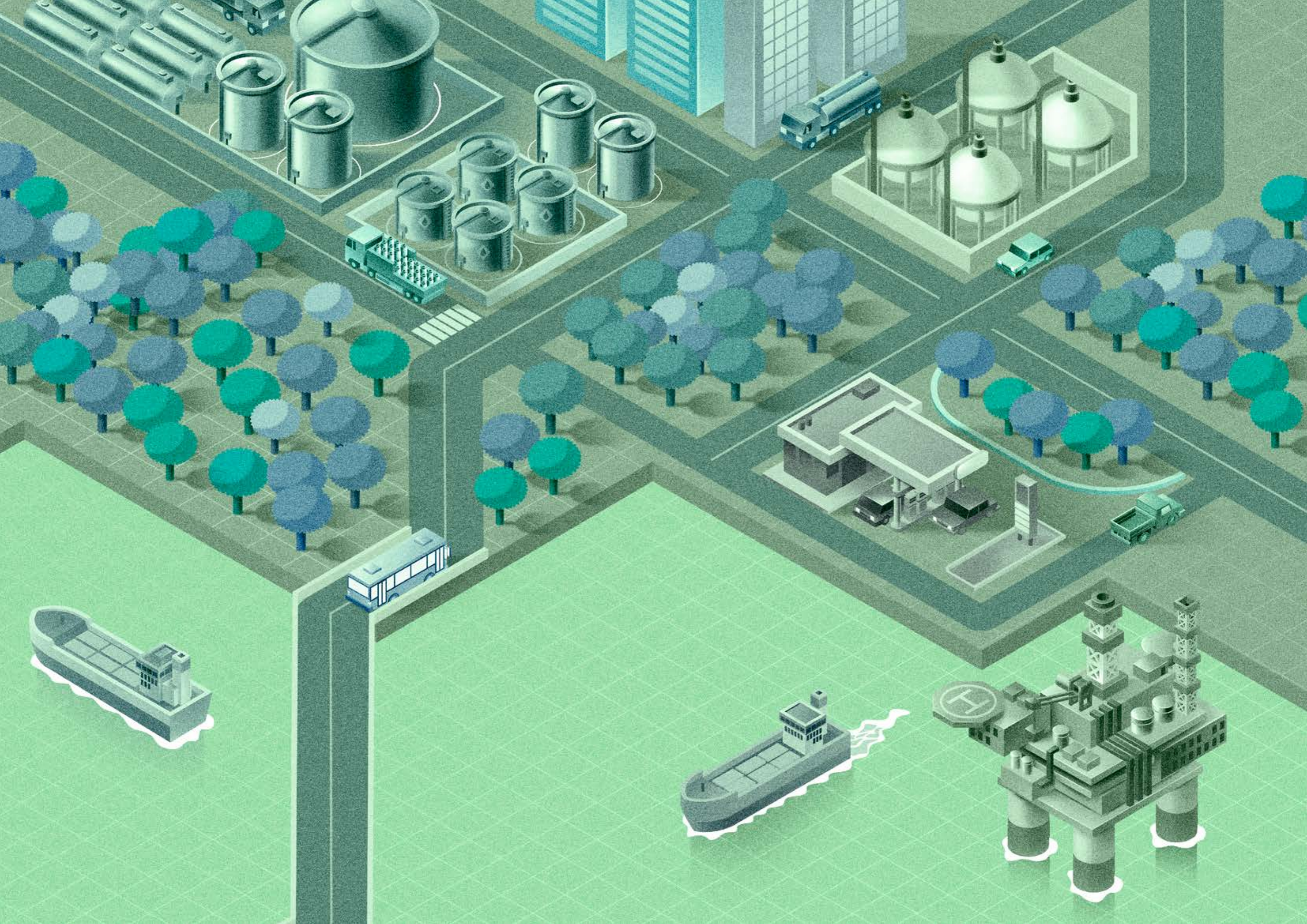


# ESPÍRITO SANTO OIL & NATURAL GAS YEARBOOK

## 2022









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# OPENING LETTER

The Yearbook of the Oil and Natural Gas Industry in Espírito Santo reaches its 6th edition and brings an important diagnosis about the exploration, production and the entire chain that this sector moves.

In fact, more than that, the document – produced by the Findes Industry Observatory – anticipates scenarios and presents fundamental projections to understand where the segment is heading.

With a share of 4.6% in the state's GDP and a weight of 20% in industry, the sector directly employs about 12,000 workers and has more than 520 active companies. In addition, it is an important revenue generator. In 2022, more than BRL 2.9 billion were collected in the State with royalties and special participations.

The numbers give the dimension of the importance that the segment has for the State, but it is necessary to understand that we are talking about a finite input and that in the last five years it has gone through a decline in production. Still, the economic activity of this chain is thriving and many opportunities are projected for the State.

Petrobras, Shell, Repsol, Equinor, Karavan Oil and Gas, ExxonMobil, Seacrest Petróleo, CNOOC Petroleum, Imetame, EnP, PRio, Vipetro, Petrosynergy, among other oil companies are preparing investments, which together exceed BRL 8.8 billion by 2027.

With these businesses, oil production, which fell 34.6% from 2021 to 2022, should reverse the downward curve and the forecast is that there will be an average annual increase of 10.2% until 2027. That is, we have to take advantage of the opportunities that pass through the investments already announced, the process of permanent offer of oil fields, Petrobras' divestment plan and also the decommissioning of platforms.

Alongside them, we need to prepare for a transition of the energy matrix. We, the productive sector, the Government and other entities in the sector, have to leverage opportunities and maximize projects that can address us for a more sustainable and developed State.

In this context, the Capixaba [belonging to the state of Espírito Santo] Oil and Gas and Energy Forum has played an important role. By bringing together the main players in the sector, through qualified discussions, the Forum contributes to strengthening the energy segment of Espírito Santo.

If we are strategic and carry out joint planning – and this Yearbook is a very rich tool in this process – we will be able to attract more businesses that diversify our activities and make us a reference to the world, in addition to developing projects that target the energy transition.

**Enjoy your reading!**



**Cris Samorini**  
Chairperson of Findes







**Marília Gabriela da Silva**  
Observatório da Indústria  
Executive Manager

# PRESENTATION

After six consecutive years of falling oil and natural gas production in Espírito Santo, the year 2023 rescues a scenario of optimism for the future. The fundamental piece that supports this statement arises in the recent announcements of investments in offshore areas that lead to an increase in the production of inputs in the short term. In the onshore environment, optimism appears in the recent diversification of operators that with results still isolated, demonstrate that the model with more independent companies operating in Exploration and Production (E&P) is the most prosperous path.

According to the ANP, in Espírito Santo more than 120 wells were passed on to private operators in 18 onshore exploration fields that account for an approximate volume of 3,000 boe/day. When we compare the average production volumes before and after the divestment of these areas by Petrobras, it is possible to see that 83.3% of these fields registered an increase in oil and natural gas production in the first twelve months of operation of the new companies.

There is no questioning about the benefits caused by increased competition in the exploration and production of oil and natural gas. Onshore production is an important

catalyst for the regional socioeconomic development of producing municipalities, especially in the generation of employment and income.

It is in this context that the 6th edition of the Yearbook of the Oil and Natural Gas Industry in Espírito Santo brings together the most important variables of analysis of the sector for Espírito Santo, combining the technical rigor and structured, updated and reliable information.


The first chapter of the Yearbook addresses the global oil and natural gas industry. Chapter 2 exposes the oil and natural gas industry in Espírito Santo. The economic effects of these activities are dealt with in chapter 3. Finally, chapter 4 discusses the new opportunities in exploration and production of oil and natural gas for Espírito Santo.

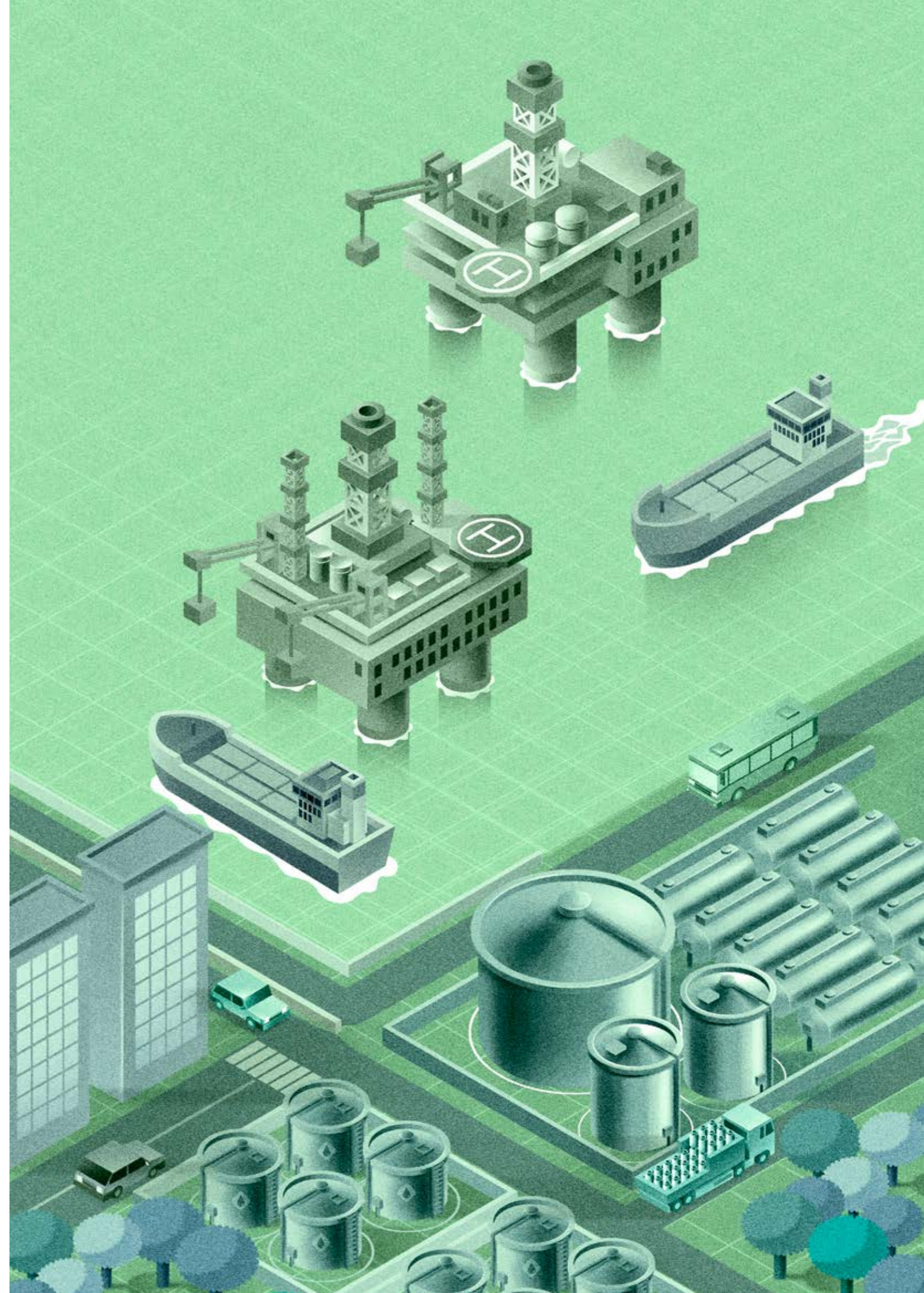
The Industry Observatory reaffirms its commitment to the sector and to the industry of Espírito Santo, and also keeps updated the Panel - Oil and Gas Industry – which contains the most relevant data of the sector in digital, intuitive and dynamic format.

### Enjoy your reading!

 **ACESSE AQUI O PAINEL – INDÚSTRIA DO PETRÓLEO E GÁS**



 **ACCESS THE ENGLISH EDITION OF THE DOCUMENT HERE**





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## Chapter 1

INTERNATIONAL  
PANORAMA

## 1.1 Overall energy consumption

**In 2021, global primary energy consumption was 595 exajoules, 5.5% higher than in the previous year**

The increase can be attributed, above all, to the resumption of global economic activity, overcoming the most critical period of the new Coronavirus pandemic.

Global energy consumption is centralized in a group of ten countries (chart 1) that together concentrate 67% of the total energy consumed in the world. Only China and the United States account for 42.1% of the total energy consumed in the world.

China's energy matrix is made up of the following sources: coal (54.7%), oil (19.4%), natural gas (8.6%), hydroelectric (7.8%), renewable energy (7.2%) and nuclear energy (2.3%).

The United States' energy matrix is composed of: oil (38.0%), natural gas (32.0%), coal (11.4%), nuclear energy (8.0%), renewable energy (8.0%) and hydroelectric (2.6%).

67% 42.1%

of global energy consumption is concentrated in a group of ten countries

of energy consumed in the world is concentrated in China and the United States

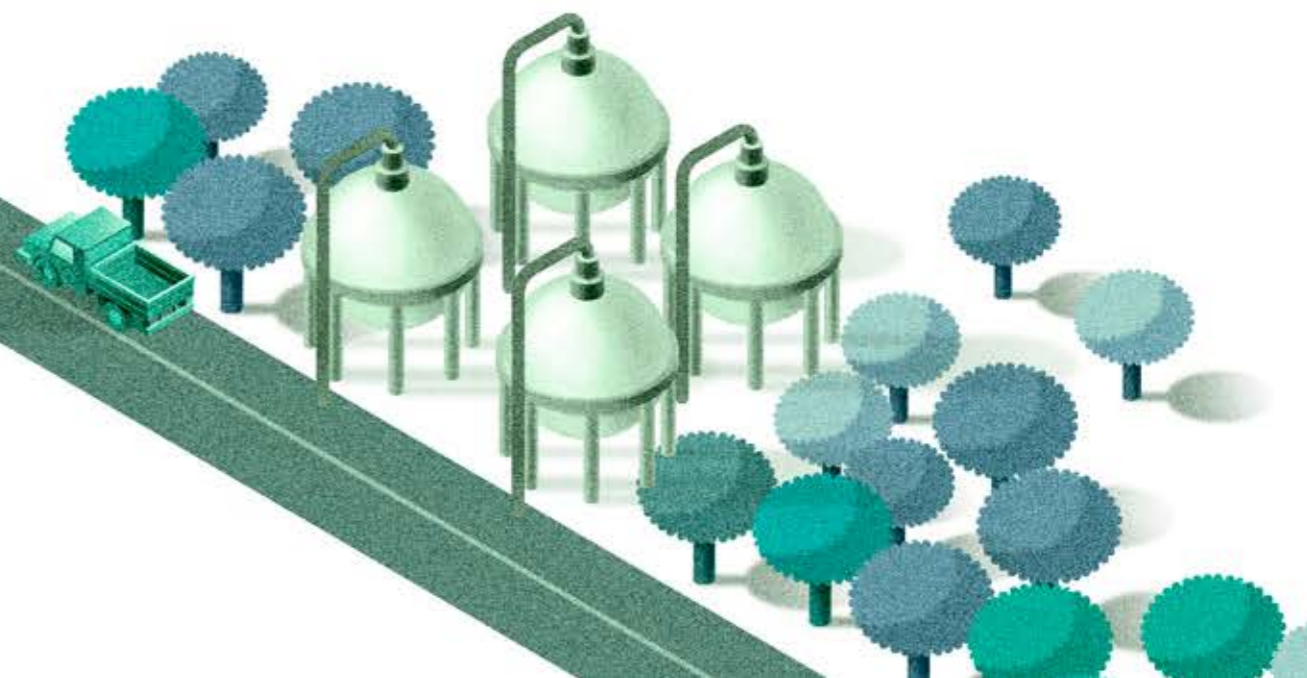
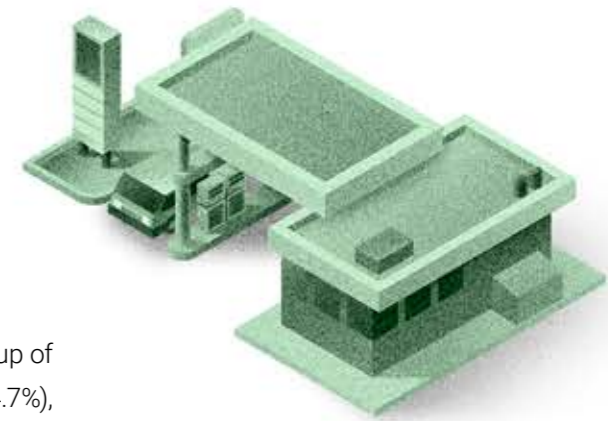
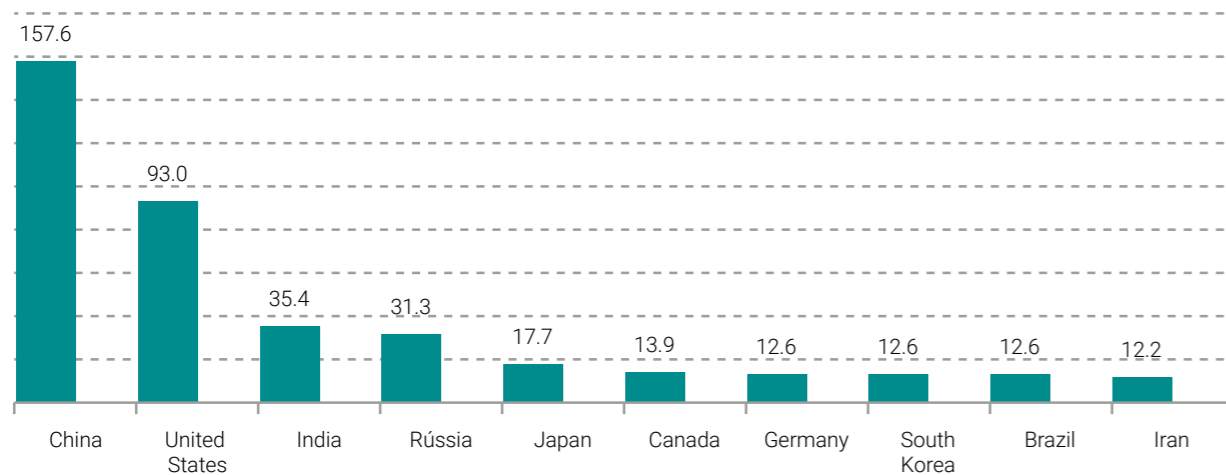




Chart 1 - Countries with the highest primary energy consumption (in exajoules) – 2021



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

24.4%

of the total primary energy consumed in the world in 2021 came from natural gas

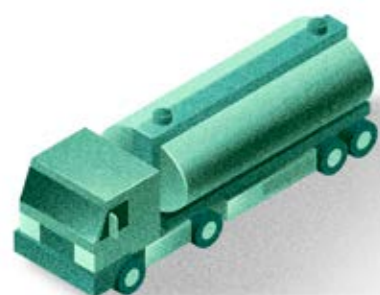
Over the past 20 years, the world's primary energy consumption has grown by an average of 1.3% per year. The highlight for the period was the increased participation of renewable energy sources in the energy matrix. In 2001, renewable sources represented 0.7% and in 2021 they rose to 6.7% of the total 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.

In turn, fossil fuels have grown more discreetly. In 2001, coal represented 25.0% of the total primary energy consumed in the world and in 2021 it rose to 26.9%. China, India and the United States concentrated 73.0% 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. It is well known that coal is one of the most polluting energy sources and yet its consumption in the last 20 years has not yet been contained.

Natural gas, which represented 21.8% of the total primary energy consumed in the world in 2001, rose to 24.4% in 2021. The consumption of natural gas represents an alternative in the transition to energy production with less polluting sources.

**As renewable sources are not yet available on a large scale, the use of natural gas becomes strategic due to production infrastructure, flow, 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 41.6%

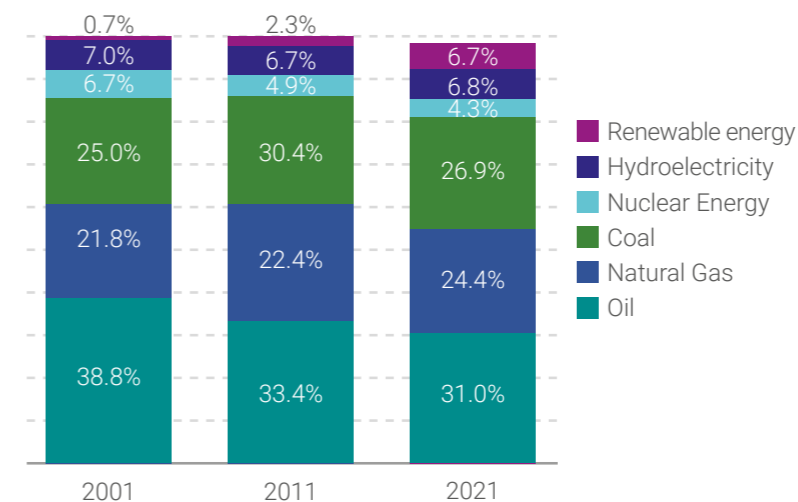


of total natural gas consumption worldwide.

Finally, oil held a 38.8% share of the global energy matrix in 2001 and, in 2021, reduced to 31.0%. The United States, China and In-

dia accounted for 40.9% of total oil consumption worldwide. It is noteworthy that despite the growth of renewable sources, in 2021, fossil fuels still represented 82.3% of the world's energy sources.

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



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

## 1.2. Global production and consumption of oil and natural gas

World oil production in 2021 was 89.9 million barrels per day<sup>1</sup>, 1.6% higher than in 2020 (chart 3), representing an increase of 1.4 million barrels per day in production in absolute numbers. Despite the increase, oil production in the world has not yet recovered to the level produced in 2015 and is far from the record production in 2018, when 94.9 million barrels per day were produced.

In 2021, the division of oil production among regions in the world was: Middle East (31.3%), North America (26.6%), Commonwealth of Independent States<sup>2</sup> (15.4%), Asia (8.2%), Africa (8.1%), South and Central America (6.6%) and Europe (4.0%). The main producing countries were the United States, Saudi Arabia and Russia, which together ac-

Division of oil production in the world:

Middle East 31.3%

North America 26.6%

CEI 15.4%

Asia: 8.2%

Africa: 8.1%

South and Central America: 6.6%

Europe: 4.0%

3.0 million

barrels of oil per day were produced in Brazil in 2021, which puts the country in 9th position in the global ranking

24.3 billion

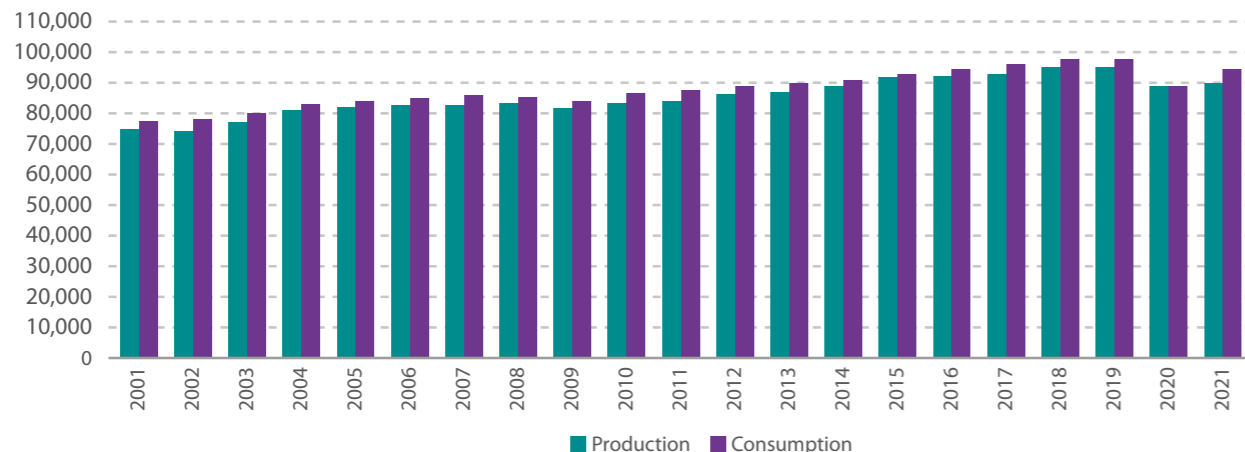
m<sup>3</sup> of natural gas were produced in Brazil in 2021, which puts the country in the 30th position of the global ranking

1. In this session it was adopted as a "barrels of oil per day" metric.

2. Member countries: Armenia, Azerbaijan, Belarus, Kazakhstan, Moldova, Kyrgyzstan, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan.



Chart 3 - Oil production and consumption in the world (thousand barrels/day)



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



Division of oil consumption in the world:

Asia	38.1%
North America	23.7%
Europe	14.4%
Middle East:	9.2%
South and Central America:	6.0%
CEI:	4.6%
Africa:	4.2%

count for 42.8% of global production. Brazil is the 9th country with the highest production of the input in the world, with 3.0 million barrels per day.

In 2021, 94.1 million barrels per day were consumed worldwide, 6.0% higher than in the previous year (chart 3), which represents the largest percentage increase among consecutive years since 1976. The significant increase can be explained by the resumption of global economic activity after the most critical period of the new Coronavirus pandemic.

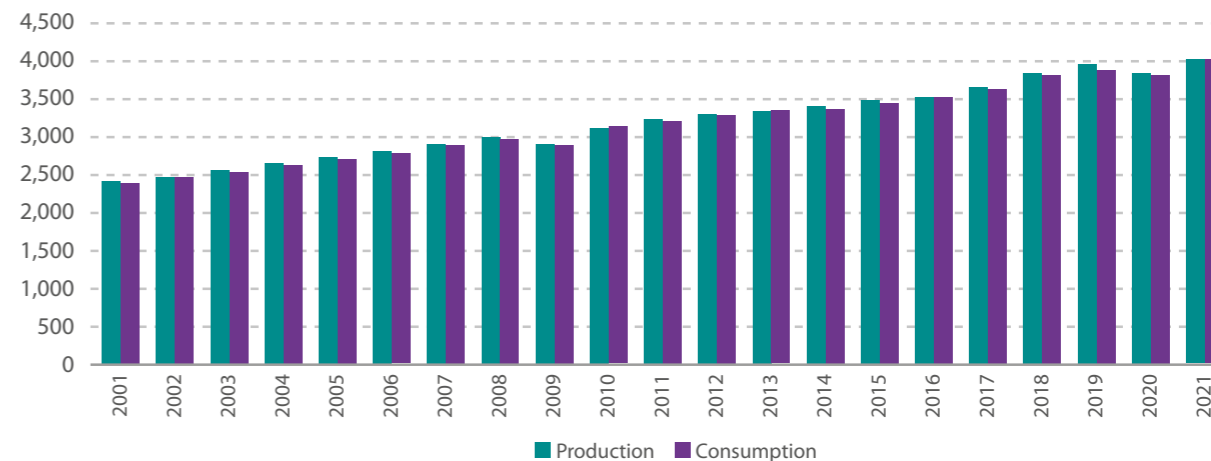
The division between the regions in the world took place as follows: Asia (38.1%), North America (23.7%), Europe (14.4%), Middle East (9.2%), South and Central America (6.0%), Commonwealth of Independent States (4.6%) and Africa (4.2%). The main consumer countries were the United States,

China and India, which together account for 41.5% of global consumption. Brazil is the 8th country with the highest consumption of the input in the world, with 2.3 million barrels per day.

Regarding natural gas, global production reached 4.0 trillion m<sup>3</sup> in 2021 (chart 4). This input's production increased by 175.4 billion m<sup>3</sup> from 2020 to 2021, which represents an increase of 4.5% and resumes the interrupted growth trend between 2019 and 2020, reaching the highest value of the series in the last year.

The division of natural gas production among regions in the world was: North America (28.1%), Commonwealth of Independent States (22.2%), Middle East (17.7%), Asia (16.6%), Africa (6.4%), Europe (5.2%) and South and Central America (3.8%). The United States, Russia and Iran,

Chart 4 - Production and consumption of natural gas in the world (billions of m<sup>3</sup>)



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

the United States, Russia and Iran, which together account for 46.9% of global production. Brazil is the 30th country with the highest production of the input in the world, with 24.3 billion m<sup>3</sup> of natural gas.

The consumption of natural gas in the world in 2021 was 4.0 trillion m<sup>3</sup>, an amount 5.0% higher than in the previous year.

The division of natural gas consumption among regions in the world was: North America (25.6%), Asia (22.7%), Commonwealth of Independent States (15.1%), Middle East (14.3%), Europe (14.1%), Africa (4.1%) and South and Central America (4.0%). The United States, Russia and China account for 41.6% of global natural gas consumption. Brazil is the 24th country with the highest consumption of the input in the world, with 40.4 billion m<sup>3</sup> of natural gas.



Division of natural gas production in the world:

North America	28.1%
CEI	22.2%
Oriente Médio	17.7%
Asia:	16.6%
Africa:	6.4%
Europe:	5.2%
South and Central America:	3.8%

Division of natural gas consumption in the world:

North America	25.6%
Asia	22.7%
CEI	15.1%
Middle East:	14.3%
Europe:	14.1%
África:	4.1%
South and Central America:	4.0%





11.9 billion

barrels of oil is Brazil's oil reserve in 2020, which puts the country in 16th position in the global ranking

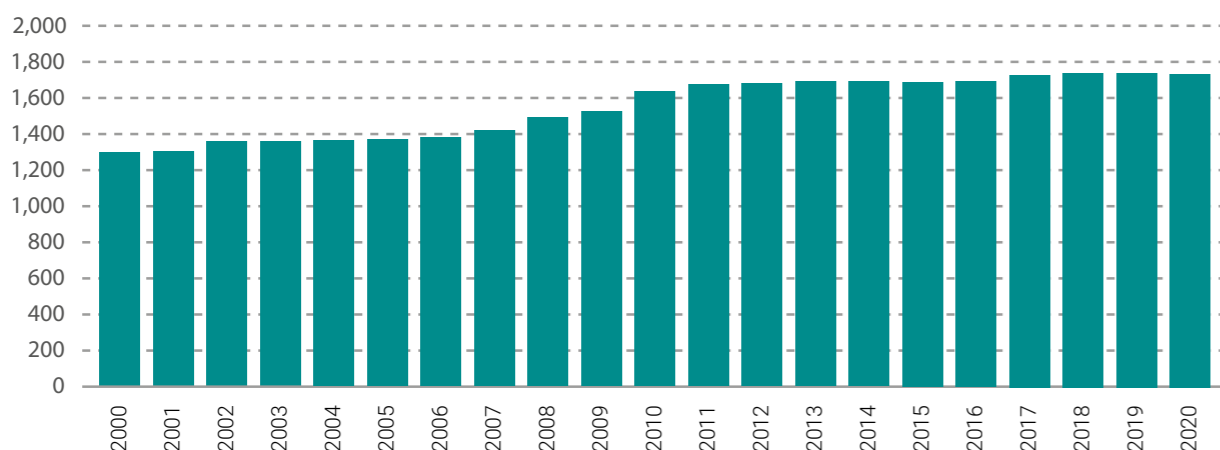
### 1.3. Global oil and natural gas reserve

With regard to global oil and natural gas reserves, it is worth mentioning that the available data did not receive updates for the year 2021, so the most recent elements refer to 2020.

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

stable compared to 2019, with a slight decrease of 0.1% (chart 5). 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.

Chart 5 - Proven world oil reserves (billions of barrels)



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

44.4%

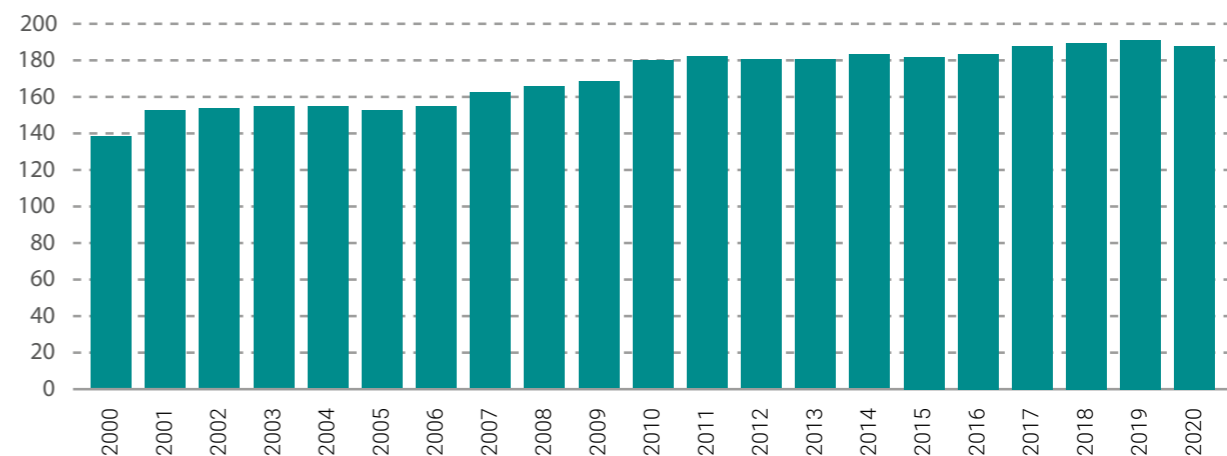
of the world's oil reserves are concentrated in Venezuela, Saudi Arabia and Canada

The division of oil reserves among the regions of 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 is the 16th country with the largest input reserve in the world, with 11.9 billion barrels of oil.

Regarding natural gas, in 2020 reserves reached 188.1 trillion m<sup>3</sup>, 1.2% lower than in the previous year. In absolute terms, the drop was 2.2 trillion m<sup>3</sup> of natural gas (chart 6). 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 Eu-

rope (1.7%). Russia, Iran and Qatar accounted for 50.1% of the world's total natural gas reserves. Brazil is the 33rd country with the largest reserve in the world, with 348.5 billion m<sup>3</sup> of natural gas.

Chart 6 - Natural gas reserves in the world (trillions of m<sup>3</sup>)



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



Division of oil reserves in the world

Middle East	48.3%
South and Central America	18.7%
North America	14.0%
CEI	8.4%
Africa	7.2%
Asia	2.6%
Europe	0.8%

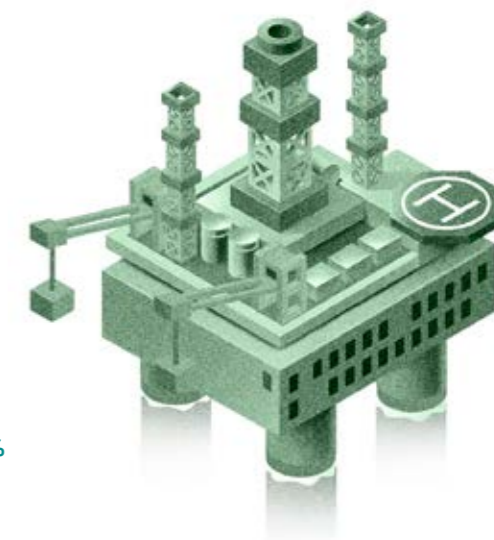


Division of natural gas reserves in the world

Middle East	40.3%
CEI	30.1%
Asia	8.8%
North America	8.1%
Africa	6.9%
Asia	2.6%
South and Central America	4.2%
Europe	1.7%

348.5 billion

m<sup>3</sup> is Brazil's natural gas reserve in 2020, which puts the country in 33rd position in the global ranking

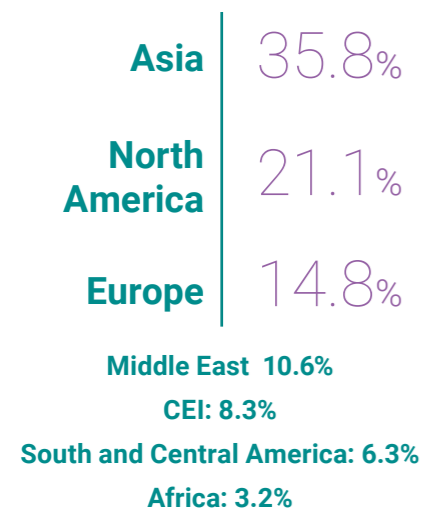






## 1.4. Global Oil Capacity and Refining

### Oil refining capacity in the world



The world's installed refining capacity was 101.9 million barrels per day in 2021. There was a reduction of 419,500 barrels per day, representing 0.41% less than in the previous year.

World oil refining was 79.2 million barrels per day in 2021. There was an increase of 3.6 million barrels refined per day refined in the world, 4.8% higher than in the previous year (chart 7).

The refining capacity among the regions in the world were: Asia (35.8%), North America (21.1%), Europe (14.8%), Middle East (10.6%), Commonwealth of Independent States (8.3%), South and Central

America (6.3%) and Africa (3.2%). The United States, China and Russia concentrate 41.0% of oil refining capacity worldwide. Brazil is 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 (37.3%), North America (22.1%), Europe (14.5%), Middle East (10.8%), Commonwealth of Independent States (8.5%), South and Central America (4.5%) and Africa (2.3%). The United States, China and Russia account for 44.6% of the world's oil refining. Brazil is the 9th country with the largest oil refining in the world, with 1.8 million barrels per day.

Chart 7 - Oil Capacity and Refining in the world (thousand barrels/day)



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

# OIL AND GAS INDUSTRY PAYS ATTENTION AND INVESTS IN ENERGY TRANSITION



**Roberto Ardenghy** | Chairperson of the Brazilian Institute of Oil and Gas (IBP)

**Fernanda Delgado** | Corporate Executive Director of the Brazilian Institute of Oil and Gas (IBP)

In a scenario where climate change is increasingly demanding solutions, the energy sector is moving in line with global efforts for a low-carbon economy. This is certainly one of the sectors that can contribute the most to achieving the goals of reducing greenhouse gas emissions. The energy transition is a path of no return, but it is a complex process and surrounded by challenges.

In view of this context, it is of great importance to highlight that the oil and natural gas sector, contrary to what is often suggested by common sense, can be configured as an important ally for the energy transition process. This is because the most current approaches to this process must cover not only the issue of decarbonization, but also aspects related to the security of energy supply and economic and social development.

Therefore, the contribution of the oil and natural gas sector to the energy transition process can take place from different perspectives, including technological development and technical expertise, the use of infrastructure, the financing capacity of projects focused on low carbon energies and also aspects related to energy security and economic and social development.

Energy security is an issue that has been gaining increasing importance due to the recent energy crisis caused by the conflict between Russia and Ukraine and its striking effects, especially for the European continent that has lived for months with fears related to energy supply during the winter. This issue also becomes especially sensitive in the midst of the quest

for decarbonization. The wind and solar photovoltaic source lead the energy transition process, but are subject to generation variability due to climatic conditions such as low incidence of solar rays or the absence of winds. Thus, the performance of the oil and natural gas sector remains necessary to guarantee the supply of energy to the population.

The importance of these sources is necessary even in the case of Brazil, which stands out for its energy matrix with a participation of more than 40% from renewable sources, with great emphasis on hydroelectric plants. In times of unfavorable weather conditions as observed in 2021 during the period of water scarcity, the activation of thermoelectric plants was fundamental to ensure that electricity reached the consuming units.

Another important contribution of the oil and natural gas sector concerns its developments in socioeconomic terms. According to the Brazilian Institute of Oil and Gas (IBP), the sector will attract another USD 180 billion, from 2022 to 2031 in Exploration & Production (E&P) activities. With this, it can generate a collection of more than USD 600 billion for governments, in addition to providing 400,000 more jobs on average per year. With more than 800 million barrels of proven oil reserves and about 20 billion m<sup>3</sup> of proven natural gas reserves, Espírito Santo also has the potential to enjoy the socioeconomic benefits associated with investments in oil and natural gas E&P activities.

From the point of view of decarbonization, the performance of the oil and gas sector can be decisive in



several aspects given its technical expertise, in addition to the ability to gather the necessary resources for the financing of projects focused on low carbon energies. The International Energy Agency (IEA) estimates that 50% of the emissions reductions needed to achieve net-zero emissions by 2050 will come from technologies that are still under development. Without the support of the oil and natural gas sector, these very important technologies for reducing emissions may not reach the level of maturity and supply structure necessary for their large-scale competitive adoption.

This shows that there is still a long way to go and the oil and gas sector has a lot to contribute to this trajectory. This industry also has the expertise and infrastructure needed to drive other activities. Several initiatives for investments in low-carbon technologies can be observed in oil and natural gas companies. In line with the Paris Agreement, these companies have committed to meeting carbon reduction targets. Data from Goldman Sachs Global Investment Research show, for example, that large companies in the sector allocated, on average, 15% of their 2021 budgets to low-carbon sources, while in 2019, this percentage was 4%.

A significant example of synergy between the oil and gas sector and renewable sources from the perspective of technological development is offshore wind energy. Knowledge of the type of environment, installations on floating bases and the adequacy of materials and techniques are some of the examples of synergies between these two sectors. The extensive expertise in the maritime environment held by the oil and natural gas sector can be configured as an important way to reduce expenses and take advantage of knowledge, especially with regard to the construction and operation of assets in this environment.

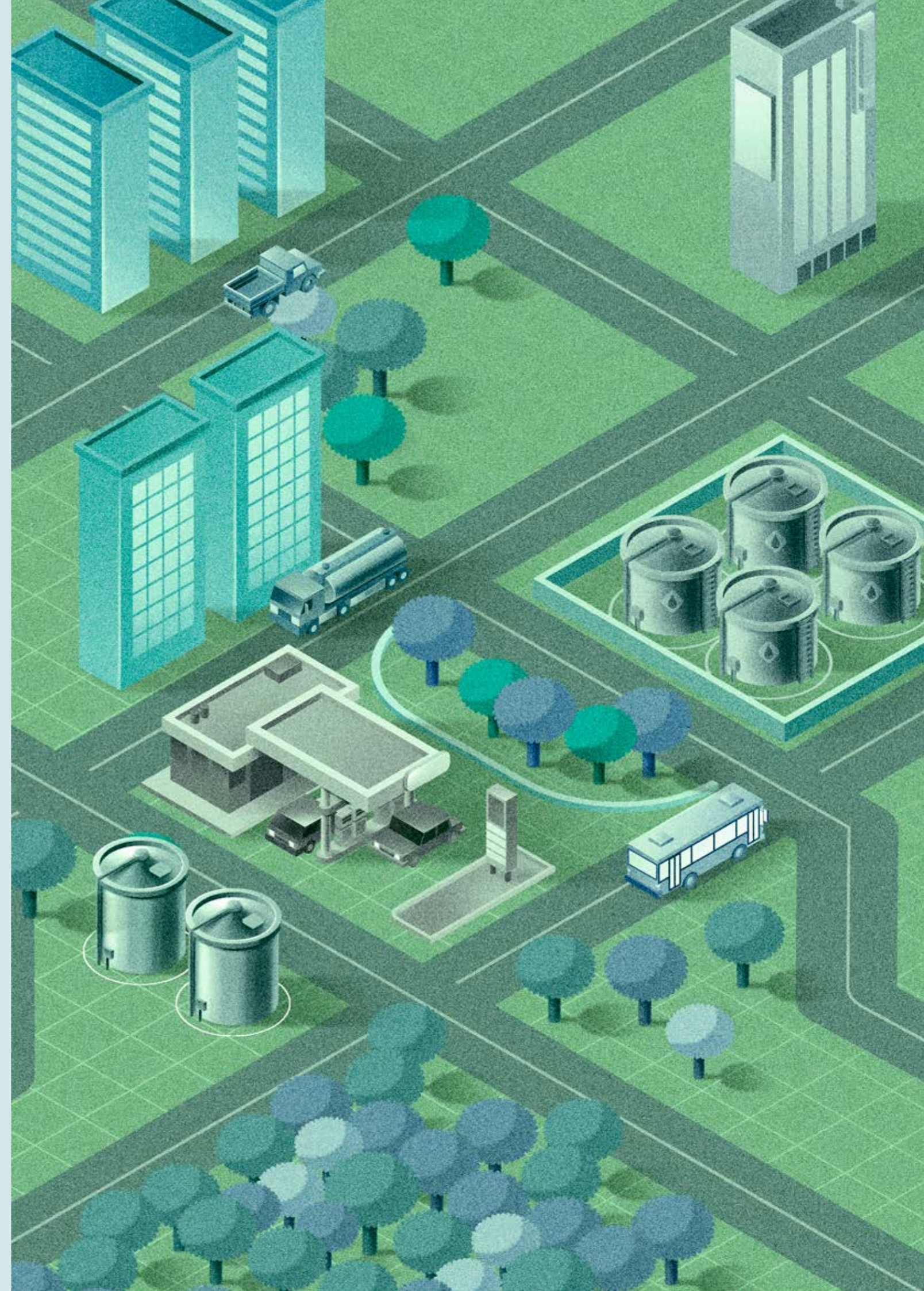
With 7,367 km of coastline and 3.5 million km<sup>2</sup> of maritime space, the country is able to be a promising agent in wind generation also in an offshore environment, contributing to the consolidation of its position as one of the leaders in energy transition. The Brazilian potential has already attracted

the attention of investors. Data from the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) indicate that there are about 177 GW in offshore wind projects with an open environmental licensing process in the agency, four projects located on the coast of Espírito Santo totaling more than 5 GW in the region.

Thus, Brazil is positioned as a strategic location for bringing together characteristics that place it in a privileged position in terms of energy transition, especially in aspects involving existing synergies with the O&G sector for decarbonization. The relatively clean energy matrix gives the country a differentiated profile of its emissions: while in most countries the energy sector is the largest responsible for emissions, in Brazil this role is in the agriculture and land use sector. In addition, the country is also notable for having an oil production with carbon intensity around 18 kg CO<sub>2</sub>eq per barrel, lower than some of the main players in the Middle East that reach carbon intensities of the order of 70 kgCO<sub>2</sub>eq per barrel.

These characteristics make it possible for Brazil to continue investing in the oil and natural gas sector and reap the rewards in socioeconomic terms without taking the country off the path of energy transition and decarbonization. In this way, the construction of a decarbonized future in the country goes through a path that should be paved with an important contribution from the oil and gas sector, especially with the use of the existing synergies between the sector and renewable sources.

This does not mean, however, that there is not much work to be done ahead nor any challenges. The oil and natural gas sector is aware of its role in the process of decarbonizing the economy and its commitments in the transition. Increasingly, it will be necessary to invest, innovate, research new technologies, improve methods and form partnerships and the sector has already been directing efforts to deliver a more resilient barrel of oil with lower CO<sub>2</sub> emission rates. This path has already begun to be trodden and the willingness of companies in the sector to seek a better future walks in the same direction as the desires of society.





## Chapter 2

EXPLORATION  
AND PRODUCTION  
OF OIL AND  
NATURAL GAS IN  
ESPÍRITO SANTO

The physical configuration of the exploration and production of oil and gas of the State of Espírito Santo, both on land and at sea, consists of 69 fields in the production phase and 4 fields in the development stage. In addition, the state has 34 exploratory blocks divided into two sedimentary basins: part of the Campos basin and the entire Espírito Santo basin. In the confrontation with the Campos basin, the state has 11 fields and 6 exploratory blocks. In the Espírito Santo basin there are 62 fields, 7 in the offshore part and 55 in the onshore part. Still in this last basin, there are 28 exploratory blocks, 10 in the offshore part and 18 in the onshore part.

In the state, 19 oil companies operate with fields in the production stage or in the production development stage. Among them, 7 foreign companies (CNOOC Petroleum Brasil, ExxonMobil Exploração Brasil, ONGC Campos, QP Brasil, Repsol Exploração Brasil, Seacrest and Shell Brasil Petróleo) and 12 national companies (3R Petroleum, BGM Petróleo e Gás, Capixaba Energia, IBV Brasil, Imetame, IPI, PRio, Petrobras, Petromais, Petrosynergy, Ubuntu Engenharia and Vipetro Petróleo).

Petrobras has the concession of the fields with the highest productivity in the state, such as the fields that make up Parque das Baleias.

2.1. Drilling activity  
in Espírito Santo

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 the beginning of drilling activity in 1959, Espírito Santo has already recorded a total of 2,341 wells

drilled, divided between onshore (75.7%) and offshore (24.3%). Between 2002 and 2022, 642 onshore wells were drilled, with emphasis on the fields of Fazenda Alegre, Inhambu Jacutinga and Cancã. With the exception of the Jacutinga field, these areas make up the land fields with the highest production in the state. In 2021, 7 wells were drilled on land, 5 wells drilled by BGM in the Suindara field and in block ES-T-496, and 2 wells were drilled by Imetame in block EST-441 and in the Rio Ipiranga field. In 2022, the oil company BGM drilled 1 well, in block ES-T-496 and 2 wells in block ES-T-506.



2,341  
wells have been drilled in  
Espírito Santo since 1959

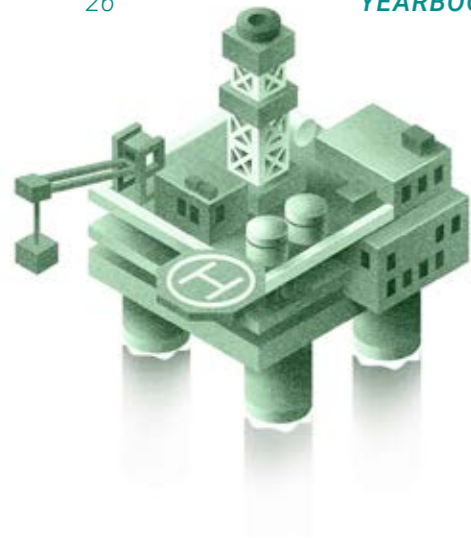


642  
onshore wells were drilled  
in Espírito Santo between  
2002 and 2022



424  
offshore wells were drilled in  
Espírito Santo between 2002  
and 2022

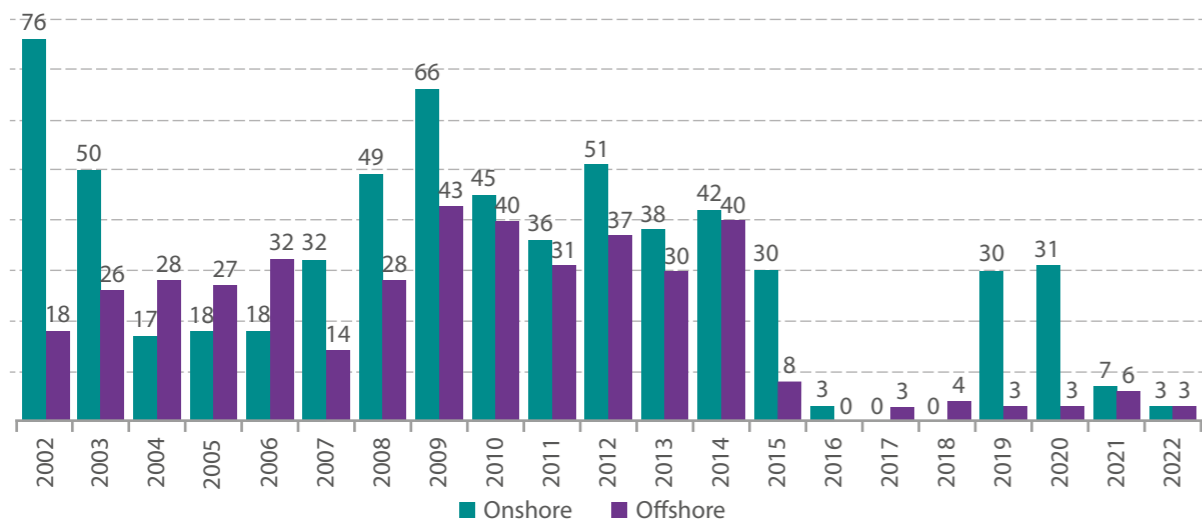




The offshore drilling activity recorded, between 2002 and 2022, a total of 424 drilled wells, with emphasis on the Jubarte, Golfinho, Bloco BC-60 and Argonauta fields. In 2021, 6 wells were drilled at sea, 4 wells in Jubarte, 1 well in block ES-M-669 and 1 well in the Argonauta field. In

2022 Petrobras drilled 3 offshore wells: 1 well in the Jubarte field and 2 wells in block ES-M-596, belonging to the oil company's campaign for the Andurá and Joelho prospects. In 2023, the most recent period, Petrobras drilled 1 well in the Jubarte field.

Chart 8 - Wells drilled in Espírito Santo (in units)



Source: ANP | Elaboration: Industry Observatory/Findes



## 2.2. Hydrocarbon declarations

184 onshore hydrocarbon indicia statements

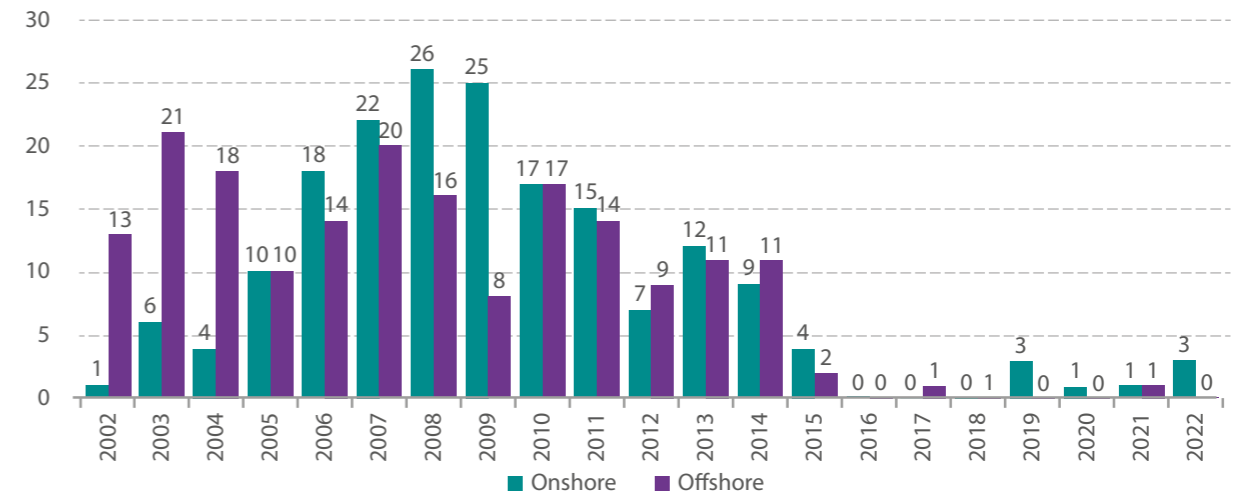
186 onshore hydrocarbon indicia statements

This was the amount of statements issued in Espírito Santo between 2002 and 2022

If the drilling of the wells is successful in discovering any reservoir, the oil company is obliged to issue the hydrocarbon declaration with the ANP, indicating the occurrence of hydrocarbons or any other natural resources in the explored area. Since 1998, when the hydrocarbon declaration became mandatory, 447 declarations were

issued in Espírito Santo, divided between onshore (50.6%) and offshore (49.4%). Between 2002 and 2022, 184 declarations were issued on land, highlighting the Cançã, Jacutinga and Tucano fields. At sea, in the same period, 186 hydrocarbon declarations were issued, highlighting the Golfinho, Jubarte and Argonauta fields.

Chart 9 - Statements of hydrocarbon evidence in Espírito Santo (in units)



Source: ANP | Elaboration: Industry Observatory/Findes

In 2021, 2 hydrocarbon declarations were issued in Espírito Santo. Imetame announced the existence of onshore oil in block ES-T-441, located in the municipality of Jaguaré<sup>3</sup>. Petrobras announced the existence of offshore natural gas in block ES-M-669. This block is part of Petrobras and Equinor's campaign to reach

the pre-salt layer in the Espírito Santo basin<sup>4</sup>. In 2022, the most recent period, BGM found evidence of onshore oil in blocks ES-T-496, ES-T-506 and in the Irara field, all areas located in the municipality of Linhares. In 2023, the most recent period, BGM found evidence of onshore oil in block ES-T-506.



2021

**Imetame** announced the existence of oil in block ES-T-441 (municipality of Jaguaré)

**Petrobras** announced the existence of natural gas in block ES-M-669

2022

**BGM** announced the existence of oil in blocks ES-T-496 and EST-506 and in the Irara field

2023

**BGM** announced the existence of oil in block ES-T-506

## 2.3. Declarations of commerciality

The declarations of commerciality are made after the notification of hydrocarbon indications. At this stage, the oil company verifies the commercial viability for the production of the deposits. If so, the oper-

ating company must issue the declaration of commerciality with the ANP, demonstrating the intention to produce oil and/or natural gas in the demarcated area.

3. This block was auctioned in the 14th round of the ANP, held in 2017.

4. The project, entitled "Monai Prospectus" will be fundamental for them to evaluate the exploitation of other concessions acquired in the 11th round of the ANP.





20 offshore statements of commerciality  
38 onshore statements of commerciality

This was the number of statements issued in Espírito Santo since 1999

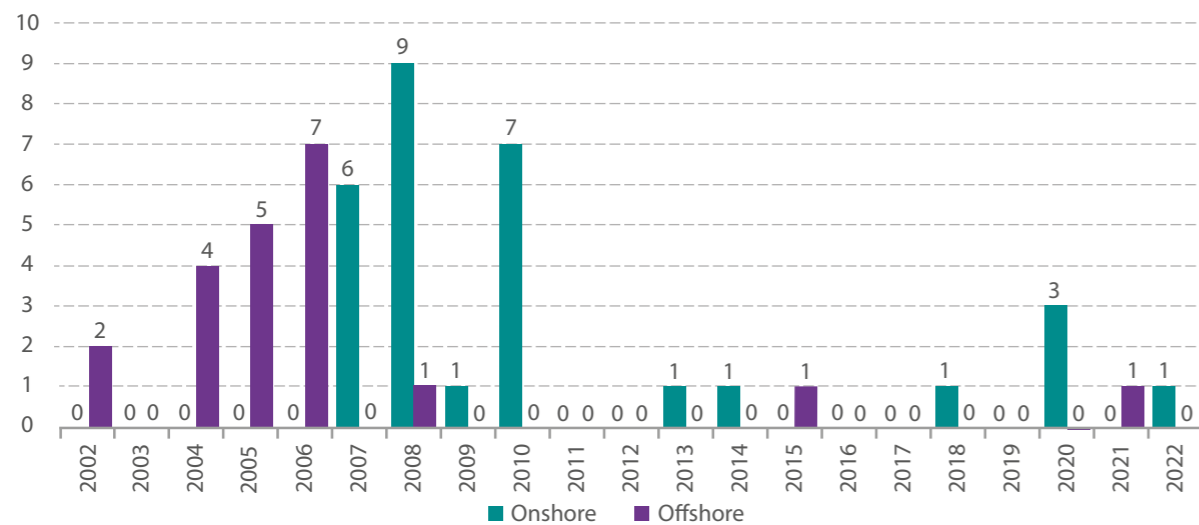
Since 1999, 58 declarations of commerciality have been issued in Espírito Santo, divided between onshore (65.5%) and offshore (34.5%). In 2020, 3 declarations of commerciality were issued in an onshore environment, in the Suindara, Rio Mariricu and Garça Branca fields. The oil companies responsible for issuing these fields were, respectively, BGM, Petrobras and Petromais. In 2022, BGM issued the declaration of commerciality for the Irara field.

PRio issued the declaration of commerciality for the Wahoo field. The Wahoo field is located in the pre-salt, in the capixaba part of the Campos Basin. Since 2008, Espírito Santo has not registered a declaration of commerciality at sea. The latter was issued at the request of Petrobras for the Camarupim Norte field.

The low number of emissions from declarations of commerciality in Espírito Santo signals a low number of new oil and natural gas exploration and production projects in the state.

In an offshore environment, in 2021

Chart 10 - Statements of commerciality in Espírito Santo (in units)



Source: ANP | Elaboration: Industry Observatory/Findes



2020

BGM stated commerciality in the onshore field of Suindara

Petrobras stated commerciality in the onshore field of Rio Mariricu

Petromais stated commerciality in the onshore field of Garça Branca

2021

PRio stated commerciality in Wahoo offshore field

2023

BGM announced the existence of oil in block ES-T-506

## 2.4. Oil and natural gas reserves

In the transition from 2020 to 2021, Brazilian oil reserves recorded an increase of 20.3%, reaching 24.3 billion barrels of oil in 2021. This increase in reserves came mainly from the increase in offshore reserves in Rio de Janeiro and Espírito Santo. In Espírito Santo, in the same period, there was an increase of 7.1% in oil reserves, reaching a reserve of 1.4 billion barrels of oil in 2021. With this increase, Espírito Santo maintains the third position of state with the largest total oil reserves, behind São Paulo (2.1 billion barrels of oil) and Rio de Janeiro (20.1 billion barrels of oil).

Regarding natural gas, the transition from 2020 to 2021 registered an increase of 24.5% in Brazilian reserves, reaching a reserve of 562.6 billion m<sup>3</sup>. This increase in reserves came mainly from the increase in onshore reserves in Maranhão and the increase in offshore reserves in Rio de Janeiro and Espírito Santo. In Espírito Santo, in the same period, there was an 18.2% increase in reserves, reaching a natural gas reserve of 36.2 billion m<sup>3</sup> in 2021. With this increase, Espírito Santo ranks third among the states with the largest total natural gas reserves, behind Amazonas (45.3 billion m<sup>3</sup>) and Rio de Janeiro (388.1 billion m<sup>3</sup>).



1.4 billion

barrels of oil is the input reserve in Espírito Santo in 2021, which puts the state in the 3rd position in the national ranking



36.2 billion

m<sup>3</sup> of natural gas is the input reserve in Espírito Santo, which puts the state in the 3rd position in the national ranking

### 2.4.1. Offshore reserves in Espírito Santo

In 2021, Espírito Santo's offshore oil reserves recorded an increase of 10.1% compared to the previous year, reaching 1.36 billion barrels of oil (chart 11). With this increase, the state registered the first increase in offshore oil reserves in ten years and remained as the third state with the largest volume of offshore oil reserves, behind São Paulo (2.1 billion barrels of oil) and Rio de Janeiro (20.1 billion barrels of oil).

Regarding offshore natural gas, in 2021, Espírito Santo reached 35.9 billion m<sup>3</sup> of reserves, an increase of 18.5% compared to the previous year (chart 12). With this increase, the state returned to second place among the states with the largest reserves of offshore natural gas, behind Rio de Janeiro (388.1 billion m<sup>3</sup>).



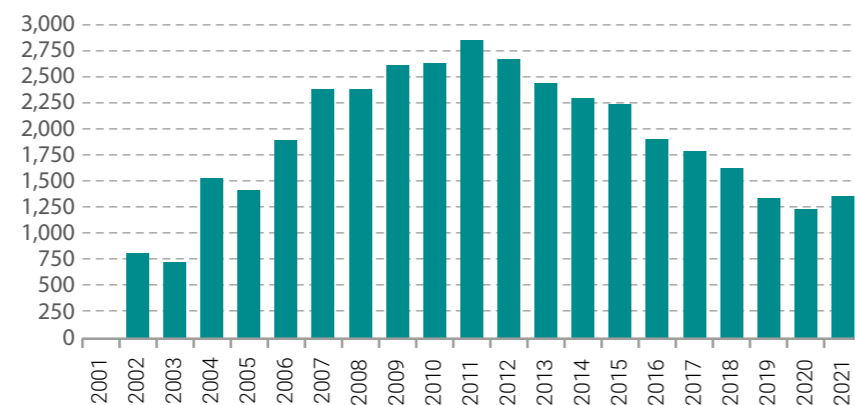


1.36 billion barrels of oil is the **offshore reserve** of the input in Espírito Santo in 2021

35.9 billion m<sup>3</sup> of natural gas is the **offshore reserve** of the input in Espírito Santo

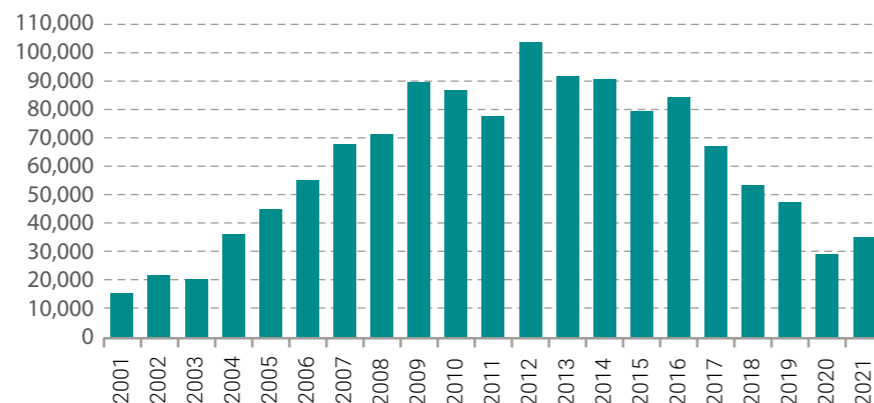
The indicator that evaluates the useful life of the reserves that will sustain production over time<sup>5</sup> demonstrated that, currently, Espírito Santo has a useful life of offshore oil reserves of 18 years, below the Brazilian indicator that registered 23 years. In relation to natural gas, the indicator showed that the capixaba reserves have a useful life of 18 years, higher than the national indicator, which recorded 11 years

Chart 11 - Offshore oil reserves in Espírito Santo (in millions of barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 12 - Offshore natural gas reserves in Espírito Santo (million m<sup>3</sup>)



Source: ANP | Elaboration: Industry Observatory/Findes

### 2.4.2. Onshore reserves in Espírito Santo

Regarding onshore environment, in 2021, oil reserves in Espírito Santo registered a decrease of 8.5%, compared to the previous year, reaching 49.3 million barrels of oil (chart 13). With this drop, the state lost a position among the states with the highest volumes of onshore oil reserves, ranking fifth, behind Amazonas (52.4 million barrels), Rio Grande do Norte (184.5 million barrels), Sergipe (201.4 million barrels) and Bahia (206.0 million barrels).

Onshore natural gas reserves in Espírito Santo fell 10.9% in 2021 compared to the previous year and reached a reserve of 342.2 million m<sup>3</sup>, raising the eighth position among the largest states with the resource in an onshore environment. Among the states

with the largest onshore natural gas reserves are: Amazonas (47.3 billion m<sup>3</sup>), Maranhão (35.4 billion m<sup>3</sup>), Bahia (9.9 billion m<sup>3</sup>), Rio Grande do Norte (2.6 billion m<sup>3</sup>), Alagoas (2.3 billion m<sup>3</sup>), Sergipe (416.4 million m<sup>3</sup>), Paraná (400.0 million m<sup>3</sup>) and Espírito Santo (342.2 million m<sup>3</sup>).

The indicator that evaluates the useful life of the reserves that will sustain production over time demonstrated that, currently, Espírito Santo has a useful life of onshore oil reserves of 17 years, below the Brazilian indicator that registered 22 years. In addition, the indicator for natural gas showed that the capixaba reserves have a useful life of 13 years, higher than the national indicator, which recorded 12 years.



49.3 million barrels of oil is the **onshore reserve** of the input in Espírito Santo in 2021

342.2 million m<sup>3</sup> of natural gas is the **onshore reserve** of the input in Espírito Santo

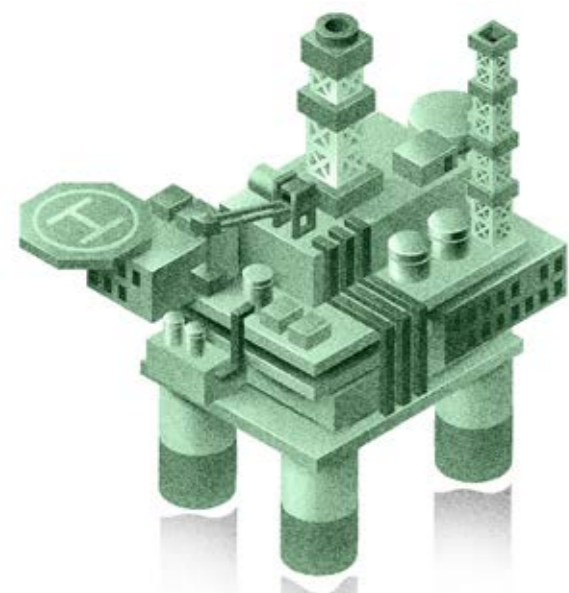
Chart 13 - Onshore oil reserves in Espírito Santo (in millions of barrels)



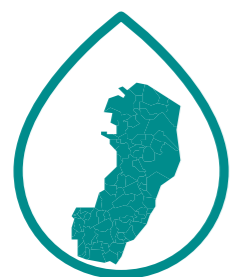
Source: ANP | Elaboration: Industry Observatory/Findes

5. The indicator is calculated through the relationship between the reserve and the production of oil and natural gas. The higher the indicator, the greater the time available for the production of inputs.

6. The indicator is calculated through the relationship between the reserve and the production of oil and natural gas. The higher the indicator, the greater the time available for the production of inputs.







34.6%

was the drop in **oil production** in Espírito Santo in 2022 when compared to 2021

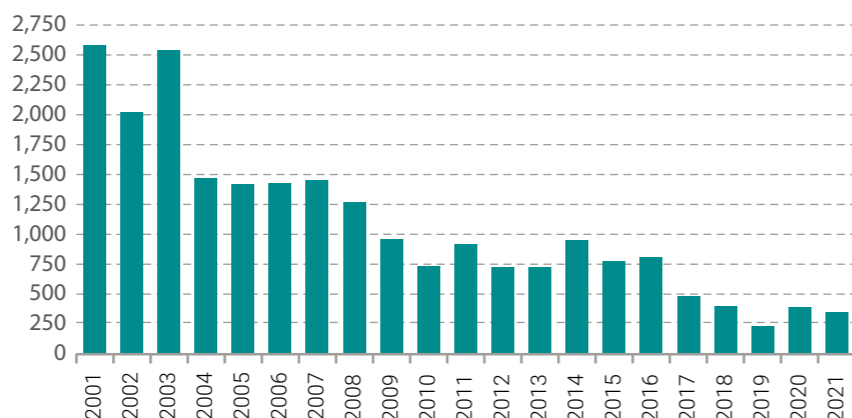


37.6%

was the drop in **natural gas production** in Espírito Santo in 2022 when compared to 2021



Chart 14 - Onshore natural gas reserves in Espírito Santo (million m<sup>3</sup>)



Source: ANP | Elaboration: Industry Observatory/Findes

## 2.5. Total oil and natural gas production

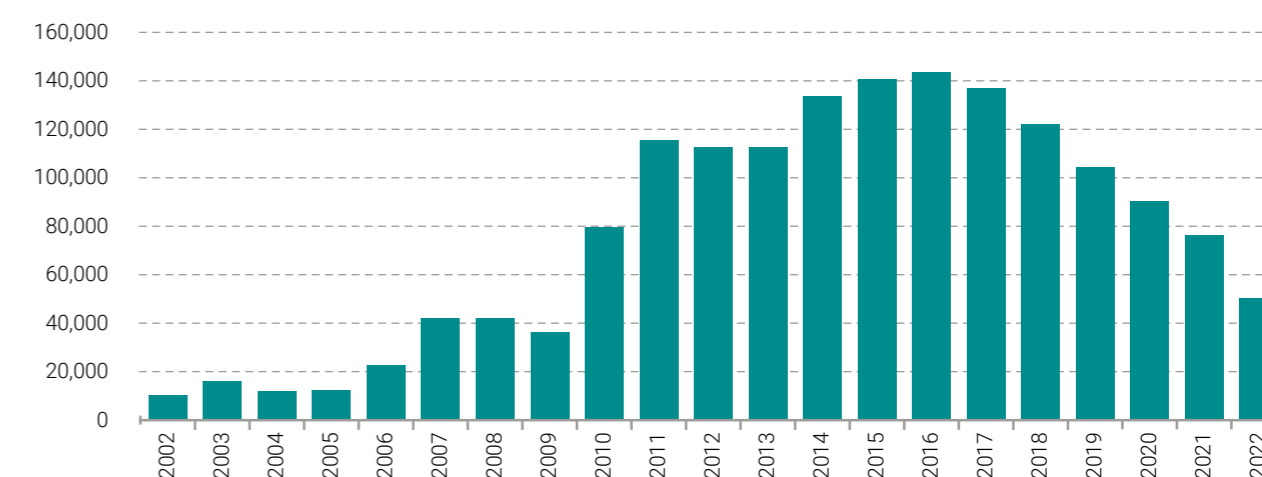
In 2022, Brazilian oil production reached 1.1 billion barrels, 4.0% higher than in 2021. Espírito Santo produced, in 2022, a total of 50.3 million barrels of oil, 34.6% lower than what was recorded in the previous year (chart 15). The state remained in the third position with the highest oil production among all federal units, behind São Paulo (93.5 million barrels) and Rio de Janeiro (93.2.4 million barrels). Between 2011 and 2018, the state remained the second largest producer of the input, losing in 2019 to the state of São Paulo.

Regarding natural gas, in 2022 Brazilian production was 50.3 billion m<sup>3</sup>, 3.1% higher than in 2021. In Espírito Santo, 1.25 billion m<sup>3</sup> were produced, 37.6% lower than

in the previous year (chart 16). The state is in the fifth position among the states with the highest input production, behind Bahia (1.8 billion m<sup>3</sup>), Amazonas (5.1 billion m<sup>3</sup>), São Paulo (5.9 billion m<sup>3</sup>) and Rio de Janeiro (34.8 billion m<sup>3</sup>).

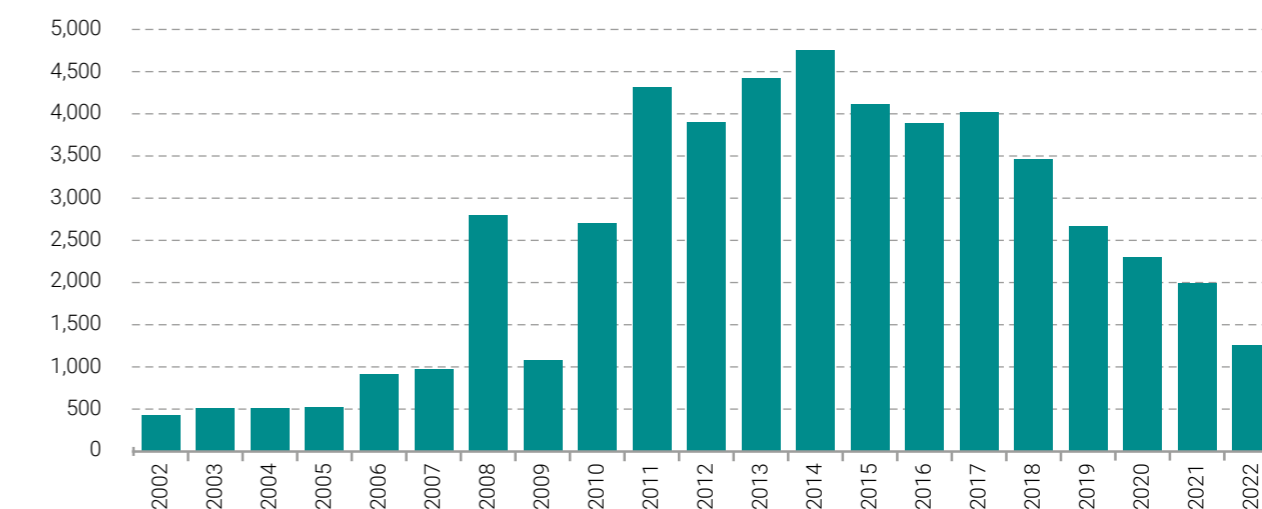
**The explanation for the sharp drop in oil and natural gas production in Espírito Santo in 2022 is due to three factors. The first is related to the operational problems faced by the FPSO Cidade de Anchieta. The second is related to the decommissioning of the FPSO Capixaba and finally, the third and last explanatory factor is the accelerated natural decline of the production of the fields under production in the state.**

Chart 15 - Total oil production in Espírito Santo (thousand barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 16 - Total natural gas production in Espírito Santo (million m<sup>3</sup>)



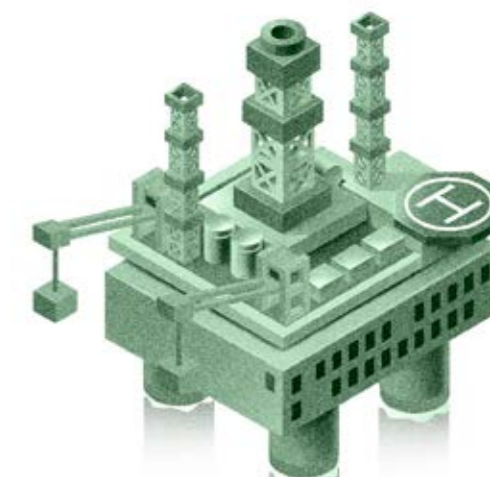
Source: ANP | Elaboration: Industry Observatory/Findes

### 2.5.1. Offshore oil and natural gas production

In 2022, offshore oil production in Espírito Santo was 47.7 million barrels of oil, 35.5% lower than in the previous year. Regarding natural gas, in 2022, capixaba production was 1.22 billion m<sup>3</sup>, 37.9% lower than in the previous year. With these falls, the state is approaching the level produced

in the years leading up to the production of oil and natural gas from the pre-salt layer in capixaba water.

The drop can be explained mainly by the production performance in the pre-salt layer wells, which, in 2022, fell by 51.2% and 47.3% for







47.7 million

barrels of oil was the offshore production of the input in Espírito Santo in 2022

1.22 billion

m<sup>3</sup> of natural gas was the offshore production of the input in Espírito Santo in 2022

oil and natural gas production, respectively. In 2022, oil production in the capixaba pre-salt was 18.4 million barrels of oil and natural gas production was 706.8 million m<sup>3</sup>. Production in the pre-salt layer accounts for 38.7% and 57.8% of offshore oil and natural gas production in Espírito Santo, respectively.

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 Baleias<sup>7</sup> and Parque das Conchas<sup>8</sup>, while the third is located in the producing fields of the Espírito Santo Basin<sup>9</sup>.

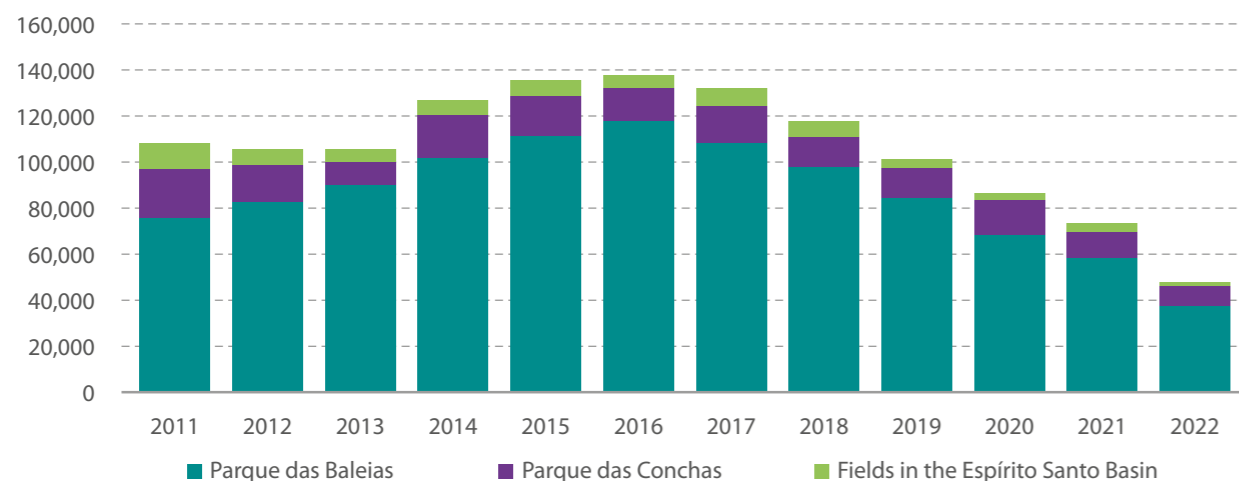
In the transition from 2021 to 2022, Parque das Baleias recorded a 35.9% and 40.7% drop in oil and natural gas production, respectively. The area produced 37.7 million barrels of oil (chart

17) and 921.9 million m<sup>3</sup> of natural gas (chart 18), being responsible for producing 79.1% of the oil and 75.3% of the offshore natural gas of Espírito Santo.

Parque das Conchas recorded, in the transition from 2021 to 2022, a drop of 23.6% and 23.2% in oil and natural gas production, respectively. The park produced 8.6 million barrels of oil (chart 17) and 82.4 million m<sup>3</sup> of natural gas (chart 18), being responsible for producing 18.0% of the oil and 6.7% of the offshore natural gas of Espírito Santo.

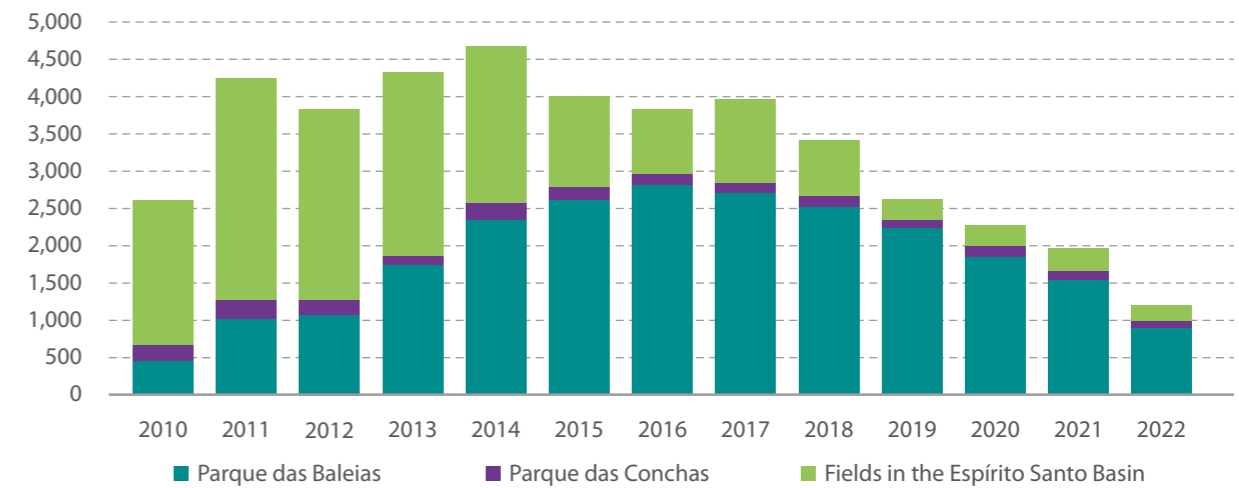
Finally, the producing fields of the Espírito Santo Basin registered a drop in production of 64.4% for oil and 29.2% for natural gas in the transition from 2021 to 2022, reaching a production of 1.3 million barrels of oil (chart 17) and 219.6 million m<sup>3</sup> of natural gas (chart 18).

Chart 17 Offshore oil production in Espírito Santo by location (thousand barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 18 - Offshore natural gas production in Espírito Santo by location (million m<sup>3</sup>)



Source: ANP | Elaboration: Industry Observatory/Findes

### 2.5.2. Onshore oil and natural gas production

Onshore oil production in Espírito Santo in 2022 was 2.6 million barrels of oil, 12.9% lower than in the previous year (chart 19). Onshore natural gas production in Espírito Santo, in 2022, was 21.9 million m<sup>3</sup>, 16.1% lower than in the previous year (chart 20). The state has reached the lowest level of onshore oil production in twenty years.

Regarding the division by location, 95.6% of onshore oil production in Espírito Santo is concentrated in ten producing fields: Fazenda Alegre (49.9%), Cancã (16.2%), Fazenda São

Rafael (7.2%), Inhambu (6.6%), and Fazenda Santa Luzia (5.7%), Fazenda São Jorge (3.8%), Lagoa Parda (3.4%), Fazenda Queimadas (1.2%), Suindara (0.9%) and São Mateus (0.9%). It is worth highlighting the good performance in the production of the Lagoa Parda and Suindara fields. These areas had low production and in 2021, they recorded a production of 27.8 and 102.5 thousand barrels of oil, respectively. The Suindara field is operated by oil company BGM Petróleo e Gás Natural and the Lagoa Parda field is operated by Capixaba Energia.



2.6 million

barrels of oil was the onshore production of the input in Espírito Santo in 2022

21.9 million

m<sup>3</sup> of natural gas was the onshore production of the input in Espírito Santo in 2022

7. In 2019, 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 exten-

sion for another 27 years for the production phase.

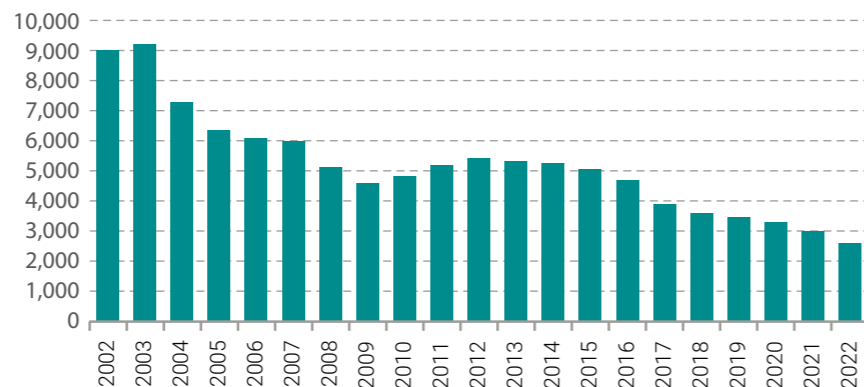
8. Composed of the fields of Abalone, Argonauta and Ostra.

9. Composed of the fields of Caçã, Camarupim, Camarupim Norte, Canapu, Cangoá, Golfinho and Peroá.



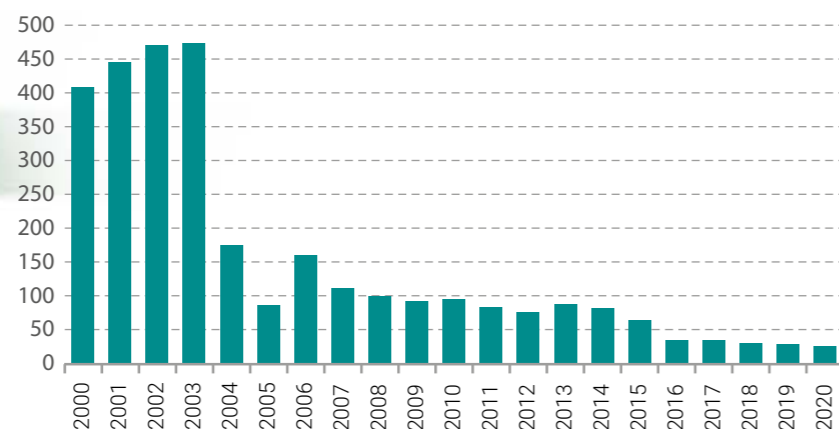
Onshore natural gas production in Espírito Santo is concentrated in ten producing fields, which together account for 96.4% of total production. The fields are: Fazenda Alegre (35.9%), Fazenda Santa Luzia (16.9%), Fazenda São Rafael (16.5%), Rio São Mateus (11.1%), Lagoa Parda (5.8%), Cancã (3.7%), Fazenda São Jorge (2.1%), Inhambu (1.9%), Cacimbas (1.8%) and Fazenda Queimadas (0.9%).

Chart 19 - Onshore oil production in Espírito Santo (thousand barrels)



Source: ANP | Elaboration: Industry Observatory/Findes

Chart 20 - Onshore natural gas production in Espírito Santo (million m³)



Source: ANP | Elaboration: Industry Observatory/Findes

## ESPÍRITO SANTO, PROTAGONISM IN DIVERSIFIED PRODUCTION OF OIL & GAS FROM ONSHORE TO PRE-SALT



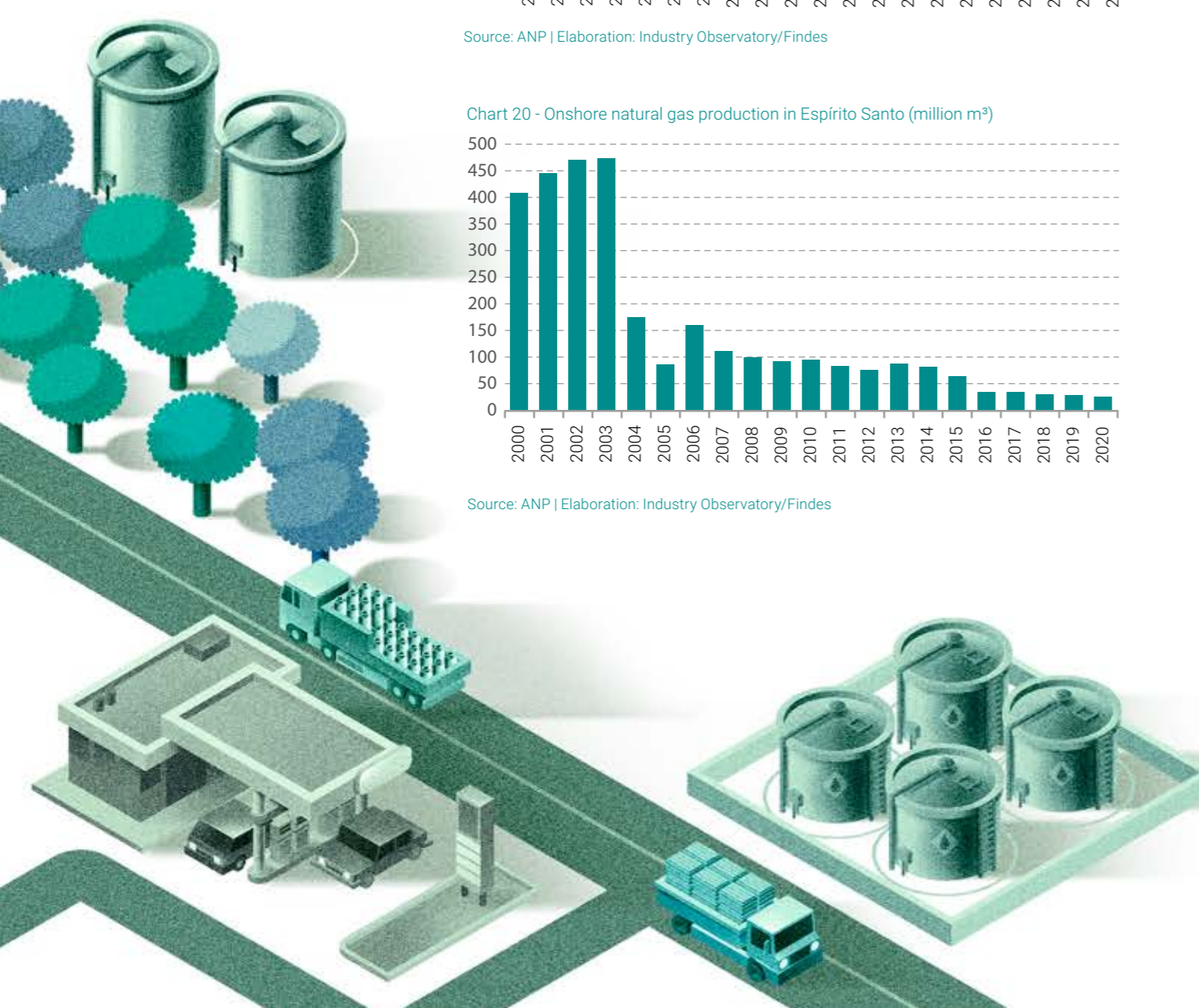
**Márcio Felix** - CEO of EnP Energy

Two phases mark the evolution of oil and natural gas reserves in Espírito Santo. The first phase, in the second half of the twentieth century, started in 1957, was characterized by a concentration in onshore activities in the north region of the state. In this same phase, Espírito Santo always with the vocation, but with the milestone of the beginning of maritime exploration in Brazil in 1968, through well 1-ESS-1 (Espírito Santo Submarino), on the coast of the municipality of São Mateus. The state was not a discoverer of oil or gas, but it found a gigantic salt dome, bringing the first clues to look for hydrocarbons below the salt layer. The second phase is marked by the discovery of significant volumes of oil and gas in deep waters, including the pre-salt layer. According to data from the National Agency of Petroleum, Natural Gas and Biofuels - ANP presented in this chapter, in 2001, Espírito Santo had 1.4% and 5.7% of oil and natural gas reserves in its territory and area of maritime influence, respectively.

After a sequence of relevant discoveries of hydrocarbons on the coast of Espírito Santo, from the 2000s, the state became part of the group of the three largest producers of O&G in Brazil, together with the states of Rio de Janeiro and São Paulo, be-

ing the first to produce in the pre-salt through well 1-ESS-103A, in the Jubarte field, in September 2008. In 2009, it achieved a share in national reserves of 12.8% for oil and 15.1% for natural gas.

The increase in proven reserves and the consequent projects for the development of its production, mostly headed by Petrobras, have led to the emergence of important infrastructure investments and production flow, marking a golden phase for the sector and for the economic development of the state. If, in 2001, the state's participation in the national production of oil and natural gas represented 1.5% and 2.8%, respectively, occupying the seventh position among the producing states in both inputs, in 2006 it became the second national producer. In 2014, the state continued to occupy the second





position among the largest producers of both inputs, reaching 16.3% of national oil production and 14.9% of national natural gas production.

After this period, with the growth of pre-salt production on the coast of São Paulo and some decline in the capixaba production, the state became the third largest national oil producer, very relevant position and far ahead of the fourth place. In 2021, for example, despite this decline, the state delivered a very significant contribution to national production, of 7.3% for oil and 4.1% for natural gas. Part of the explanations for the drop in oil and gas production in Espírito Santo can be justified by a hiatus of new discoveries and the implementation of large production projects.

**In the period 2011 to 2021, even in a scenario of production reduction, we had two great results. The giant Jubarte field continued with increasing production, which had already happened in the previous decade. For the onshore environment, the main highlight was the growth of production from the Cancã field, in the municipality of Linhares, northern region of the state.**

However, the expectation is that production in the state will grow again as early as 2023, both on land and at sea. The basis for this statement lies in promising and recent events in the sector, such as the implementation of at least one large maritime project and better operational performance, such as mature areas such as Parque das Conchas, operated by Shell, and several land fields. In summary, the state has attracted the attention of new and traditional oil companies that are projecting their operations in Espírito Santo, including exploratory activities (acquisition of seismic data and drilling of pioneer wells) aiming for new discoveries, such as CNOOC, ExxonMobil and Repsol, in addition to

Petrobras itself. These new projects have not yet started the production of inputs and therefore do not yet appear as important vectors of oil and natural gas production. In addition to the implementation of the Integrated Project of Parque das Baleias (100% Petrobras), offshore production begins to gain new momentum with the arrival of operators such as PRIO (Itaipu and Wahoo discoveries), BW Energy (Golfinho Center) and 3R Petroleum (Peroá Center). In addition to these, the consolidation of Seacrest's projects at Cricaré and Norte Capixaba Centers is expected, the latter being acquired by Petrobras. Also, from the onshore exploration and production assets of Imetame Energia, Energy Paranã, BGM, ES Óleo & Gás and Capixaba Energia, among other companies with Espírito Santo DNA and from other regions of the country, such as Origem, for example.

The expectation is that with a greater diversity of players and environments, the production of oil and gas in the state rises in a sustainable way, keeping Espírito Santo in the group of the 3 largest producing states in Brazil. With this, there will be a greater generation of income and employment for capixabas, contributing to a new phase of development for Espírito Santo.

## 2.6. Production projection

For the projection of oil and natural gas production in Espírito Santo, the use of accounting rules to capture the production trend focused on the regional supply of the input was adopted as a methodology. The values were projected until the year 2027, considering a detailed analysis of the profile of the supply of hydrocarbons, related to the exploration and production phases of each field, operator and platform. The calculations were performed using algebraic formulas that reproduced the means and historical patterns of

production in each producing well in Espírito Santo.

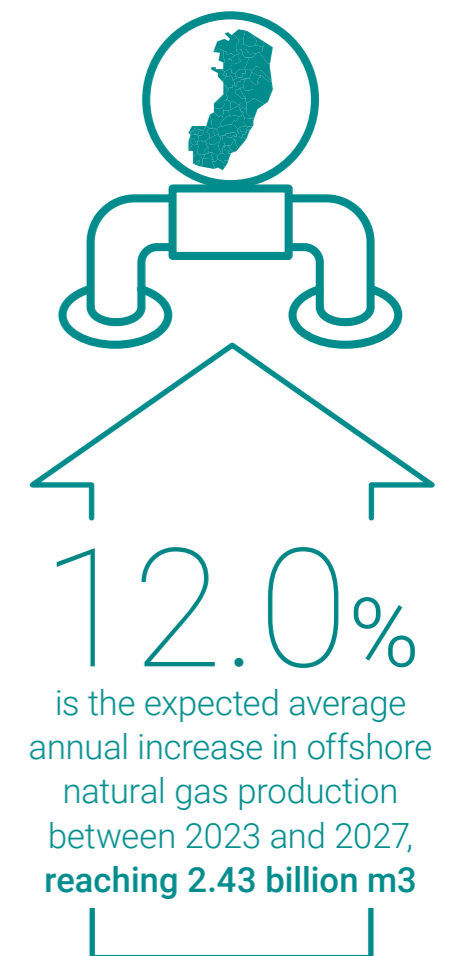
It is expected that between 2023 and 2027 total oil production will have an average annual increase of 10.3%, reaching in 2027 a production of 90.0 million barrels of oil. For natural gas, an average annual increase of 11.9% is projected between 2023 and 2027, reaching a production of 2.43 billion m<sup>3</sup> in 2027. The reversal of the downward trend in production is expected in the transition from 2024 to 2025, both for oil and natural gas.



### 2.6.1. Projection of offshore production in Espírito Santo

Offshore production accounts for a majority share of the total volume produced of oil and natural gas 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. Between 2023 and 2027, offshore oil production is expected to record an average annual increase of 10.7%, reaching an output of 87.8 million barrels in 2027. For natural gas, an average annual increase of 12.0% is projected, between 2023 and 2027, reaching a production of 2.41 billion m<sup>3</sup>, in 2027.

Charts 21 and 22 show the recent evolution and projection of production at sea until 2027. The decrease in the production of inputs between 2017 and 2022 can be explained by the natural decay of the producing fields at sea, with emphasis on the sharp falls in Parque das Baleias and Parque das Conchas. In addition, during the period there was a low number of new offshore projects in the state and the consequent concentration of future production in projects that were developed in the past.





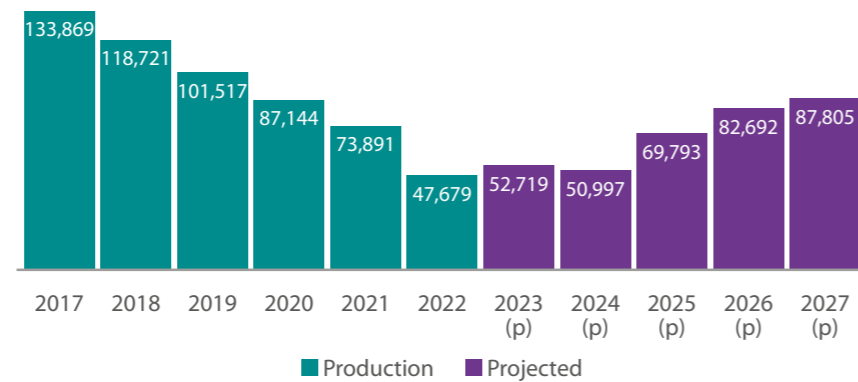


For 2023, a small recovery in offshore production is expected due to overcoming operational problems that affected the production performance of the previous year, such as the leak in the hull of FPSO Cidade de Anchieta and the decommissioning of FPSO Capixaba. For 2024, a drop in offshore production is projected due to the continuation of the natural decline in production.

A significant change is expected in 2024 and 2025, when Petrobras intends to put into operation a new platform in Parque das Baleias (FPSO Maria Quitéria) and

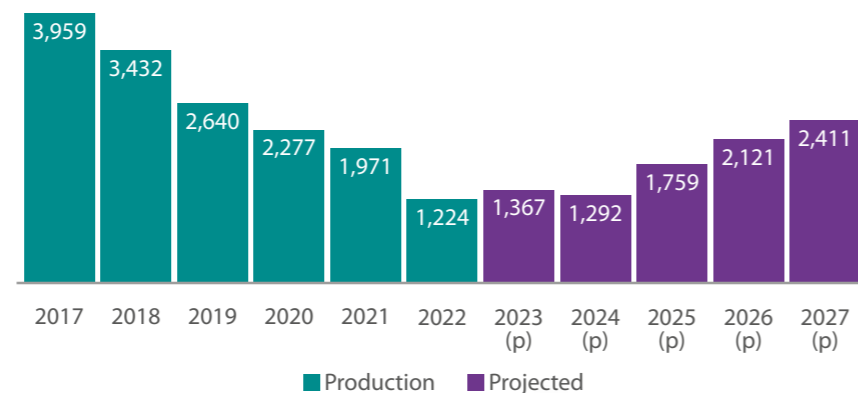
PetroRio (PRio) plans to start the extraction in the Wahoo field. The Petrobras project intends to increase the oil and gas recovery factor through the optimization of the current drainage network, with the interconnection of a new FPSO. The intention is that the new platform will be operating in the last quarter of 2024. PRio intends to drill 4 producing wells and 2 injectors, with 1st oil expected for the 1st half of 2024. These projects are responsible for the reversal curve of the projected falls for the production of oil and natural gas in Espírito Santo.

Chart 21 - Projection of offshore oil production in Espírito Santo (thousand barrels)

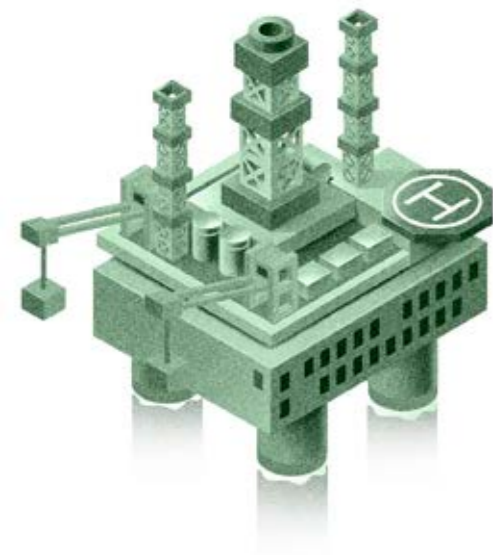
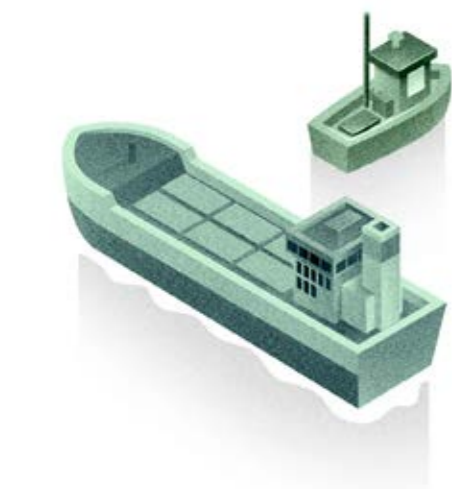


Elaboration: Industry Observatory/Findes and LCA.

Chart 22 Projection of offshore natural gas production in Espírito Santo (in millions of m³)



Elaboration: Industry Observatory/Findes and LCA.



### 2.6.2. Projection of onshore production in Espírito Santo

Onshore production accounts for a minority share of the volume of oil and natural gas produced. The evolution of production on land does not significantly affect the total produced by the state. However, this activity is important in the regional socio-economic development of producing municipalities, especially in the generation of employment and income. It is expected that between 2023 and 2027 onshore oil production will have an average annual drop of 2.9%, reaching in 2027 a production of 2.2 million barrels. For natural gas, an average annual drop of 2.2% is projected, between 2023 and 2027, reaching a production of 18.4 million m³, in 2027.

Charts 23 and 24 show the recent evolution and projection of onshore production until 2027. The downward trend in the production is due to the fact that all the main fields are mature and with a declining trend in production. In addition, Petrobras has no interest in the development

of onshore assets, which reduces the absorption capacity of new projects in the region. The company owns the fields with the highest production of terrestrial oil and natural gas in Espírito Santo.

Despite this result, less sharp declines are expected until 2027 due to the sale of Petrobras assets to other operators. The prospect is that these new entrants will increase investment in revitalizing and extending the useful life of these areas. In addition, the increase in the number of hydrocarbon and commerciality declarations, aligned with the sale of land areas in the Permanent Offer, signals a possible increase in the number of new onshore projects.

It should be noted that as the values of production on land are lower, any new projects or unscheduled shutdowns can cause large deviations from the projected volumes.



4.1%

is the expected average annual drop in onshore oil production between 2022 and 2027, reaching 2.2 million barrels



5.4%

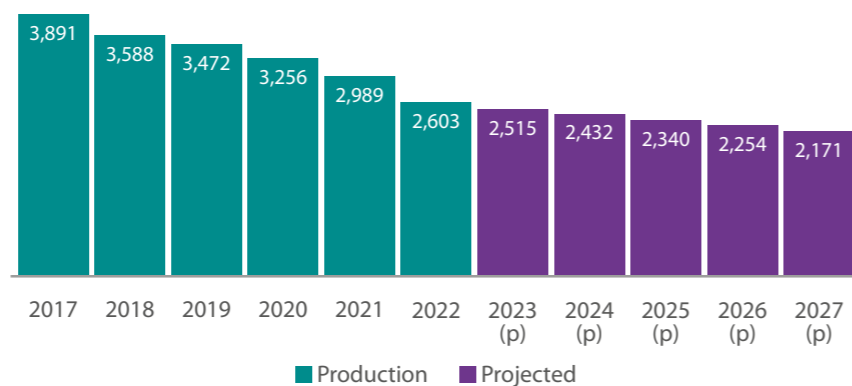
is the expected average annual drop in onshore natural gas production between 2022 and 2027, reaching 17.0 million m³





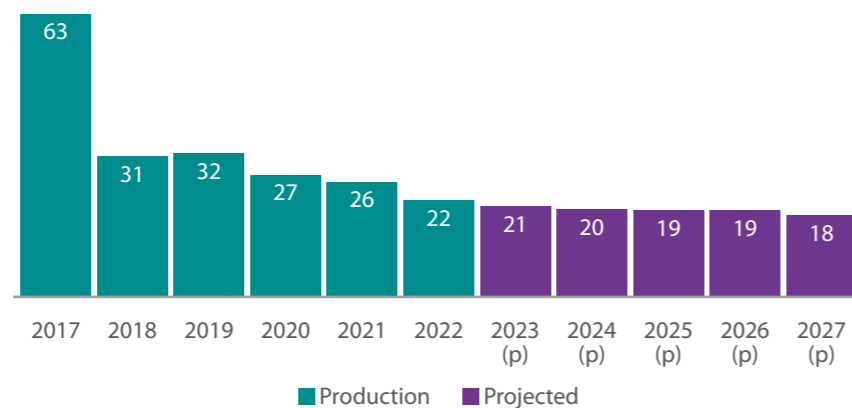
Onshore production is important in the **regional socioeconomic development** of producing municipalities, especially in the **generation of employment and income**

Chart 23 - Projection of onshore oil production in Espírito Santo (thousand barrels)

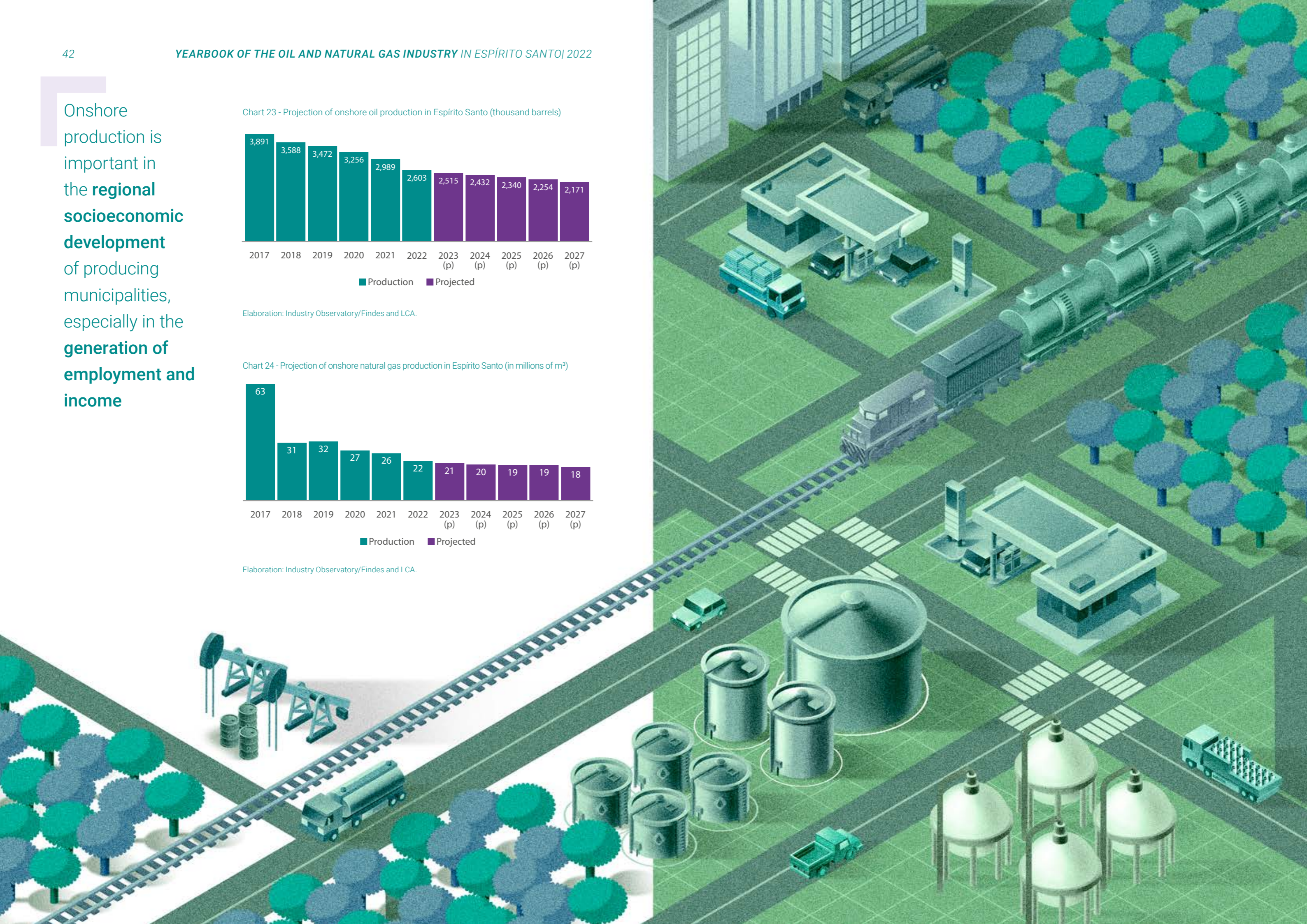


Elaboration: Industry Observatory/Findes and LCA.

Chart 24 - Projection of onshore natural gas production in Espírito Santo (in millions of m³)



Elaboration: Industry Observatory/Findes and LCA.



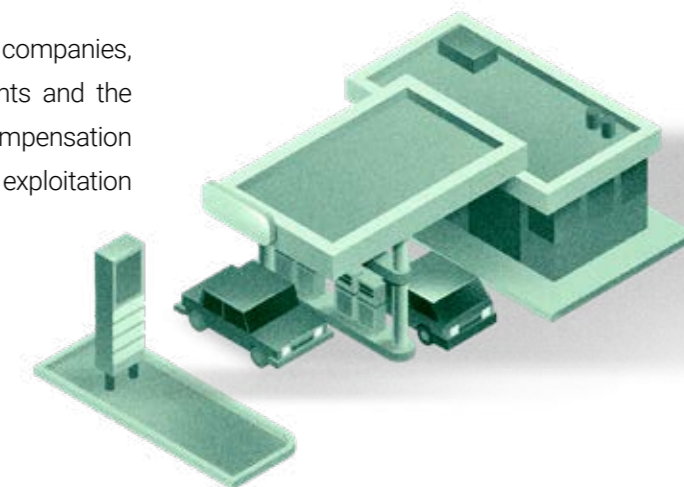


Chapter 3

ECONOMIC REFLECTIONS

The exploration and production of oil and natural gas generates demands for goods and services that creates a specialized market in its surroundings. As a result, there is an expansion in the number of companies,

qualified jobs, investments and the payment of financial compensation and taxes related to the exploitation of this natural resource.



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

The chain of the oil sector of the State of Espírito Santo was segmented into five links: (i) exploration and production (E&P), also known as upstream, which consists of the activities of extraction and production of oil and gas (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.

In 2021, the productive chain of the O&G sector had 527 companies in Espírito Santo, 5.4% higher than in the previous year (table 1). This total of companies represented 2.2% of all national companies in the segment and 0.6% of all companies in the state. This number of companies was distributed in the following links as follows: 80.8% in the supply chain; 10.1% in supply; 6.6% in E&P; 1.5% in petrochemical companies and 0.9% in petroleum derivatives.

527

companies in Espírito Santo operating in the oil and natural gas production chain in 2021

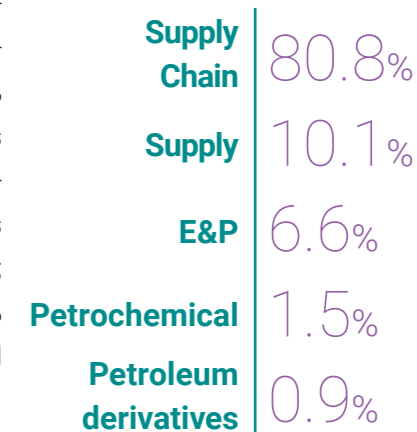


Table 1 - Companies in the productive chain of the O&G sector in Espírito Santo (in units)

Chain links	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
E&P	32	27	26	26	27	26	20	24	30	34	35
Oil derivatives	7	6	7	6	6	5	6	5	7	6	5
Petrochemicals	2	2	2	1	0	1	1	1	2	5	8
Supply	57	53	52	54	52	52	51	44	49	48	53
Supply Chain	427	440	468	474	483	450	422	416	406	407	426
<b>Total</b>	<b>525</b>	<b>528</b>	<b>555</b>	<b>561</b>	<b>568</b>	<b>534</b>	<b>500</b>	<b>490</b>	<b>494</b>	<b>500</b>	<b>527</b>

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





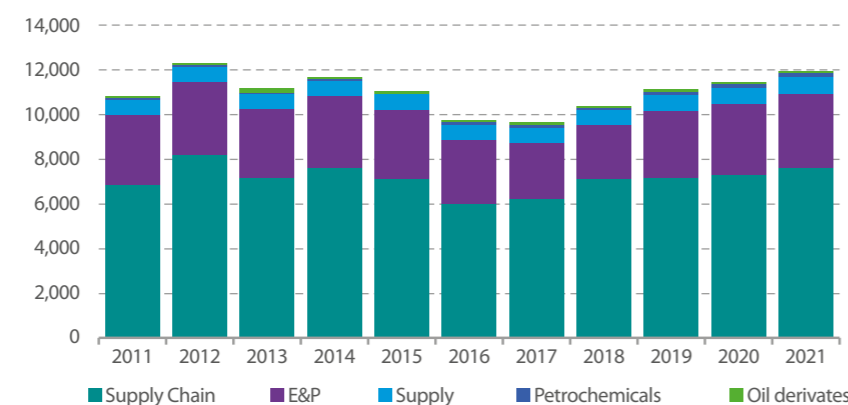
In relation to the total number of employees, in 2021, the productive chain of the O&G sector employed 11,969 workers in Espírito Santo, 4.4% higher than in the previous year (table 2). This total number of employees represented 2.9% of all national companies in the segment and 1.3% of all companies in the state. This number of jobs was distributed in the following links: 63.4% in the supply chain; 28.0% in E&P; 6.6% in supply; 1.4% in petrochemical companies; 0.6% in oil products companies.

Table 2 - Employees in the productive chain of the O&G sector in Espírito Santo

Chain links	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
E&P	3.192	3.251	3.087	3.207	3.071	2.883	2.518	2.439	3.011	3.207	3.352
Oil derivatives	131	127	206	137	138	123	117	94	113	94	75
Petrochemicals	35	51	53	51	0	123	123	125	133	148	162
Supply	645	694	693	716	728	699	687	661	733	738	787
Supply Chain	6.868	8.223	7.186	7.630	7.143	5.981	6.232	7.107	7.155	7.275	7.593
<b>Total</b>	<b>10.871</b>	<b>12.346</b>	<b>11.225</b>	<b>11.741</b>	<b>11.080</b>	<b>9.809</b>	<b>9.677</b>	<b>10.426</b>	<b>11.145</b>	<b>11.462</b>	<b>11.969</b>

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

Chart 25 - Employees in the productive chain of the O&G sector in Espírito Santo



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

Due to the multidisciplinary nature of the various occupations, various age groups and levels of qualification and average salary. Table 3 presents the worker profile of the complete O&G chain. is heterogeneous, covering var-



**11,969**  
formal employees were employed in Espírito Santo in the oil and natural gas production chain in 2021

In 2021, the productive chain of the O&G sector employed 522 occupations, among them: welder (5.2%), administrative assistant (3.7%), oil exploration operator (3.4%), machine maintenance mechanic (3.1%) and truck driver (2.6%). Regarding the age group, 36.2% of the workers in the O&G chain from Espírito Santo were between 30 and 39 years old in 2021. Regarding the education of workers in 2021, 58.3% had

completed high school, 22.7% had completed higher education and 2.1% had a master's degree and doctorate.

As a result of the qualification of its employees, in 2021 the average monthly wage of the O&G sector in Espírito Santo was BRL 6,976.6 and the average in Brazil was BRL 6,144.8. These values were higher than the total average monthly remuneration of the state (BRL 2,631.04) and the country (BRL 3,081.3).

Table 3 - Characteristics of the labor market in the productive chain of the O&G sector in Espírito Santo - 2021

Main Occupations	ES	BR	ES/BR %
Welder	628	14,854	4.2
Administrative Assistant	447	15,723	2.8
Oil Exploration Operator	406	7,984	5.1
Machine maintenance mechanic	375	6,972	5.4
Truck Driver	314	14,419	2.2
Worker of cleaning and conservation services of public areas	277	1,376	20.1
Office Assistant	247	12,347	2.0
Occupational safety technician	245	6,066	4.0
Storekeeper	236	6,115	3.9
Mechanical technician	232	4,779	4.9
Age Group	ES	BR	ES/BR %
10 to 14	2	60	3.3
15 to 17	96	1,934	5.0
18 to 24	1,231	41,229	3.0
25 to 29	1,473	51,181	2.9
30 to 39	4,328	142,534	3.0
40 to 49	3,228	110,000	2.9
50 to 64	1,535	65,957	2.3
65 or more	76	5,952	1.3

36.2%

of workers in the oil and natural gas industry were between 30 and 39 years old in 2021

40.4%

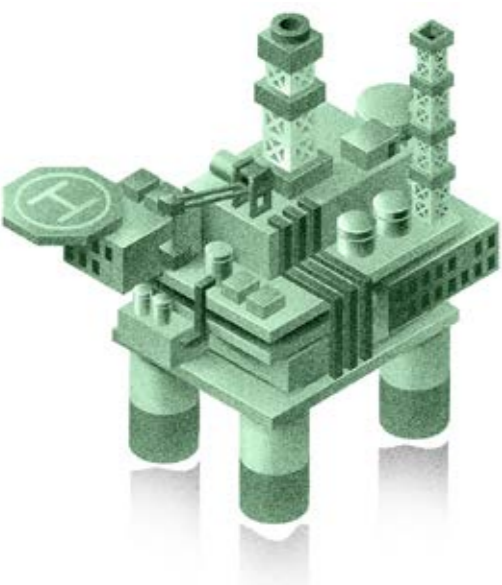
of workers in the oil and natural gas industry were over 40 years old in 2021



Distribution of education of employees in the oil and natural gas industry in 2021:

**High school** | 58.3%  
**Higher education** | 22.7%  
**Master and doctorate** | 2.1%





Schooling	ES	BR	ES/BR %
Illiterate	16	666	2.4
Up to 5th Incomplete	82	4,731	1.7
5th Complete Elementary School	78	4,751	1.6
6th to 9th Elementary School	324	13,312	2.4
Complete Elementary School	570	27,082	2.1
Incomplete High School	958	20,814	4.6
Complete High School	6,615	223,704	3.0
Incomplete Higher Education	366	20,231	1.8
Complete Higher Education	2,712	98,580	2.8
Master's Degree	224	4,269	5.2
Doctorate	24	707	3.4
Averagen Wage (R\$)	ES	BR	ES/BR %
Average Wage	6.976,6	6.144,8	-

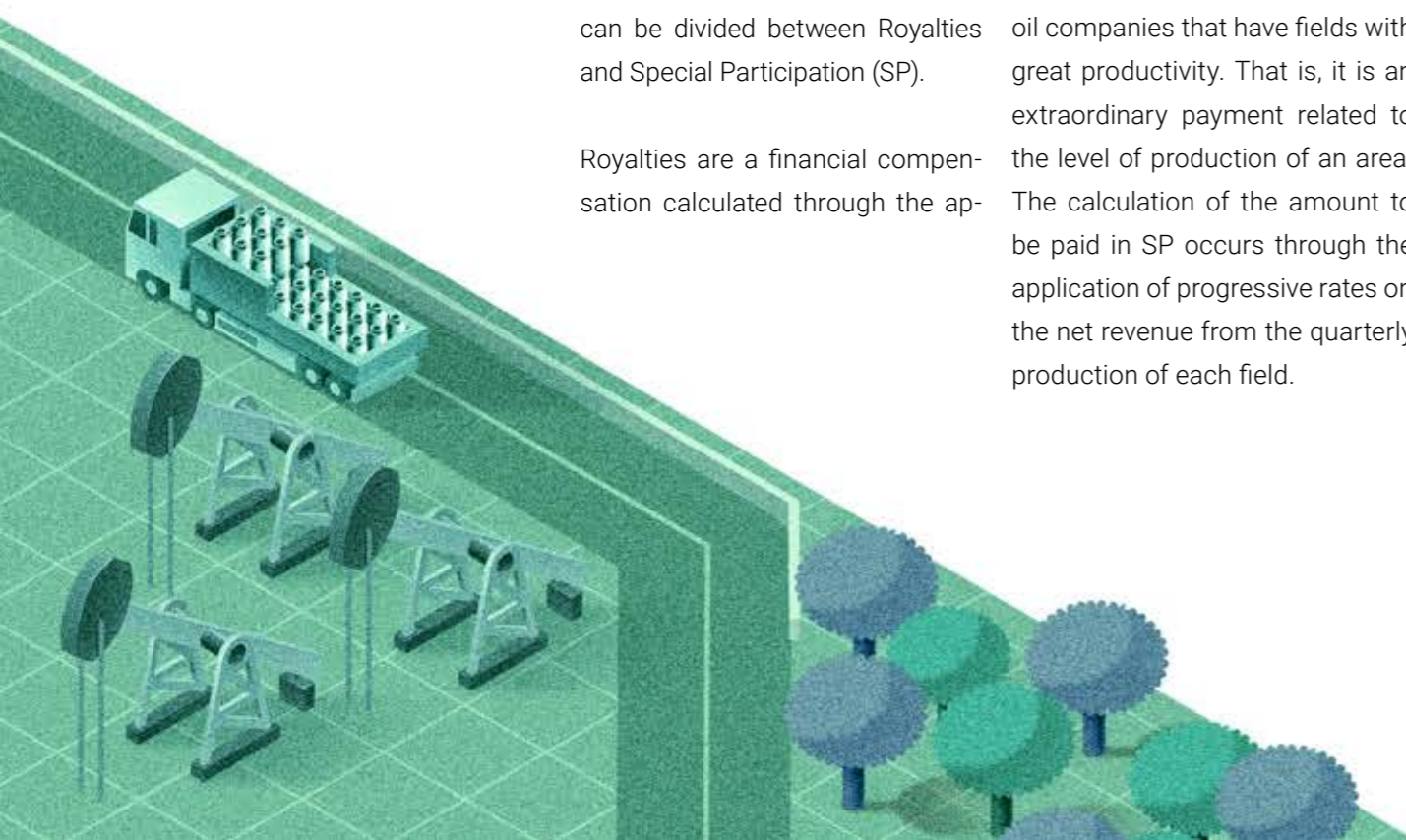
Source: Ministry of Labor and Social Security | Elaboration: Industry Observatory/Findes

### 3.2. Government Revenues

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

Royalties are a financial compensation calculated through the ap-

plication of a rate provided for in the contract, ranging from 5% to 15%, on the billing of the producing well. Special Participations are a financial compensation paid by oil companies that have fields with great productivity. 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 Brazil, oil and natural gas production paid, in 2022, R\$129.9 billion in government shares, 67.0% higher than in the previous year. This compensation was intended for the Federal Government, the states and the municipalities. The composition of these payments in the country was: 45.5% in royalties; 45.3% in special participations, 8.9% in signing bonuses and 0.3% in occupancy rate or area retention.

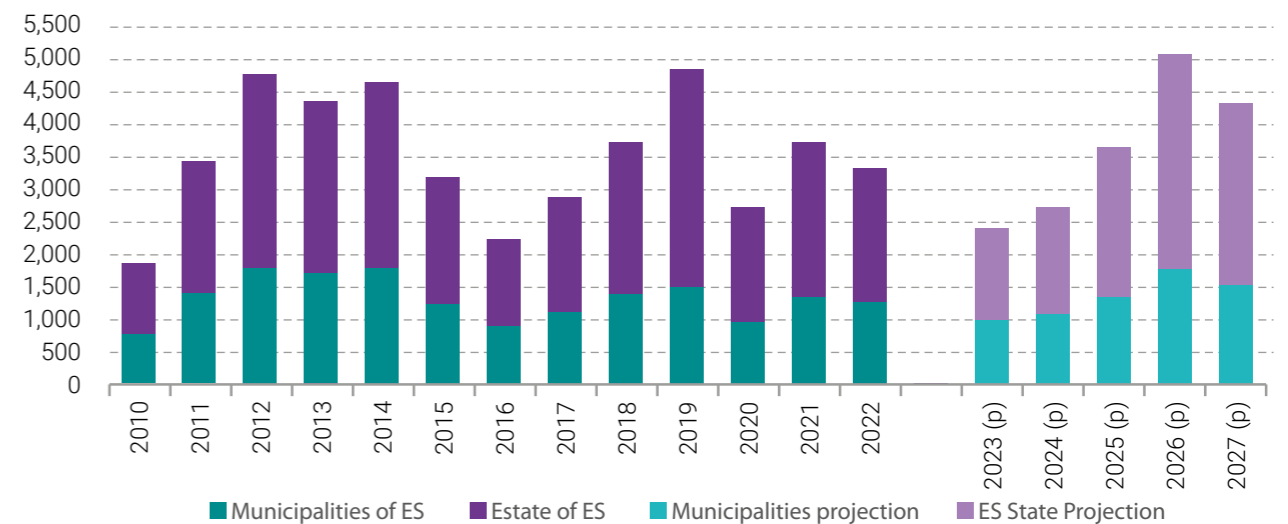
In Espírito Santo, the total government shares were BRL 3.3 billion in 2022, 10.8% lower than in the previous year (chart 26). The explanation for this drop is due to the 34.6% decrease in oil production and 37.62% in natural gas production in Espírito Santo, in 2022. Of this total, BRL 1.6 billion was re-

lated to the payment of Royalties and BRL 1.7 billion was related to the payment of Special Participations. The state received the third highest collection of government shares among all states, behind Rio de Janeiro (BRL 49.5 billion) and São Paulo (BRL 5.9 billion).

According to ANP projections, between 2022 and 2027, government revenues from oil and gas exploration within the areas of influence of Espírito Santo are expected to record an average annual growth of 12.6%, reaching in 2027 a total collection of BRL 4.3 billion (chart 26). 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.

BRL 3.3 billion  
were paid for the production of oil and natural gas to Espírito Santo in government shares in 2022

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



Source: ANP | Elaboration: Industry Observatory/Findes  
Constant values - IPCA [National Extended Consumer Price Index] accum. Jan-Dec 2022



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

		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total Government Interests	Cities in ES	736	1,372	1,743	1,659	1,763	1,996	866	1,080	1,347	1,459	927	1,307	1,218
	Estate of ES	1,081	2,020	2,973	2,644	2,830	1,165	1,316	1,763	2,336	3,344	1,770	2,383	2,073
	Total Brazil	43,763	48,772	56,604	53,979	56,491	35,363	24,066	40,129	67,283	68,119	54,382	81,969	117,941
	% 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
Royalties	Cities in ES	616	1,129	1,305	1,308	1,390	938	709	843	1,004	841	637	912	888
	Estate of ES	603	1,051	1,222	1,243	1,336	900	690	814	962	871	609	805	753
	Total Brazil	20,119	24,708	28,105	27,678	29,555	19,971	16,052	20,153	29,675	28,544	26,569	40,007	59,128
	% 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
Special Participation	Cities in ES	120	242	438	350	374	264	157	237	344	618	290	395	330
	Estate of ES	478	969	1,751	1,401	1,494	1,057	626	949	1,374	2,473	1,161	1,579	1,320
	Total Brazil	23,644	24,064	28,499	26,301	26,936	15,392	8,014	19,976	37,608	39,575	27,813	41,961	58,813
	% 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

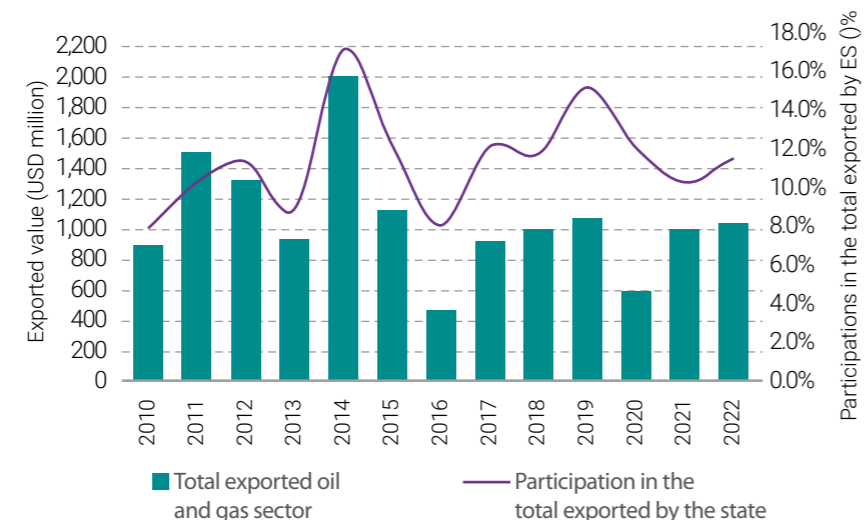
Source: ANP | Elaboration: Industry Observatory/Findes  
Constant values – IPCA [National Extended Consumer Price Index] accum. Jan-Dec 2022

### 3.3. External sector

USD FOB 1.0 billion  
was exported by the oil and natural gas industry of Espírito Santo

The oil and natural gas industry of Espírito Santo exported USD 1.0 billion in 2022, 4.0% higher than in the previous year (chart 27). **The total exported by the sector in the state represented 1.7% of the sector's foreign sales in the country and 11.4% of the state's total foreign sales.** Among all the sectors of the state of Espírito Santo, the oil and natural gas industry was the third sector with the highest exports, behind only the sectors of metallic mineral extraction and metallurgy.

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



Source: Ministry of Development, Industry, Commerce and Services | Elaboration: Industry Observatory/Findes

The foreign sale of crude oil totaled USD 970.4 million, 93.1% of the total exported by the capixaba oil and natural gas sector in 2022 (table 5). In the transition from 2021 to 2022, crude oil exports registered a drop of 1.8% explained by the reduction in production in the state. The destinations of capixaba crude oil were: Malaysia (77.0%), Singapore (8.9%), India (5.8%), Sweden (5.1%) and the Netherlands (3.2%).

Exports of coke and petroleum products totaled USD 70.8 million, 6.8% of the total exported by the local oil and natural gas sector in 2022 (table 5). In the transition from 2021 to 2022, the export of coke and petroleum products registered an increase of 496.1% explained by the in-

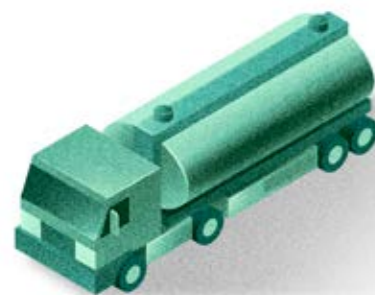
crease in foreign sales of fuel oil to Singapore. The main destinations of coke and petroleum products from Espírito Santo were: Singapore (99.8%), Malta (0.11%) and Marshall Islands (0.08%).

Finally, exports of the products that make up the petrochemical segment totaled USD 1.4 million, 0.1% of the total exported by the capixaba oil and natural sector in 2022 (table 5). Between 2021 and 2022, the export of petrochemical products registered a drop of 40.9%, mainly explained by the reduction in sales of fluorinated polymers to France. The main destinations of petrochemical products were: Argentina (73.9%), Uruguay (17.0%), Paraguay (4.7%) and Mexico (0.8%).

11.4%  
of Espírito Santo's total foreign sales are from the oil and natural gas industry







Regarding imported products, the oil and natural gas industry of Espírito Santo imported USD 130.5 million in 2022, 4.2% lower than in the previous year. The total imported by the sector in the state represented 0.2% of the sector's

external purchases in the country and 1.4% of the state's total external purchases (table 6). The main prominent segments are imports of petrochemical products, especially organic chemicals and thermosetting resins.

Table 5 - Exports of the O&G 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%

Source: Ministry of Development, Industry, Commerce and Services | Elaboration: Industry Observatory/Findes

Table 6 - Imports from the O&G 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%

Source: Ministry of Development, Industry, Commerce and Services | Elaboration: Industry Observatory/Findes

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

Signed in the oil and natural gas exploration and production contracts, the RD&I clause establishes that oil companies must carry out expenses qualified as research and development in an amount corresponding to 1% (one percent) of the gross revenue from the production of the fields that pay Special Participation. The amounts generated are invested in RD&I projects that can be executed by the oil company itself, by Brazilian Companies or by accredited institutions throughout the country<sup>10</sup>.

Between 1998 and June 2022, the RD&I clause generated in Brazil approximately BRL 24.5 billion in bond volume, with Petrobras responsible for BRL 20.6 billion (84.2%). In 2021, the amount generated in obligations under the clause was BRL 3.03 billion, an increase of 107.6% compared to the same period of the previous year. The increase in resources in the period can be explained by the increase in production in areas of high productivity, notably in areas that

pay special participations, in addition to the appreciation of the price of a barrel of oil in the period.

Regarding the number of projects, between 1998 and June 2022, 13,013 projects were developed in Brazil financed with funds from the obligations generated by the clause. In 2021, the total number of projects financed by the clause was 805, an increase of 352.2% compared to 2020.

In Espírito Santo, between 2000 and June 2022, 94 projects financed with funds from the obligations generated by the clause were developed. Of these projects, 91 were executed, or are being executed, by UFES, 1 project by IFES, 1 project by Faculdade do Centro Leste (UCL) and 1 project by the company Mogai Tecnologia de Informação S.A. (graphic 28). The projects developed in Espírito Santo covered the areas of supply research, exploration and production, natural gas and cross-cutting themes.



BRL 24.5 billion

were generated by the RD&I clause for research throughout Brazil between 1998 and 2022

13,013

was the total of research projects funded by the RD&I clause throughout Brazil between 1998 and 2022

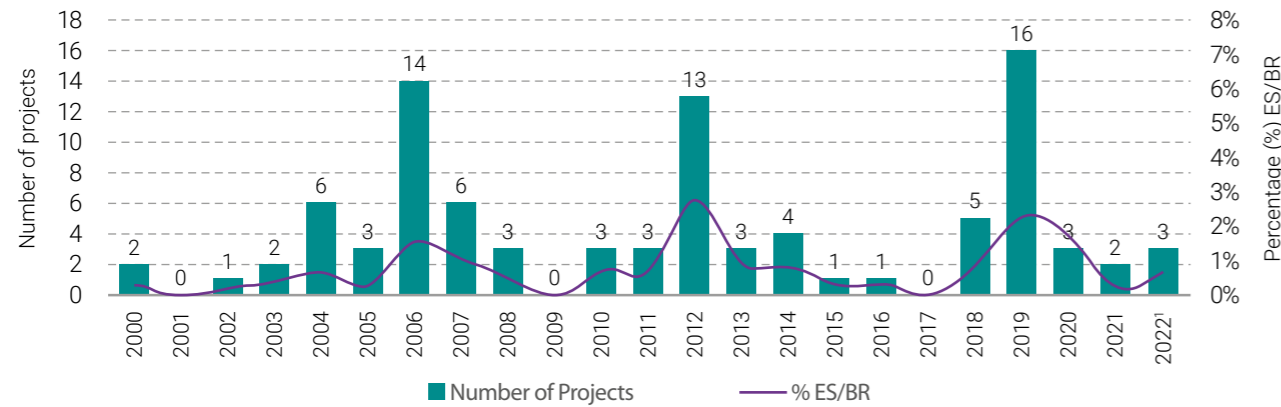
94

was the total of research projects funded by the RD&I clause in Espírito Santo between 2000 and June 2022

10. In previous editions of the Yearbook of the Oil and Natural Gas Industry in Espírito Santo, the legal and regulatory system pertinent to the RD&I clause was presented and analyzed.



Chart 28 - Platform Decommissioning Program (PDI) Projects that received resource from the RD&I clause in Espírito Santo (in units)



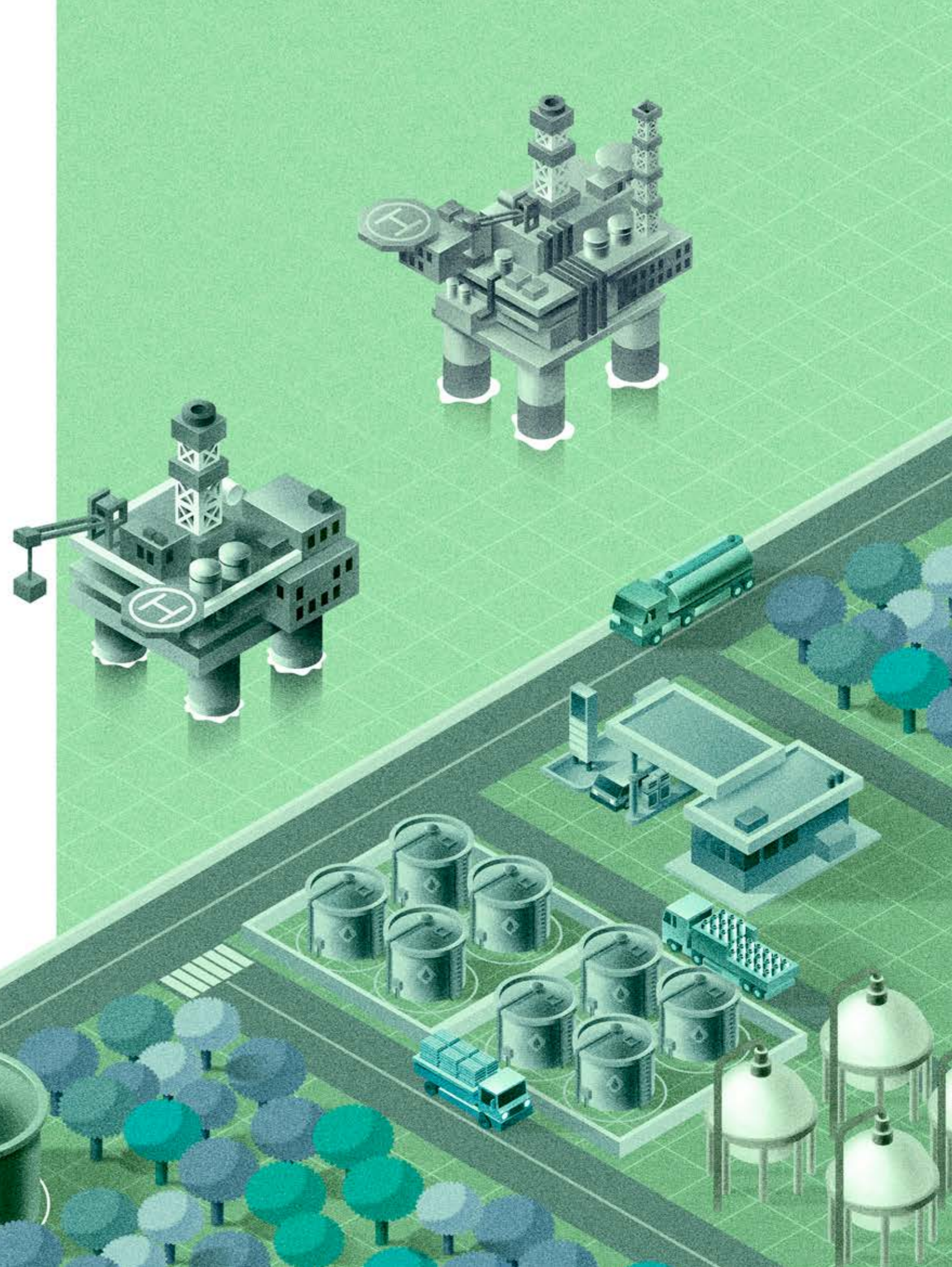
Source: ANP. Elaboration: Industry Observatory/Findes  
 The information originates from Technical Regulation No. 05/2005 and Technical Regulation No. 03/2015.  
<sup>1</sup> Data until June 2022

**BRL 5.2 million**  
 were invested in research in Espírito Santo from January to June 2022

In 2021, 2 projects were initiated involving resources from the RD&I clause in Espírito Santo with an investment of BRL 3.5 million. The first project is being carried out by the company Mogai Tecnologia de Informação S.A. and aims to identify and manage corrosion on oil platforms using 3D cameras. The company was the first company from the state of Espírito Santo to develop a project with resources from the RD&I Clause. The second project is being carried out by the Geological Oceanography Laboratory of UFES and aims to calibrate paleobathymetric zones with the quaternary in the Espírito Santo Basin.

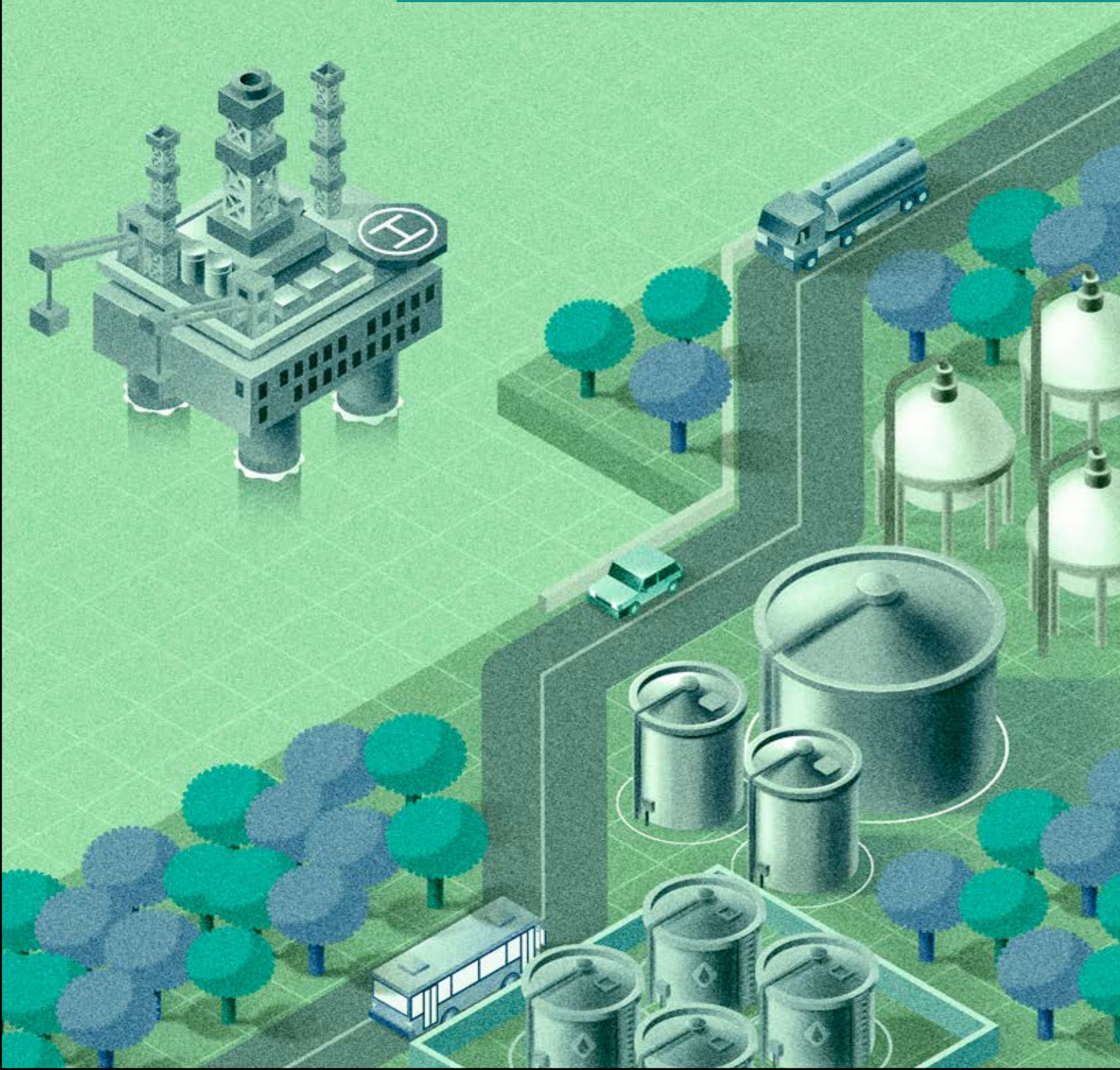
By June 2022, 3 projects involving RD&I clause resources in Espírito Santo were initiated with an investment of BRL 5.2 million.

The first project is underway at the Telecommunications Laboratory of UFES and aims to develop a Profiler with optical fiber for FPSO tanks. The second project is being carried out at UFES LabPetro and aims at the performance of chemical dispersants in oils for mitigation in cases of spills. The third project is in secondary execution by the High Performance Computing Laboratory (LCAD) of UFES and aims to develop a high resolution customizable computer acquisition and processing system for fault diagnosis in electric motors, using artificial intelligence.





## Chapter 4

OPPORTUNITIES  
FOR ESPÍRITO  
SANTO

For the coming years, the strategies of the main oil companies direct towards a scenario marked by the possibility of recovering the global investment capacity lost in recent years. Despite persistent global geopolitical and macroeconomic uncertainty, the industry remains committed to providing investments that provide energy security in the short term and, for the long term, investments that ensure a transition to the use of cleaner energies.

Espírito Santo will be impacted by the priority projects of large oil companies and also by the new market of small and medium-sized companies operating in new areas of the sector. Opportunities for the state can be summarized into four groups: i) Announced Investments; ii) Permanent Offer; iii) Petrobras' divestment plan and iv) Decommissioning of facilities.



BRL 8.8  
billion

is the expected amount of **investments in Espírito Santo** in the oil and natural gas sector by 2027

### 4.1. Announced Investments

In Espírito Santo, according to the survey of investments carried out by the Observatory of Industry/Findes, it is estimated that the state will receive BRL 8.8 billion in investments in the oil and natural gas sector, until 2027. In total, 8 projects were raised in the State, mainly involving PRio, Petrobras, Shell, Karavan Oil and Gas and Seacrest Petróleo. The highlight is the Integrated Project of Parque das Baleias, which intends to install the Maria Quitéria FPSO in the Jubarte field (table 7).

The Integrated Project of Parque das Baleias (IPB) intends to increase the oil and gas recovery factor through the optimization of the current drainage network,

with the interconnection of a new FPSO<sup>11</sup>. In February 2022, Petrobras and Yinson signed the agreement for chartering and provision of services of FPSO Maria Quitéria. The intention is that the new platform will be operating in the last quarter of 2024. Currently, the project is in Petrobras' Strategic Plan 2023-2027.

In addition to this investment, there are also announcements from oil companies and other companies that are interested in adding new areas in their portfolios or expanding their activities in Espírito Santo. Table 7 presents the main projects raised by the Industry Observatory.



11. The park area is formed by the areas of Jubarte, Baleia Azul, Baleia Franca, parts of Cachalote and Pirambu.



Table 7 - Top investment projects announced in the O&amp;G sector in Espírito Santo for the next 5 years

Investor	Project	Municipality	Project Status	Amount (in millions BRL)
PetroRio	The Wahoo project includes the drilling of wells and the connection between the wells and the Frade FPSO.	President Kennedy	Running	4,200
Petrobras	Development of the New Jubarte Field, formed by the areas of Jubarte, Baleia Azul, Baleia Franca, parts of Cachalote and Pirambu.	Anchieta, Piúma, Itapemirim, Marataízes and Presidente Kennedy	Under Bidding	1,300
Petrobras	Construction of the Arpoador Drillship for drilling and oil extraction.	Aracruz	Running	1,012
Shell	Development and Production of the fields of the South Coast of Espírito Santo.	Anchieta, Piúma, Itapemirim, Marataízes and Presidente Kennedy	Running	1,000
Karavan Seacrest Spe Cricaré S.A.	Exploration of oil and natural gas in the Cricaré Pole, which comprises 27 onshore oil fields.	Conceição da Barra, Jaguaré, Linhares and São Mateus	Running	1,000
ESGÁS	Expand the distribution network by more than 292 thousand meters and connect more than 96 thousand new consumers.	Espírito Santo	Planning	260
Subsea 7	In Ubu, Subsea 7 will manufacture 126 km of rigid lines for the Búzios 8 subsea collection system.	Anchieta	Planning	-
3R Petroleum and DBO Energia	Investment in the areas of the Peroá Pole, the Cangoá Pole and the BM-ES-21 block (Malombe Discovery), all in the Espírito Santo Basin.	Aracruz and Linhares	Running	-
<b>Total</b>				<b>8.772</b>

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

## 4.2. Sale of O&G assets

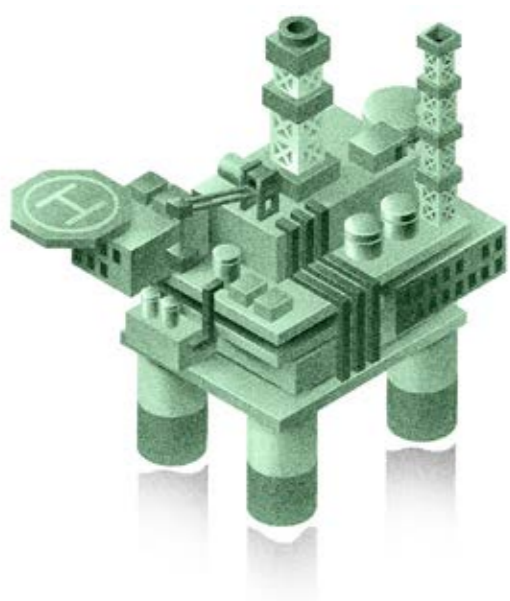
Petrobras' Divestment Plan aims to reduce the company's debt and maximize investments in assets with higher profitability, focused on operating, for example, in the exploration and production of oil and natural gas in deep and ultra-deep waters. Since 2015, the company has started the process of selling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

In Espírito Santo, 52 areas were offered with 78.8% of the assets with the sale completed. In offshore, 14 areas were offered with 21.4% of the assets with the sale completed and in onshore, 38 areas were offered with 100.0% of the assets with the sale completed. Table 8 lists the assets and status of each project.

Table 8 - Monitoring the sale of Petrobras 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	-	
		Deepwater ES	Offshore	100% of Golfinho, Canapu, Camarupim and Camarupim Norte fields and 65% of BM-ES-23 block	5	Linhares	Under negotiation	BW Offshore	
		Espírito Santo Basin	Onshore	50% stake in blocks ES-T-506 and ES-T-516	2	Linhares	Sold	Cowan Oil & Gas	
		Peroá Cluster	Offshore	100% of the fields of Peroá, Cangoá and Malombe	3	Linhares	Sold	3R Petroleum DBO 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 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, Seriema and Tabuiaíá	27	São Mateus, Conceição da Barra and Jaguaré	Sold	Karavan Seacrest Spe Cricaré S.A.	
		Lagoa Parda Center	Onshore	100% of the Lagoa Parda, Lagoa Parda Norte and Lagoa Piabanha fields	3	Linhares	Sold	Imetame	
		Campos Basin	Campo Catuá	Offshore	100% of the Catuá field	1	Anchieta	In binding phase	-

Source: Petrobras, Brasil Energia and Observatório da Indústria/Findes. Elaboration: Industry Observatory/Findes





### 4.3. Permanent Offer

#### AREAS ON OFFER IN ESPÍRITO SANTO

##### CONCESSION REGIME

48 exploratory blocks:

20 blocks onshore

28 blocks on the sea side

#### AREAS UNDER STUDY IN ESPÍRITO SANTO

##### CONCESSION REGIME

25 exploratory blocks

25 blocks onshore

##### AREAS WITH MARGINAL ACCUMULATIONS

- Barra do Ipiranga
- Rio São Mateus Oeste,
- Mariricu Oeste
- Nativo Oeste
- Jacupemba
- Rio Itaúnas Leste

The Permanent Offer is a concession modality in which there is the offer of exploratory blocks and areas with marginal accumulations. It consists of the continuous offer of fields returned, or in the process of being returned, of exploratory blocks offered in previous bids and not auctioned or returned to ANP, ANP, besides the new exploratory blocks in terrestrial basins under study at ANP.

In December 2021, the National Energy Policy Council (CNPE) authorized the Agency to define and bid on Permanent Offer, under the concession regime, blocks in any land or sea basins, as well as bid on fields returned or in the process of being returned, including areas located in the pre-salt polygon or in strategic areas.

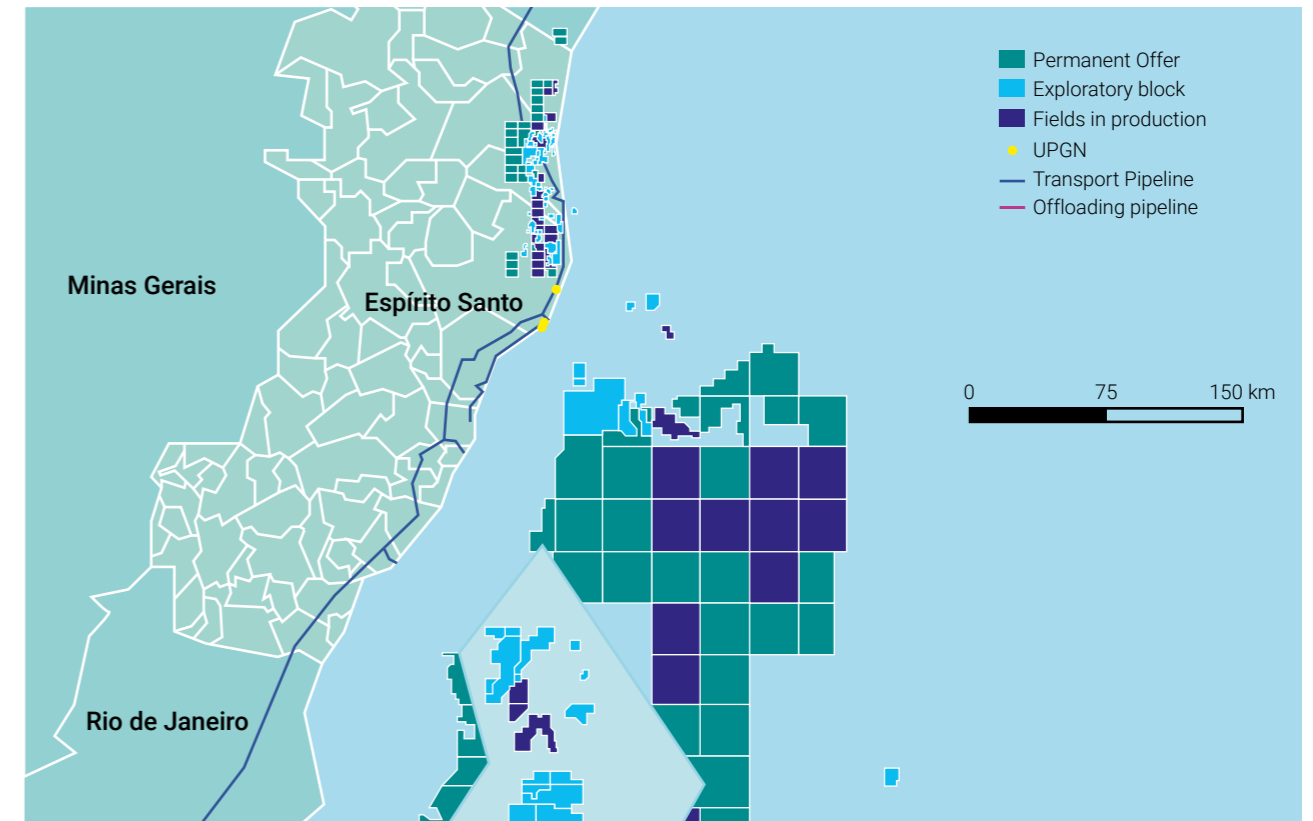
Throughout the national territory, 1,010 exploration blocks located in 17 sedimentary basins are on offer under the concession regime for the Permanent Offer. In addition, 1,018 exploration blocks in 17 Brazilian sedimentary basins and 15 areas with marginal accumulations in 6 terrestrial basins are under study under the concession regime. The areas under study will be available for the

Permanent Offer soon after the environmental opinions and the public hearing, promoted by ANP, are finalized.

In Espírito Santo, 48 exploration blocks are in offers under the concession regime for Permanent Offering, 20 blocks in the land part and 28 blocks in the maritime part. 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 area in permanent supply in Espírito Santo on land and sea.

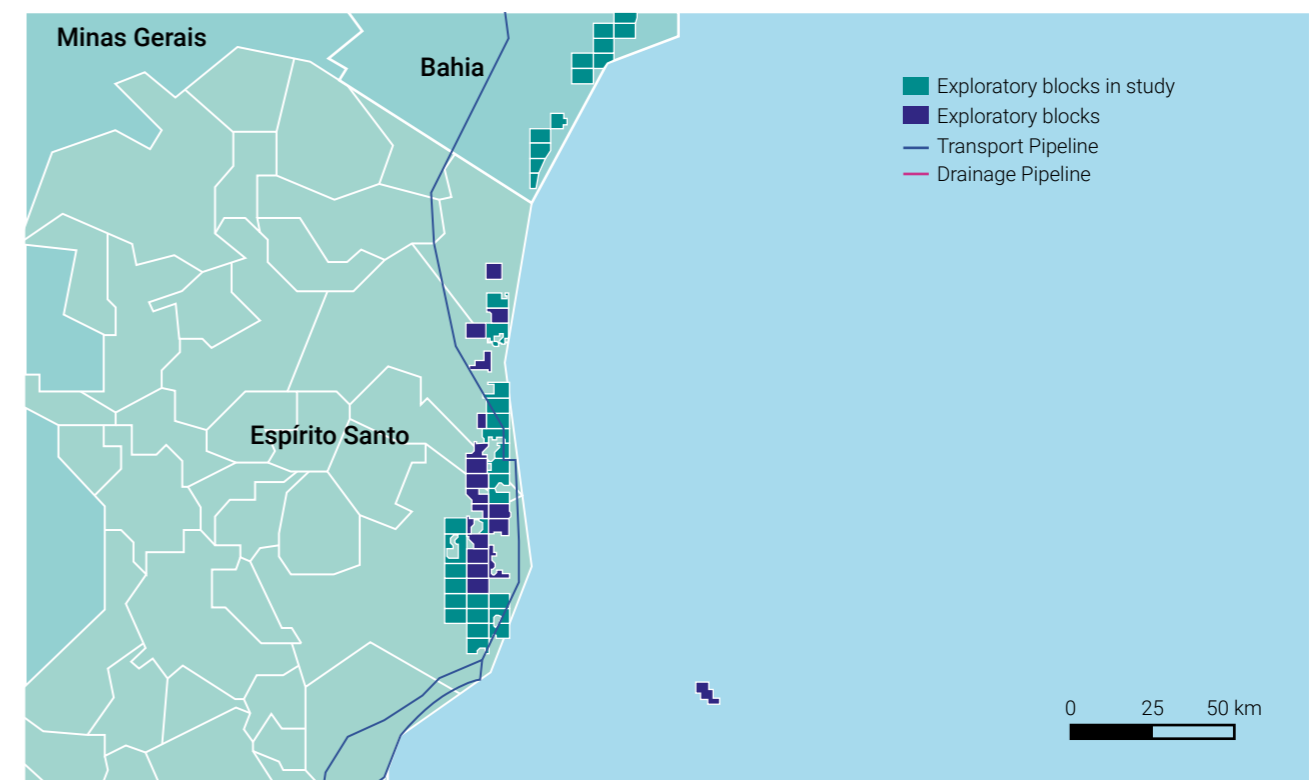
In addition to these, a total of 25 exploratory blocks are under study in Espírito Santo, all terrestrial (figure 2), and 6 areas with marginal accumulations (figure 3). Among the areas with marginal accumulations under study are: Barra do Ipiranga, Rio São Mateus Oeste, Mariricu Oeste, Nativo Oeste, Jacupemba and Rio Itaúnas Leste, all located between the municipalities of Conceição da Barra, São Mateus, Jaguaré and Linhares. These areas were in concession with Petrobras and were returned to ANP in 2019. The areas are shown in Figure 3.

Figure 1 - Exploratory blocks on offer in the Permanent Offer in Espírito Santo



Source: ANP. Elaboration: Industry Observatory/Findes

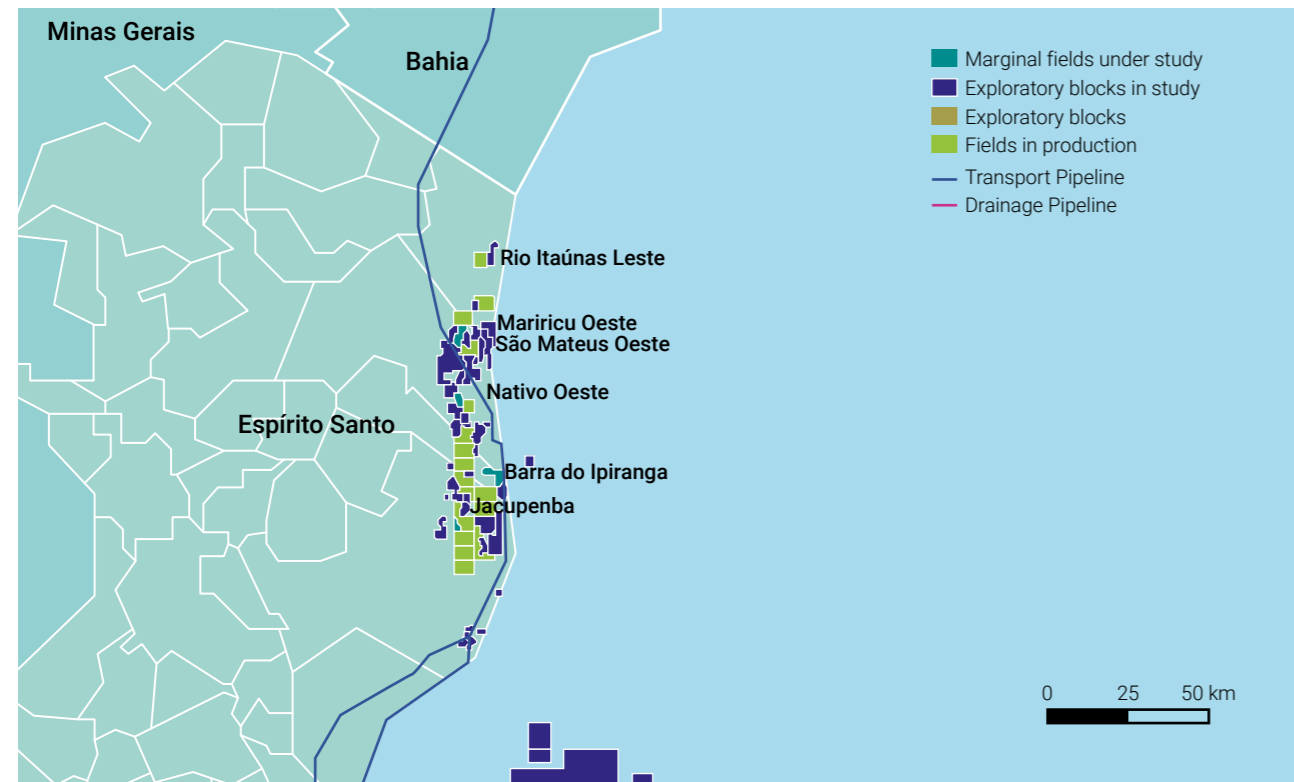
Figure 2 Exploratory blocks under study in the Permanent Offer in Espírito Santo



Source: ANP. Elaboration: Industry Observatory/Findes



Figure 3 - Areas with marginal accumulations under study for Permanent Offer



Source: ANP. Elaboration: Industry Observatory/Findes

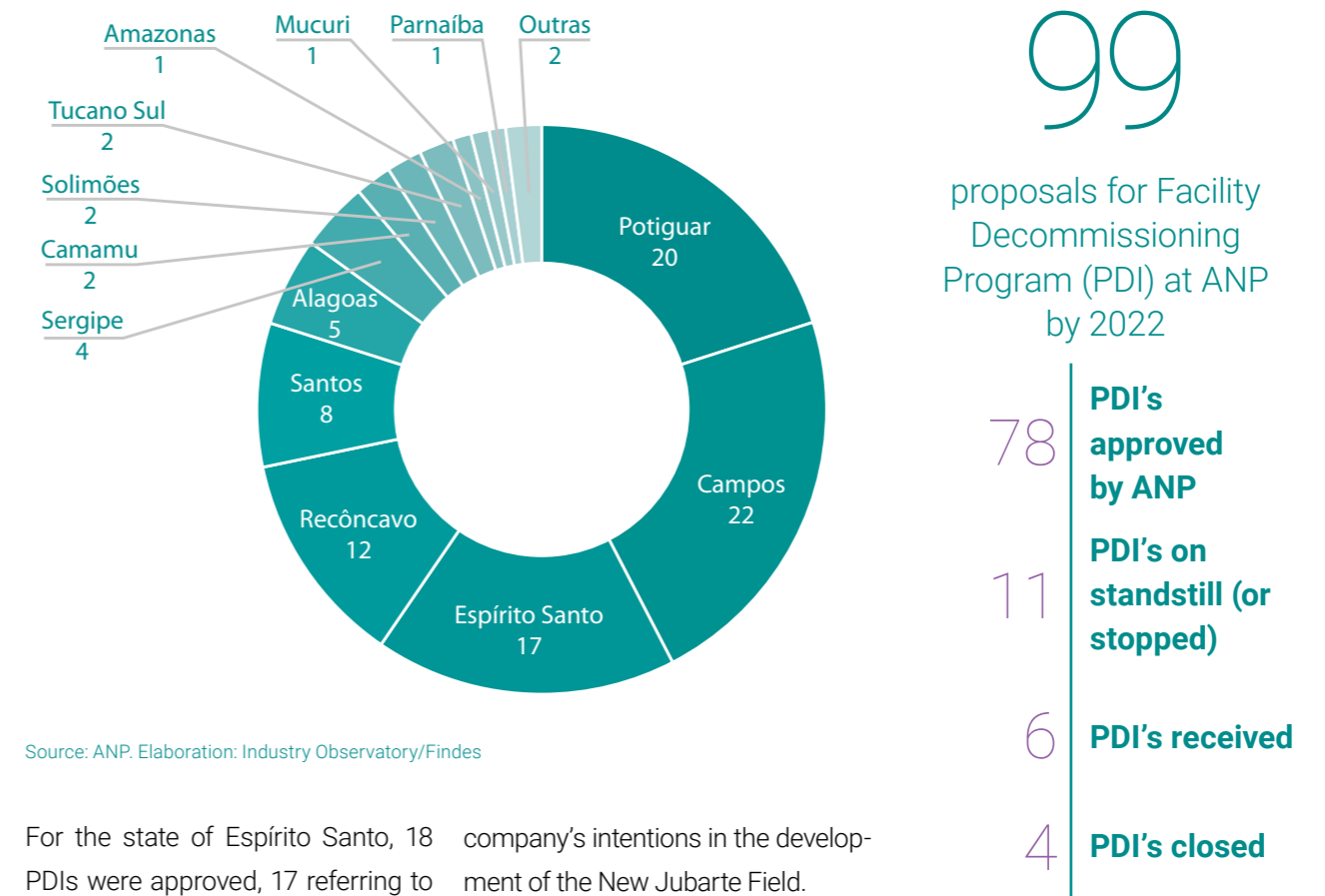
### 4.4. Facility Decommissioning

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 2022, ANP had 99 proposals for a Facility Decommissioning Program (PDI) in Brazil (chart 29), being: 78 PDI's approved by the Agency, 11 PDI's classified as suspended (or stopped), 6 PDI's classified as received and 4 PDI's classified as closed. In total, thirteen basins had PDI's approved by the ANP. Among them, 22 planes were located in the Campos Basin, 17 in the Espírito Santo Basin, 20 in the Potiguar Basin, 12 in the Recôncavo Potiguar Basin and 28 nine other basins.



Chart 29 - Facility Decommissioning Program (PDI) by basin (in units)



Source: ANP. Elaboration: Industry Observatory/Findes

For the state of Espírito Santo, 18 PDI's were approved, 17 referring to the Espírito Santo basin (all onshore) and 1 referring to the Campos basin in confrontation with the state, the FPSO Capixaba (table 9).

Petrobras and SBM initiated the procedures for the decommissioning of the unit, located in Parque das Baleias. With Petrobras' exit from the platform, the company intends. Petrobras intends to relocate the production of seven of the park's nine wells to the P-58 platform. With the complete decommissioning of FPSO Capixaba, Parque das Baleias will operate with 3 production units (P-58, P-57 and FPSO Cidade de Anchieta). The company's plan is to start operating the Maria Quitéria FPSO in 2024, a project that includes the

company's intentions in the development of the New Jubarte Field.

In 2022, the ANP approved the Facilities Decommissioning Report (RDI) of the Cação field, located in the Espírito Santo Basin. After all infrastructure deactivation activities are carried out, the oil company submits the report to the ANP, still dependent on approval. In 2022, the agency approved 6 RDI's, including: Cação, Catuá, Tatui, Gavião Real, Xerelete, Xerelete Sul and FPSO Polvo.





Tabela 9 - Relação dos Programas de Descomissionamento (PDI) aprovados no Estado do Espírito Santo

Environment	Basin	PDI	Company	
Terra	Espírito Santo	Albatroz	Petrisyenergy	
	Espírito Santo	Barra do Ipiranga	Petrobras	
	Espírito Santo	Corruíra	Petrobras	
	Espírito Santo	Jacupemba	Petrobras	
	Espírito Santo	Lagoa do Doutor	Vipetro	
	Espírito Santo	Lagoa Parda Sul	Petrobras	
	Espírito Santo	Mariricu Oeste	Petrobras	
	Espírito Santo	Mosquito	Petrobras	
	Espírito Santo	Mosquito Norte	Petrobras	
	Espírito Santo	Nativo Oeste	Petrobras	
	Espírito Santo	Rio Barra Seca	Petrobras	
	Espírito Santo	Rio Ibiribas	Petrobras	
	Espírito Santo	Rio Itaunas Leste	Petrobras	
	Espírito Santo	Rio Mariricu	Petrobras	
	Espírito Santo	Rio Mariricu Sul	Petrobras	
	Espírito Santo	Rio Preto	Petrobras	
	Mar	Campos	FPSO Capixaba	Petrobras

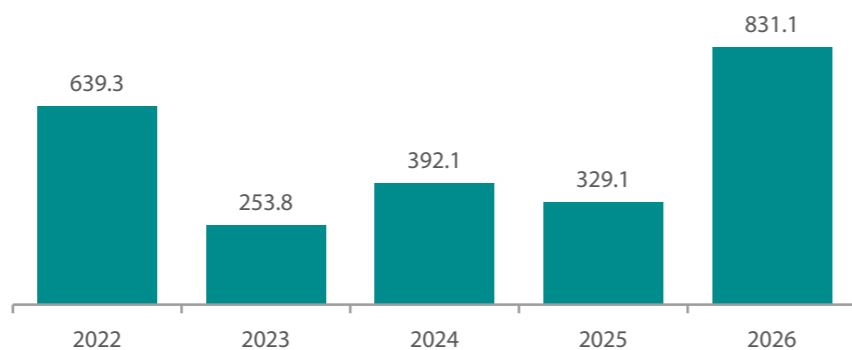
Source: ANP. Elaboration: Industry Observatory/Findes

**BRL 51.5 billion**  
in investment will be generated by the decommissioning of 9,892 facilities throughout Brazil between 2022 and 2026

Across Brazil, the decommissioning of 9,892 wells will generate BRL 51.5 billion in investment between 2022 and 2026. For Espírito Santo, the decommissioning of 751 wells will generate BRL 2.45 billion in investment in the same period, of which BRL 781.2 million in the Campos Basin and another 1.66 billion in the Espírito Santo Basin (chart 30).

This total amount will be applied in the activities of permanent abandonment (59.9%), removal of lines (23.2%), removal of facilities associated with Land Production Units (4.5%), environmental recovery (5.5%) and demobilization of Oil Exploration Units (UEP) (7.1%) and well razing (0.2%).

Chart 30 - Total investments planned for the execution of the Facility Decommissioning Programs (PDI) in Espírito Santo (in millions of BRL) - 2022 to 2026



Source: ANP. Elaboration: Industry Observatory/Findes

**BRL 2.45 billion**  
in investment will be generated by the decommissioning of 751 facilities in Espírito Santo between 2022 and 2026





## GLOSSARY

## 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 m<sup>3</sup> 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

**Concession:** modality of delegation of an economic activity by the government, usually through a competitive 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.

**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.

**Closed well:** completed well that has already entered into production or injection operation, but is closed, awaiting normalization of surface conditions, additio-

nal studies for decision making, or intervention with a probe for reassessment, recompletion, restoration, abandonment, among others.

## 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.

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

**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.

## 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.

## G

**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.

## I

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

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

## M

**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:** 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.



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

**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) annual, by means of unit values in reais 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.

**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

**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.

## 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 solidary 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:** well operating as a hydrocarbon producer.

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

**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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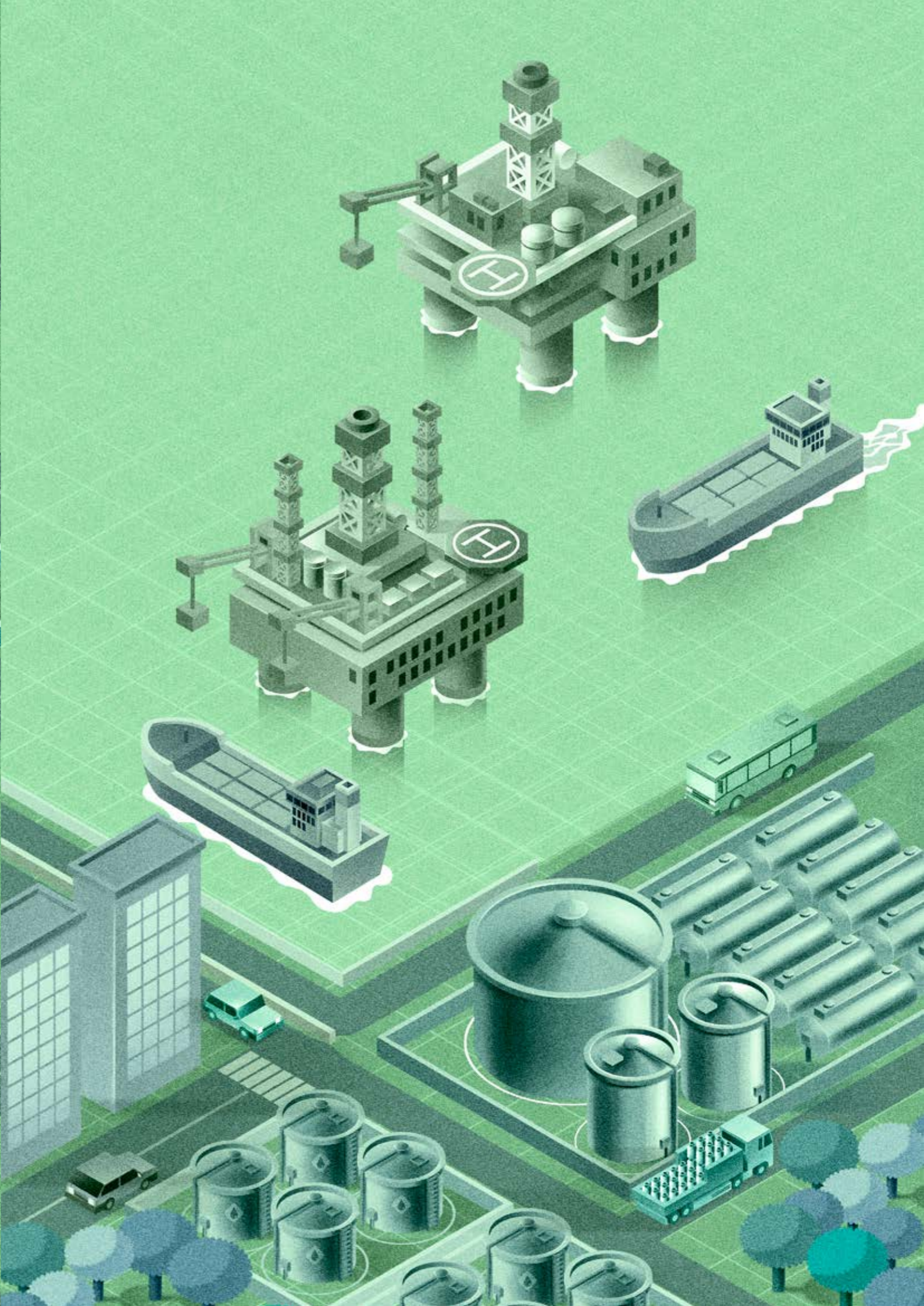
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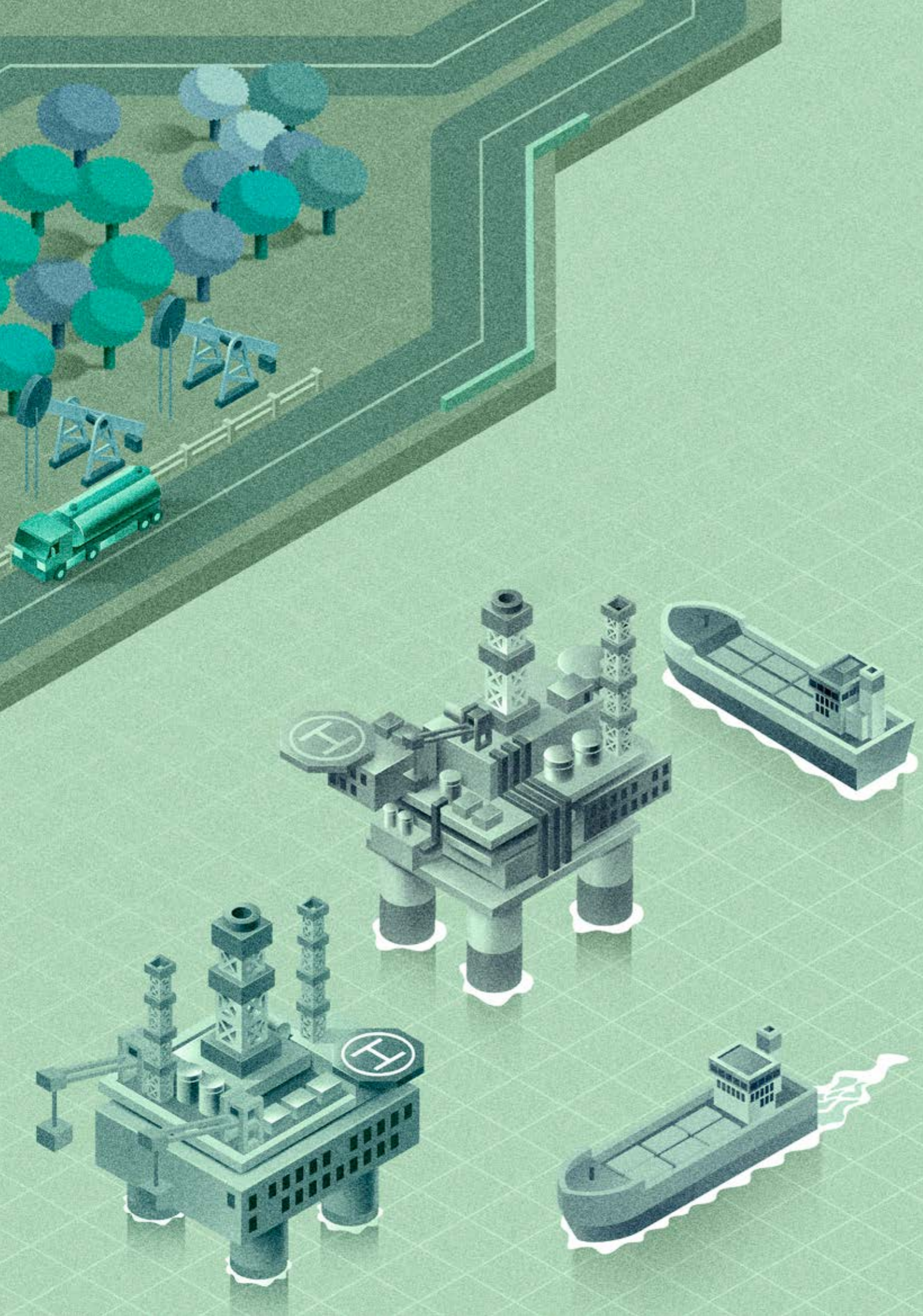
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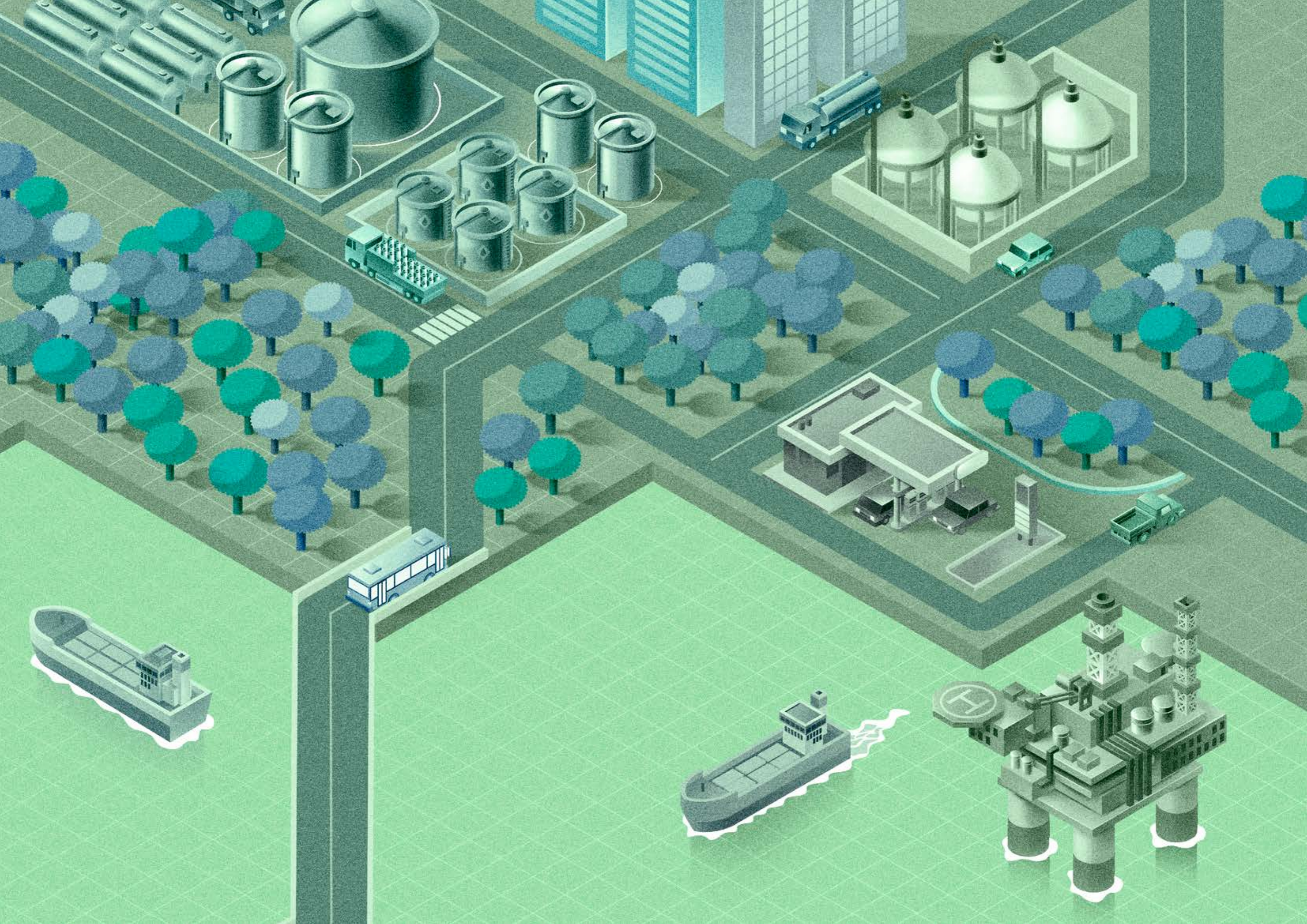




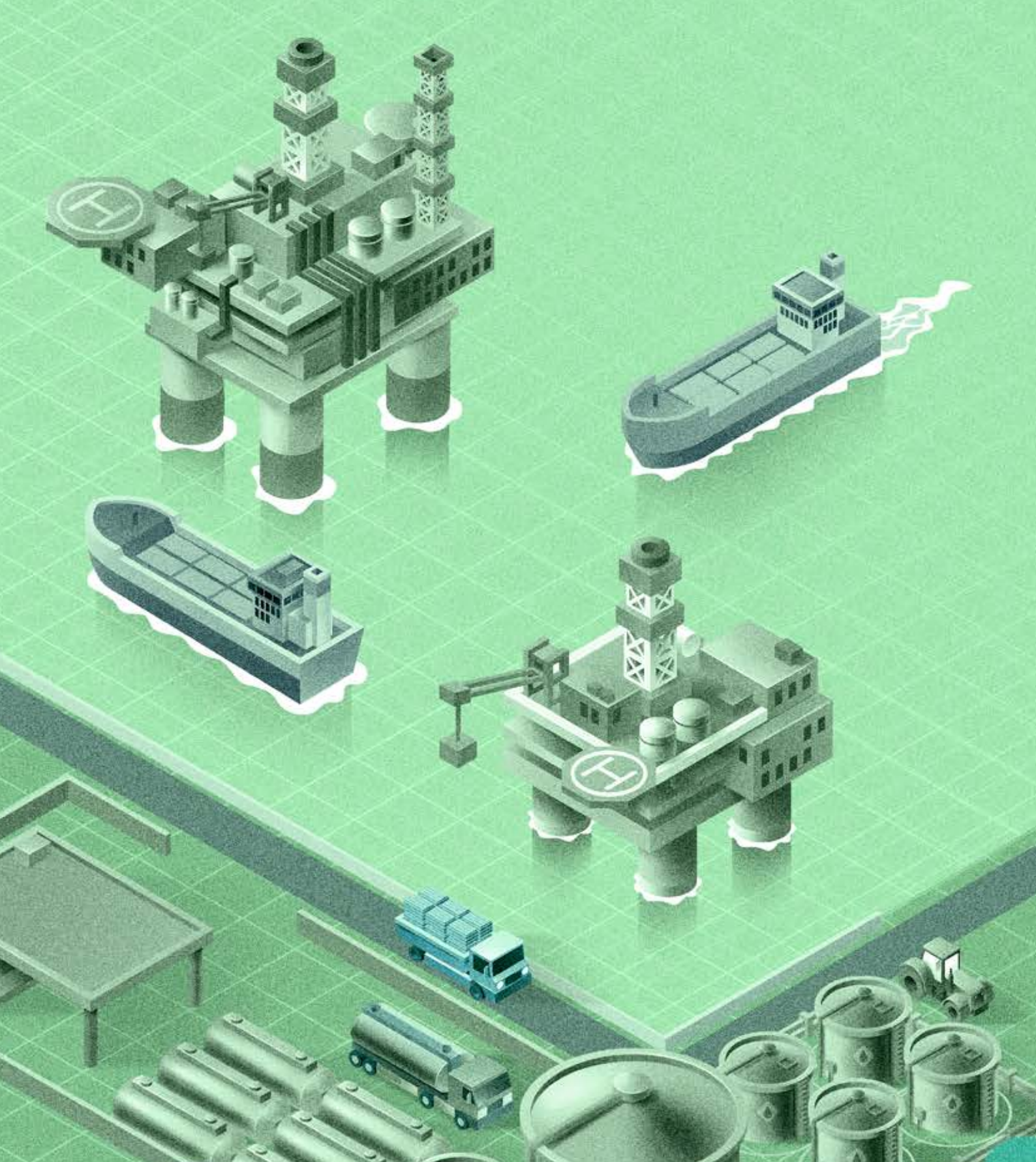












**FINDES**  
POR VOSÇE, PELA INDÚSTRIA, PELO ESPÍRITO SANTO

**SENAI**  
PELO FUTURO DO TRABALHO

**observatório**  
da indústria

Support

 Fórum Capixaba  
de Petróleo,  
Gas e Energia

**SEBRAE**

 **ONIP** | Organização  
Nacional da  
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Petróleo

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