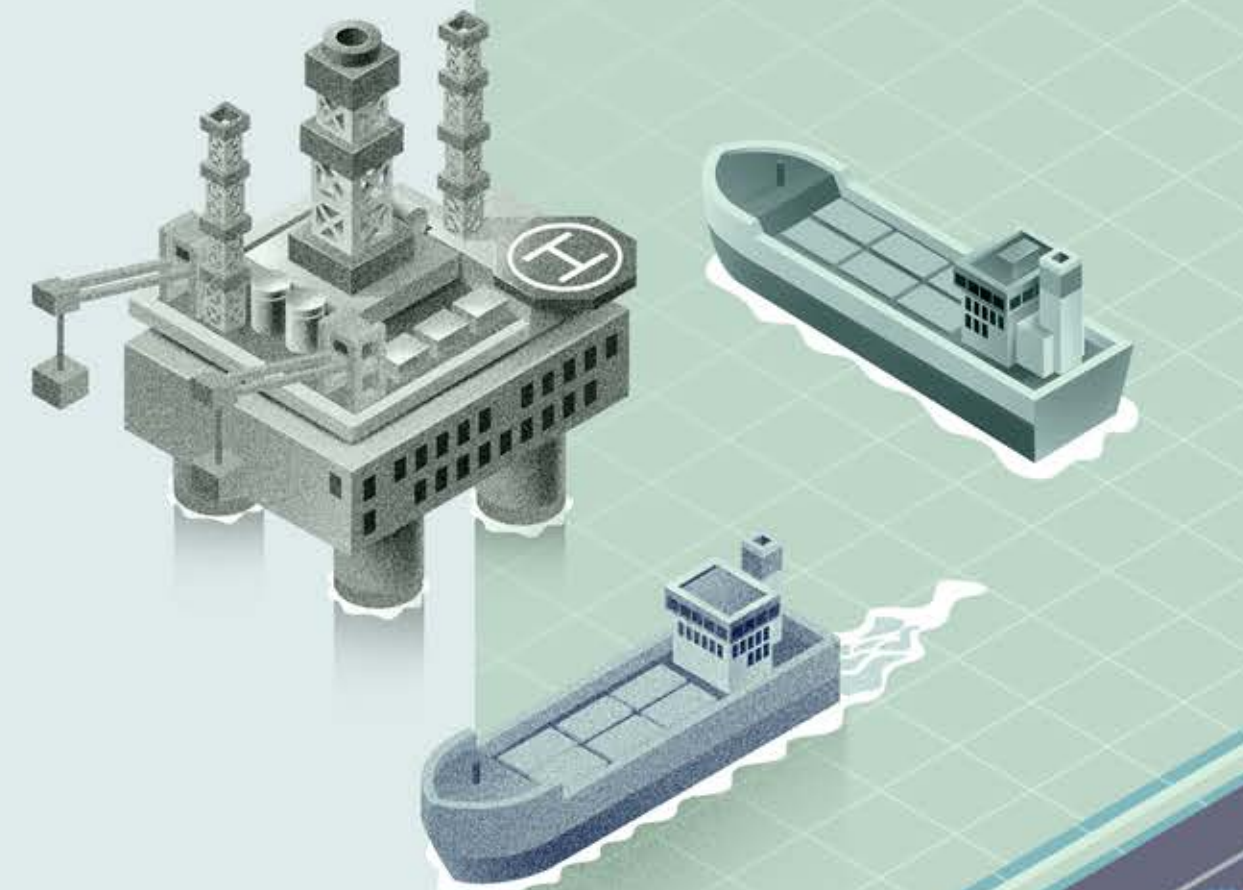
Energy plays a fundamental role in society's functioning. And the oil and gas sector is an essential pillar to provide this energy that drives progress, innovation, and economic and social development. In Espírito Santo, we anticipate approximately 40% growth in Petrobras' oil and gas production by 2025 compared to the current year.

But it is not enough to produce energy; it is necessary to produce clean energy. Decarbonization has become the watchword. We are reducing our carbon footprint, producing oil with fewer greenhouse gas emissions, and investing in cleaner energy sources. Petrobras is the largest company in the state, and we have the responsibility to lead the transformation towards a more sustainable and just future. This is not just an environmental issue; it is also a matter of long-term survival and prosperity.

We are committed to this transformation and express this conviction through commitments to society,

present in our strategic plans and our ambition to achieve emission neutrality by 2050. We are committed to researching, developing, and implementing technologies that minimize our environmental impact, and Espírito Santo plays a fundamental role in our strategies.

It is in this state that we will deploy the company's first combined cycle and all-electric production unit, the FPSO Maria Quitéria, which will start operating next year, in the Jubarte field. We are also studying the deployment of offshore wind farms and in discussions with partners to develop Carbon Capture and Storage technologies.



The choice of Espírito Santo as the location for these initiatives is due to its innovative society and qualified partners and suppliers willing to tread the same path. We work in collaboration with companies, governments, and academic institutions that are essential in this process. Together, we can accelerate the transition to a low-carbon economy.

In this sense, it is fundamental that all involved in the oil and gas sector continuously seek innovative and sustainable solutions, aligned with the needs for decarbonization and environmental preservation. Only then can we ensure the continuity of economic, social, and environmental development, building a more sustainable future for future generations.

*Together, we are people
shaping the future.*



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A

Adjacent pioneering exploratory well: well that aims to test the occurrence of oil or natural gas in an area adjacent to a discovery.

B

Barrel of oil equivalent (boe): barrel of oil equivalent (1,000 m³ of gas ≈ 6.28981 bbl) - measure that adds the volumes of oil and gas production

Barrel of oil per day (bpd): unit used to reference the daily production of barrels of oil.

Bidding rounds: action organized by ANP, which aims at the auction between companies and/or consortia interested in acquiring exploratory areas in concessions or sharing.

Brent: oil extracted in the North Sea and traded on the London Stock Exchange, being its international reference price for oil.

C

Closed well: completed well that has already entered into production or injection operation, but is closed, awaiting normalization of surface conditions, additional studies for decision making, or intervention with a probe for reassessment, recompletion, restoration, abandonment, among others.

Coke: fuel derived from coal agglomeration and consisting of mineral matter and carbon, fused together. It is a solid and cohesive residue remaining from the destructive distillation of coal, petroleum or other carbonaceous wastes and containing mainly carbon.

Concession: modality of delegation of an economic activity by the government, usually through a compe-

titive process, to an economic agent that proves capacity for its performance, at its own risk and for a determined period. In Brazil, the administrative contract for the delegation is made by the ANP, which grants companies the exercise of oil and natural gas exploration and production activities in the Brazilian territory.

Concessionaire: a company incorporated under Brazilian laws, headquartered and managed in Brazil, with which ANP enters into a concession agreement for the exploration and production of oil or natural gas in a sedimentary basin located in the national territory.

D

Declaration of commerciality: written notification from the concessionaire to ANP declaring a deposit as a commercial discovery in the concession area.

Declaration of evidence of hydrocarbons: the concession contracts establish the deadlines and work programs for exploration and production activities. According to these contracts, the concessionaire has the obligation to notify the ANP of any discovery of hydrocarbon or other mineral resources within the concession area within 72 hours after the occurrence.

Decommissioning: set of legal actions, techniques and engineering procedures applied in an integrated manner to a Pipeline, in order to ensure that its deactivation meets the conditions of safety, preservation of the environment, reliability and traceability of information and documents.

Deep waters: ocean waters located at any distance from the coast with a seabed depth of 300-1,500 meters.

Demolished well: permanently abandoned well in which there was the removal of all equipment related to the wellhead assembly and the cutting of the surface casing at the bottom of the ante well.

Development plan: is the instrument of development and production planning, covering the entire life cycle of the oil field. It describes the activities and investments that will be carried out, so that all other medium- and short-term plans will have to be consistent with it.

E

Exploration phase: aims to discover and evaluate oil and/or natural gas deposits. Exploratory activities involve the acquisition of seismic, gravimetric, magnetometric, geochemical data, drilling and evaluation of wells, among others, and must necessarily include compliance with the Minimum Exploration Program (PEM) agreed with ANP.

Exploratory Block: geographically delimited areas referring to a sedimentary basin, where oil and natural gas exploration activities are developed.

Exploratory injection well: well that aims at injecting fluids into the reservoir with the objective of improving the recovery of hydrocarbons.

Exploratory production well: well that aims to drain one or more deposits from a field.

Exploratory well for deeper prospect: well that aims to test the occurrence of accumulations or favorable geological conditions deeper in a given area.

Exploratory well for shallower prospect: well that aims to test the occurrence of accumulations or shallower favorable geological conditions in a given area

Extension exploratory well: well that aims to delimit the accumulation of oil or natural gas and/or investigate contact between fluids, communication between regions of a reservoir, and properties that allow it to be characterized.

Extraction: set of coordinated operations to extract oil or natural gas from a deposit and prepare for its movement.

F

Fields returned: area returned to ANP made through the Area Return Notification. The act of returning the field implies the interruption of all exploration activities in the returned portion, except for the activities of deactivation of facilities and environmental recovery.

Financial Compensation: amount due to the states, municipalities and the Federal Government for the use of natural resources, since these entities are affected by the exploration and production activity.

Government Participations: payments to be made by concessionaires of oil and natural gas exploration and production activities, pursuant to arts. 45 to 51 of Law No. 9.478, of 1997, and Decree No. 2.705, of 1998.

H

Hydrocarbon: A chemical compound consisting only of carbon and hydrogen atoms. Oil and natural gas are examples of hydrocarbons.

Injecting well for storage: well operating as a fluid injector for storing natural gas.

Injecting well: well operating as a fluid injector to improve the recovery of hydrocarbons from the reservoir.

L

Local content: O&G exploration and production contracts include a local content clause, an instrument that determines that part of the goods and services acquired for exploration and production activities in Brazil must be national. It also establishes a preference for hiring Brazilian suppliers whenever their offers are equivalent to those of the other suppliers invited to submit bids.

Marginal fields: inactive areas in which there was no production of oil and/or natural gas or production was interrupted due to lack of economic interest.

Mature Basin: sedimentary oil basin whose production is already in decline.

Mature fields: oil fields whose production is already in decline.

Minimum Exploration Program (PEM): exploratory activities to be compulsorily fulfilled by the concessionaire during the exploration phase, being defined by the ANP, according to evaluation criteria of the areas to be explored.

N

National Agency of Petroleum, Natural Gas and Bio-fuels (ANP): regulator of the oil, natural gas and bio-fuels market in Brazil, with the exception of the regulation of natural gas distribution, whose sphere is state.

Notification of area return: written communication, made by the Concessionaire to ANP, of the return of areas, under the circumstances provided for in the Agreement, which contains the list of Reversible Assets existing in the portion to be returned and the delimitation of the polygon of the areas to be retained.

O

Offshore: marine environment and land-sea transition zone or area located at sea.

Oil consumption: activity consisting of the use of crude oil for the manufacture of petroleum products.

Oil fields: area producing oil or natural gas, from a continuous reservoir or from more than one reservoir, at variable depths, covering facilities and equipment intended for production. (Source: Law No. 9.478, of 8/6/1997).

Oil production chain: set of activities of the production chain from the extraction of crude oil to the last phase of value addition of the sector, segmented into four branches: exploration, refining, petrochemical industry and processing industry.

Oil Production: set of coordinated operations to extract oil or natural gas from a deposit and prepare its movement, as defined in item XVI of art. 6 of Law No. 9.478, of 1997, or also volume of oil or natural gas extracted during production, as can be seen from the text, in each case.

Oil refining: activity developed by an industrial unit that uses as raw material the oil coming from the extraction and production unit of a field and that, through processes that include heating, fractionation, pressure, vacuum and reheating in the presence of catalysts, generates petroleum derivatives from the lightest (refinery gas, LPG, naphtha) to the heaviest (bunker, fuel oil), in addition to solid fractions, such as coke and asphalt residue.

Oil well: drilling into the earth's surface used to produce oil and/or natural gas.

Oil: any and all liquid hydrocarbons in their natural state, such as crude oil and condensate, whose exploration and production is regulated by Law No. 9.478, of 8/6/1997.

Onerous assignment: model of assignment of an exploratory area to Petrobras – bilateral negotiation, through the consideration of the payment of a certain amount, which was regulated by Law No. 12.276, of June 30, 2010, limiting exploration up to 5 billion boe.

Onshore: terrestrial environment or area located on land.

P

Payment for area occupation or retention: amount paid by concessionaires to landowners where oil and natural gas exploration and production activities are carried out. This payment is made in two ways: (i) an-

nual, by means of unit values in BRL per square kilometer of the concession area fixed in the notice and in the contract, being applicable, successively, to the exploration, development and production phases. The determination of this value is made by the ANP and takes into account the geological characteristics and the location of the sedimentary basin; (ii) monthly, by multiplying the equivalent of 1% of the field's total oil and natural gas production volume, during the calculation month, by their respective reference prices.

Permanent offer: continuous offer of fields returned (or in the process of being returned) and exploratory blocks offered in previous bids and not auctioned or returned to the agency (Article 4 of CNPE Resolution No. 17, of 06/08/2017).

Permanently abandoned well: well where there is no interest in future re-entry and operations were conducted for the establishment of solidary sets of permanent barriers.

Petroleum derivatives: products resulting from the processing of petroleum.

Pioneering exploratory well: well that aims to test the occurrence of oil or natural gas in one or more objectives of a geological prospect not yet drilled.

Pre-salt: subsurface region formed by a vertical prism of indeterminate depth, with a polygonal surface defined by the geographical coordinates of its vertices established in the Annex of Law No. 12.351/2010, as well as other regions that may be delimited in an act of the Executive Branch, according to the evolution of geological knowledge.

Production phase: the one in which oil and/or natural gas accumulations discovered and which have had their commercial viability proven give rise to a producing field, being developed and put into production to supply the market.

Production Sharing: model of exploration and production of oil, natural gas, which provides not only the payment of royalties, but also the physical division of the production of hydrocarbons discounting the cost incurred in exploration and production activities. It is currently regulated by Law No. 12.351, of 12/22/2010.

Production Unit (Exploration and Production): set of facilities designed to promote the separation, treatment, storage and flow of fluids produced and moved in an oil and natural gas field.

Proven reserves: amount of Oil or Natural Gas that the analysis of geoscience and engineering data indicates with reasonable certainty that it is an economically viable well, whose investments are recoverable commercially.

R

Reference Price: calculated based on the physical-chemical characteristics of the oil stream. For each field, the true boiling points, known as the TBP curve, are analyzed, defining the light, medium and heavy fractions that exist in each type of oil. Based on the fractions, the oil in a stream is valued using derivative prices from the international market.

Repeatable: these are goods under a special customs regime of export and import, which are intended for research and mining activities of oil and natural gas deposits, with suspension of customs taxes.

Royalties: constitute financial compensation due to the Federal Government, States and municipalities, by concessionaires for the exploration and production of oil or natural gas to be paid monthly according to the volume of production of the month, in a given field, from the beginning of production;

S

Sedimentary basin: depression of the earth's crust where sedimentary rocks accumulate that can be carriers of oil or gas, associated or not.

Shallow waters: ocean waters located at any distance from the coast with a depth of the seabed of 0-300 meters.

Signature bonus: resource offered by the winning bidder in the proposal to obtain the concession for the exploration of oil or natural gas, and may not be lower than the minimum value established in the bid notice. Part of this resource is allocated to the Union and part to the ANP;

Special Participation: constitutes extraordinary financial compensation due to the Federal Government, States and Municipalities, according to ANP Resolution No. 12/2014, by oil or natural gas exploration and production concessionaires, in cases of large production volume or high profitability.

Special well: well that aims at specific objectives that do not fit the purposes previously defined.

Storage Well: well that aims to allow natural gas storage operations, including injection, withdrawal and monitoring.

Stratigraphic exploratory well: well that aims to know the stratigraphic column and obtain other surface geological information in a basin or region little explored;

T

Temporarily abandoned well without monitoring: well where there is interest in future re-entry and operations were conducted for the establishment of solidarity sets of unmonitored and/or verified barriers.

U

Ultra-deep waters: ocean waters located at any distance from the coast with depth of the seabed greater than 1,500 meters.

Upstream: segment of the oil industry that includes the activities of exploration, development, production and transportation of oil to refineries.

W

Well operating for disposal: well operating for disposal of fluids produced by other wells or disposal of various effluents generated in exploration and production activities, in areas that do not produce at that time.

Well producing and injecting: well operating simultaneously producing hydrocarbons and injecting fluids (at distinct intervals).

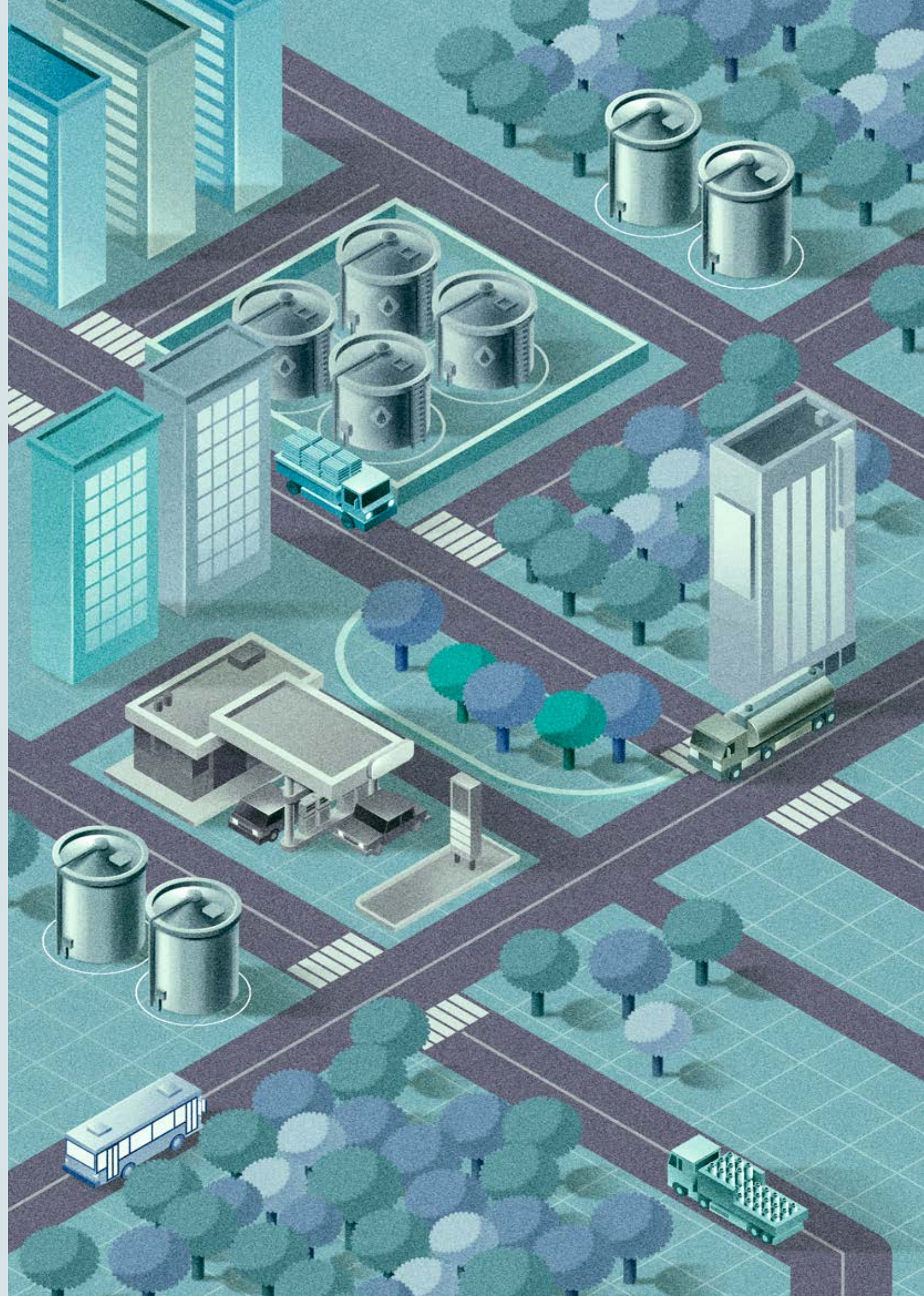
Well producing: well operating as a hydrocarbon producer.

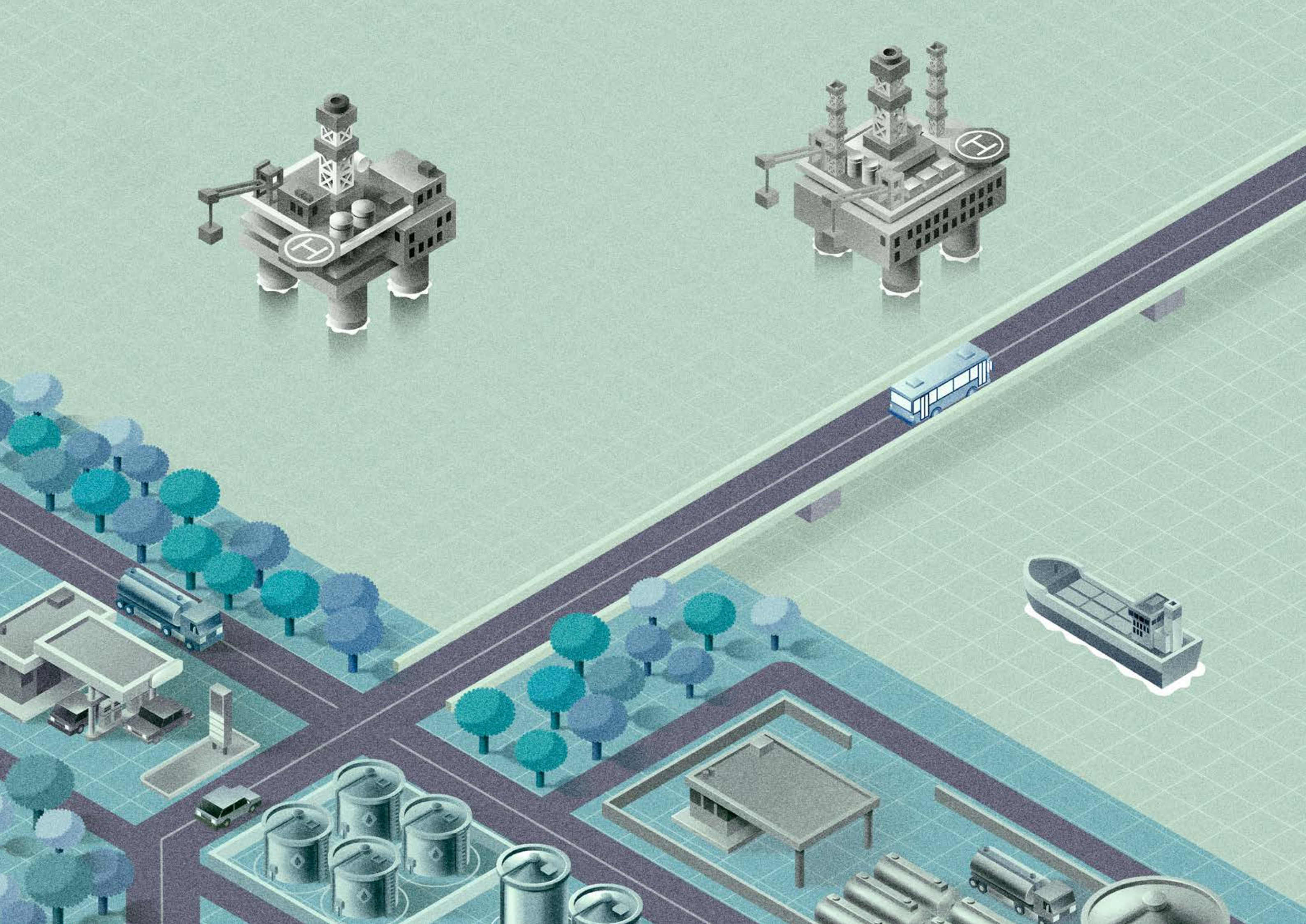
Well removing stored natural gas: well operating for the removal of natural gas from a storage reservoir.

Well temporarily abandoned with monitoring: well where there is interest in future re-entry and operations were conducted for the establishment of solidary sets of barriers, which must be periodically monitored and/or verified.

Well under observation: well instrumented for monitoring pressures in a hydrocarbon producing reservoir or natural gas storage.

WTI (West Texas Intermediate): Oil extracted from the Permian Basin in western Texas and eastern New Mexico, traded on the New York Stock Exchange. Its quotation serves as an international reference for the price of oil.







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