

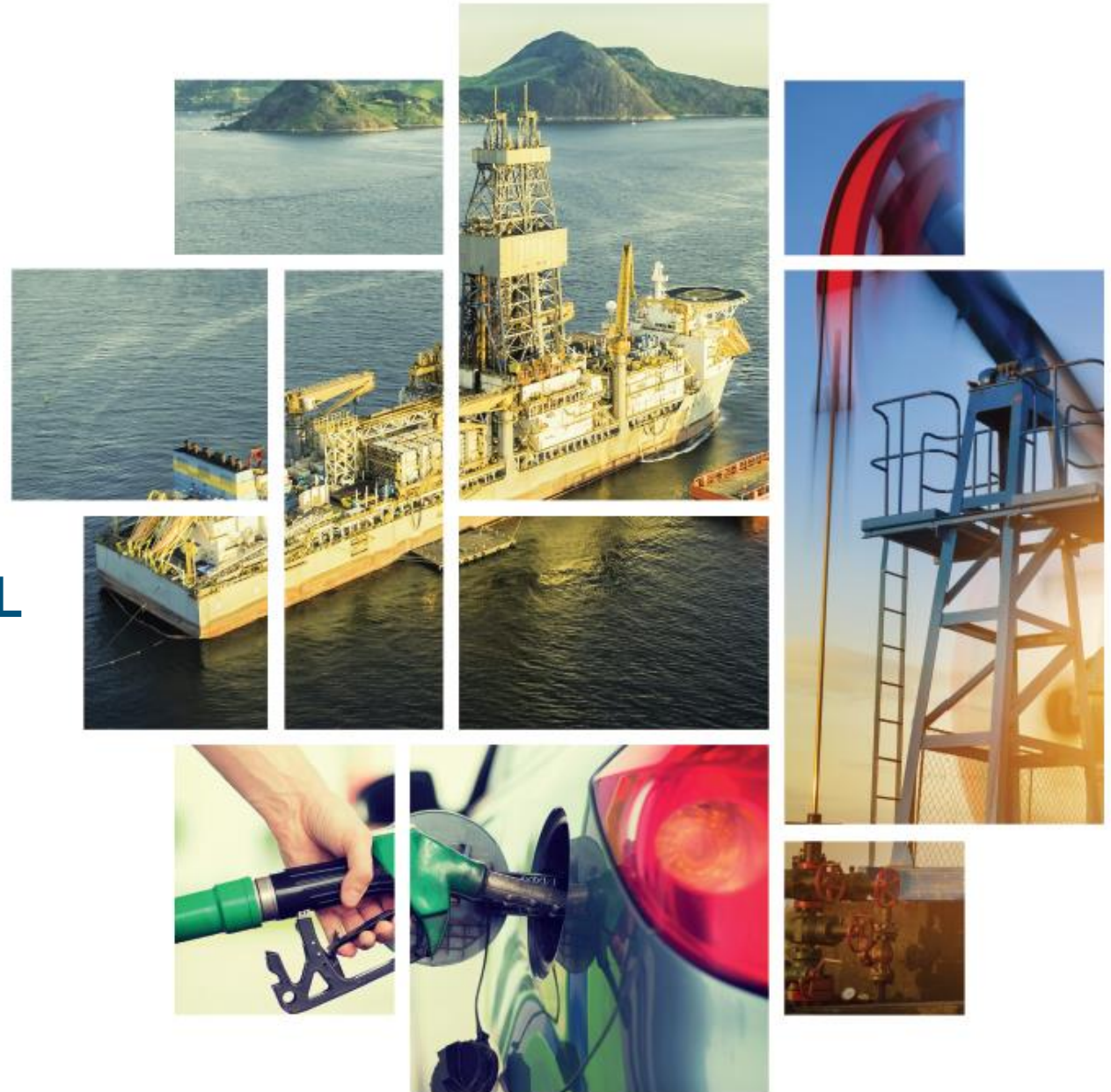


#ThisGeneratesEnergy

# THE OIL AND GAS SECTOR IN BRAZIL IN THE CONTEXT OF ENERGY SECURITY AND TRANSITION

**Roberto Furian Ardenghy**  
President - IBP

October, 2023





**IBP - THE HOME OF THE INDUSTRY**

# IBP Industry Representation

## Mission and values

Promote progress in the energy sector, focusing on the development of a competitive and sustainable oil and gas industry, generating benefits widely recognized by society



### INTEGRITY

*To defend ethics, transparency and unrestricted commitment to respecting the laws and contracts*

### LEADERSHIP

*Act with dynamism and factual basis in critical themes to promote the development of the industry, without commercial or partisan political involvement*

### COMPETITIVITY

*Foster an open business environment that favors competition, free enterprise, innovation, legal certainty, ethics, attraction of investment, and diversity of players*

### SUSTAINABILITY

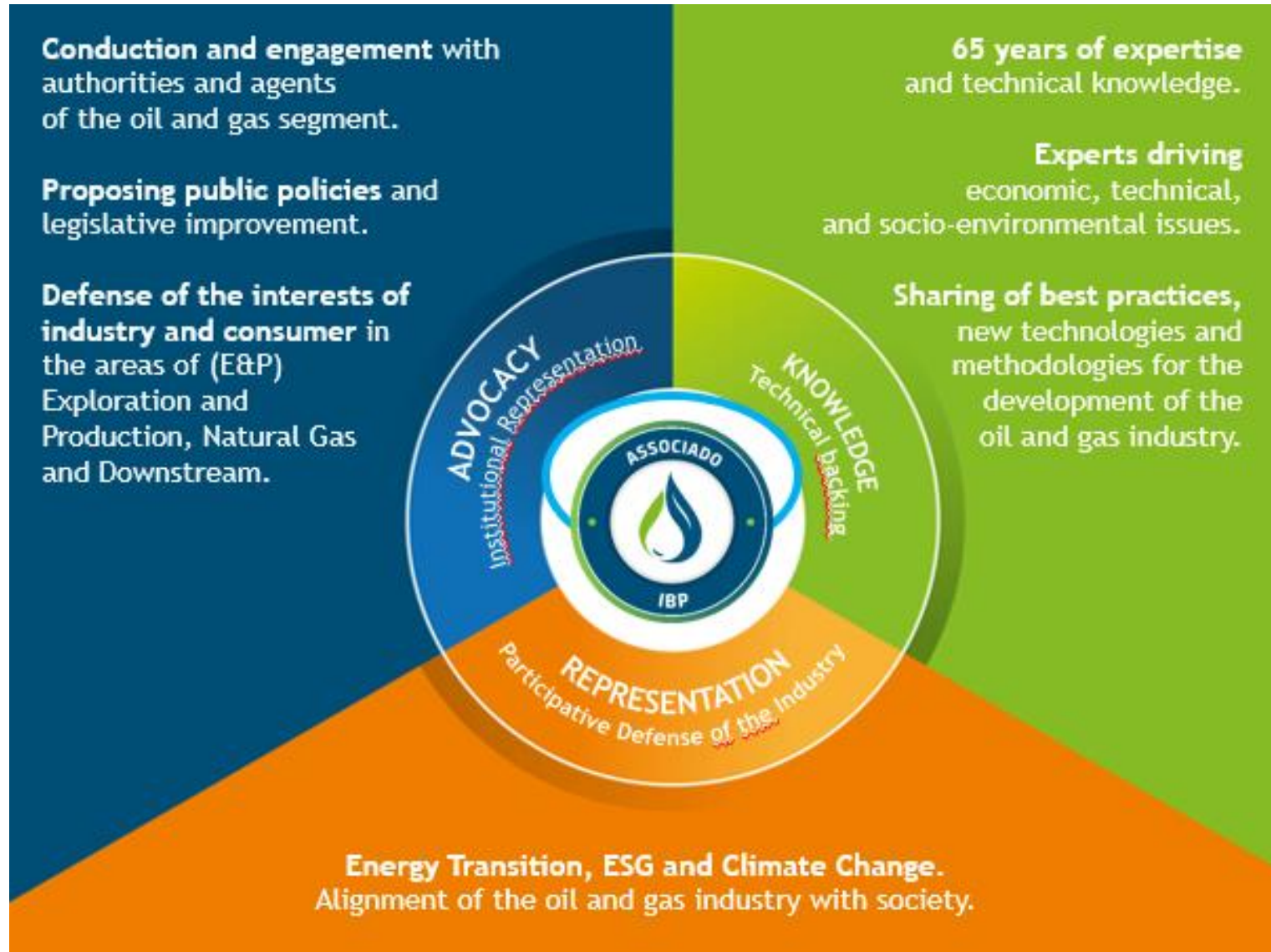
*Promote actions aimed at improving health, safety and risk management standards, in addition to the continuous reduction of the environmental and climate impacts of the industry*

### COMMITMENT TO SOCIETY

*To value the industry's ample contribution to the Brazilian society through the generation of income, technology, and jobs, guided by a performance that is diverse, inclusive, socially responsible, and recognized by society*

# IBP Industry Representation

## Activities



# IBP Industry Representation

Board Members



# IBP Industry Representation

## Associates and partners

**IBP Associates** are organizations, companies and professionals who choose IBP to represent them in the most diverse spheres of the Industry.

**IBP Associates** make the most diverse technical commissions possible, the great debates, the exchange of experiences, the encouragement of young professionals and, above all, the IBP operations as a catalyst and driver of all this effort.



### INSTITUTIONAL PARTNERS



# IBP Industry Representation

Associates and partners

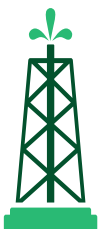




## THE BRAZILIAN MARKET



# Oil and Gas Value Chain



Economic impacts of the O&G sector



**9th**  
largest oil producer in the world<sup>1</sup>

**9th**  
largest refining complex in the world<sup>2</sup>

**10%**  
industrial GDP<sup>6</sup>

**8th**  
largest oil consumer<sup>3</sup>

**47%**  
domestic energy supply<sup>4</sup>

**2nd**  
largest biofuels producer

**1.6 million**  
of direct and indirect jobs<sup>5</sup>

19 refineries  
359 ethanol plants  
50 biodiesel producers  
42 Thousand gas stations  
161 fuel distributors  
557 Oil and oil products importers

IBP's activities

upstream

midstream

downstream

Exploration and Production (E&P)

Transport and storage

Derivatives production and biofuels

Primary Logistics

Distribution

Sales and B2B



Biomass production



Oil and Gas E&P



Maritime Transportation



Pipelines and terminals



Refineries and Petro-chemical Plants



Biofuels plants



Cabotage



Pipelines and terminals



Terminals and bases



Tank-trucks



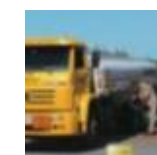
Ferries



Railways



Airports



TRR



Fuel stations



Notas:

(1) BP Statistical Review of World Energy 2022; (2) BP Statistical Review of World Energy 2022; (3) BP Statistical Review of World Energy 2022; (4) EPE BEN 2023; (5) Estimativa com base em dados do CAGED. Número de postos indiretos estimados via multiplicador de Matriz Insumo Produto; (6) CNI - 2023, último dado disponível  
Fonte: Elaboração IBP com base em dados BCG, IEA, CNI, BP, EPE e ANP.

# Opening of the Upstream Market

Positive impact on the sector, expanding oil production

Players Diversification

Risk reduction

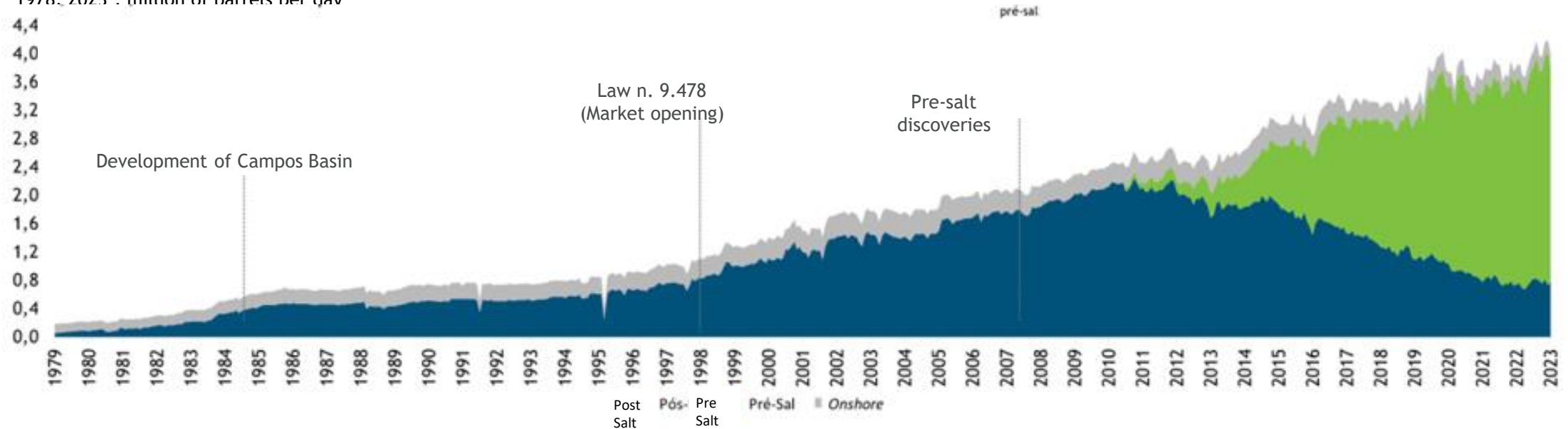
Increase in investment capacity

Increase in reserves and production

More jobs and income generation

## Brazilian oil production

1978 - 2023\*. million of barrels per day



Oil production grew significantly after the opening of the market due to the expansion of investment capacity

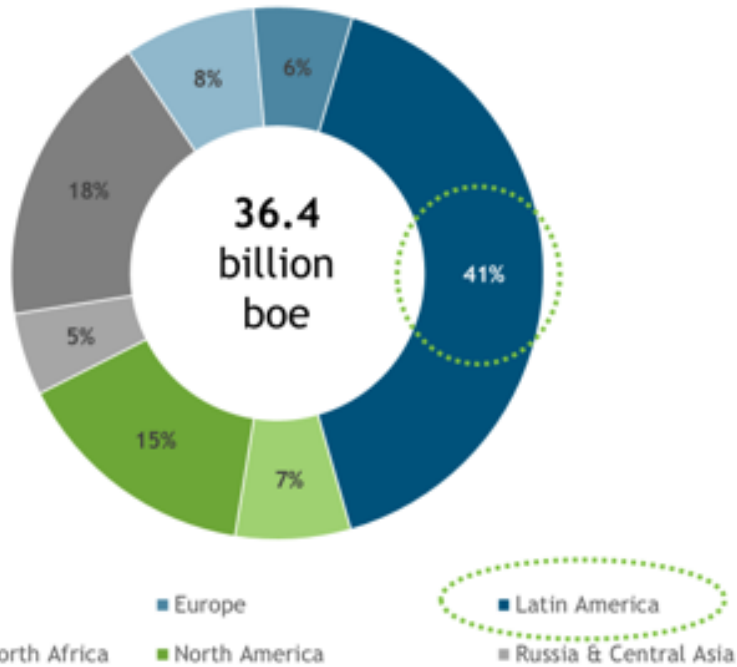
(\*) Data up to March 2022

Source: IBP with data retrieved from ANP

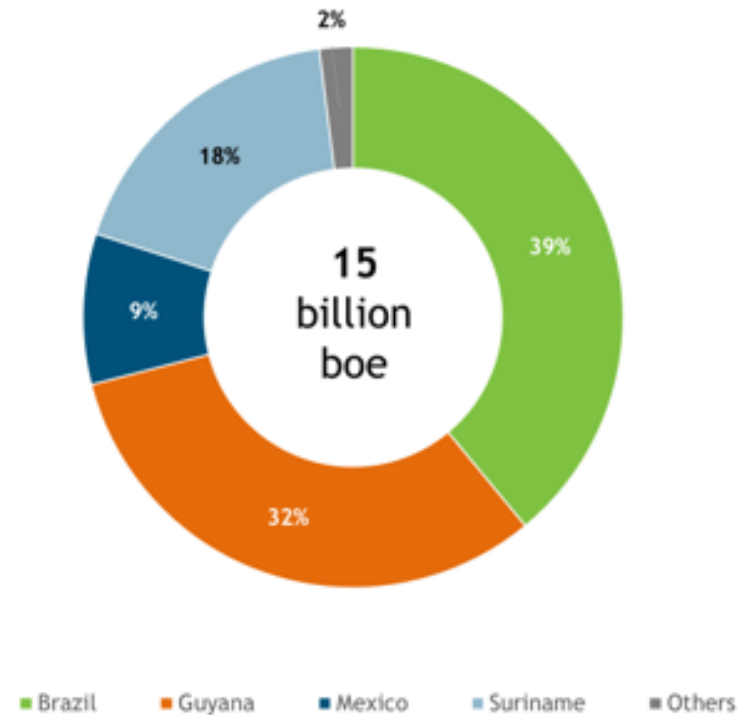
# The O&G Sector in Latin American Region

41% of worldwide discoveries. 6 billion boe in Brazil

Share of conventional discoveries since 2020 worldwide  
Percentage (%)



Share of conventional discoveries since 2020 in Latin America  
Percentage (%)



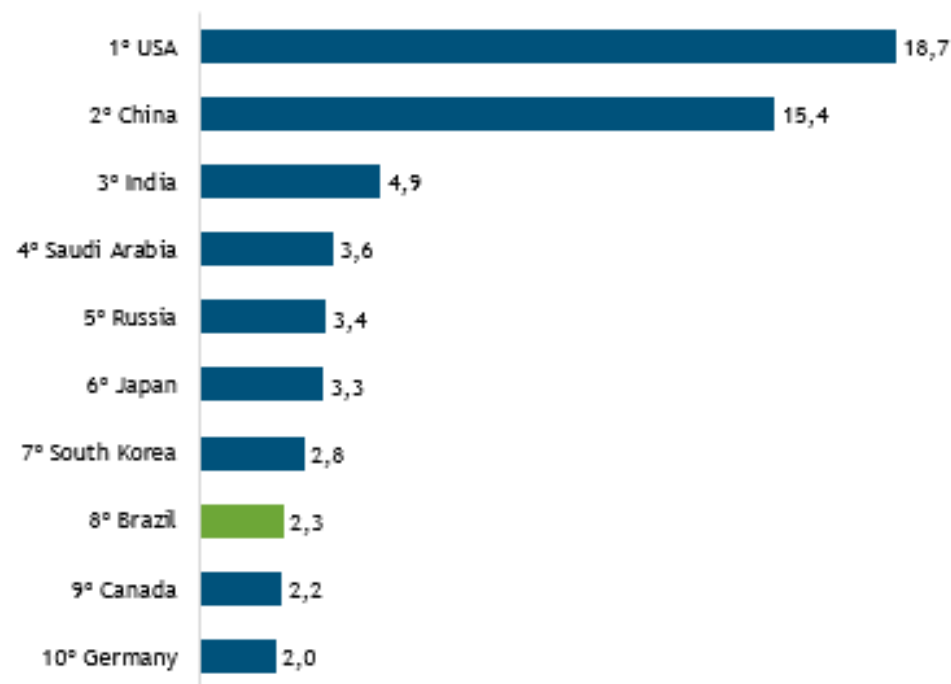
Source: IHS

# Brazilian O&G Sector Relevance

## Consumption and exports

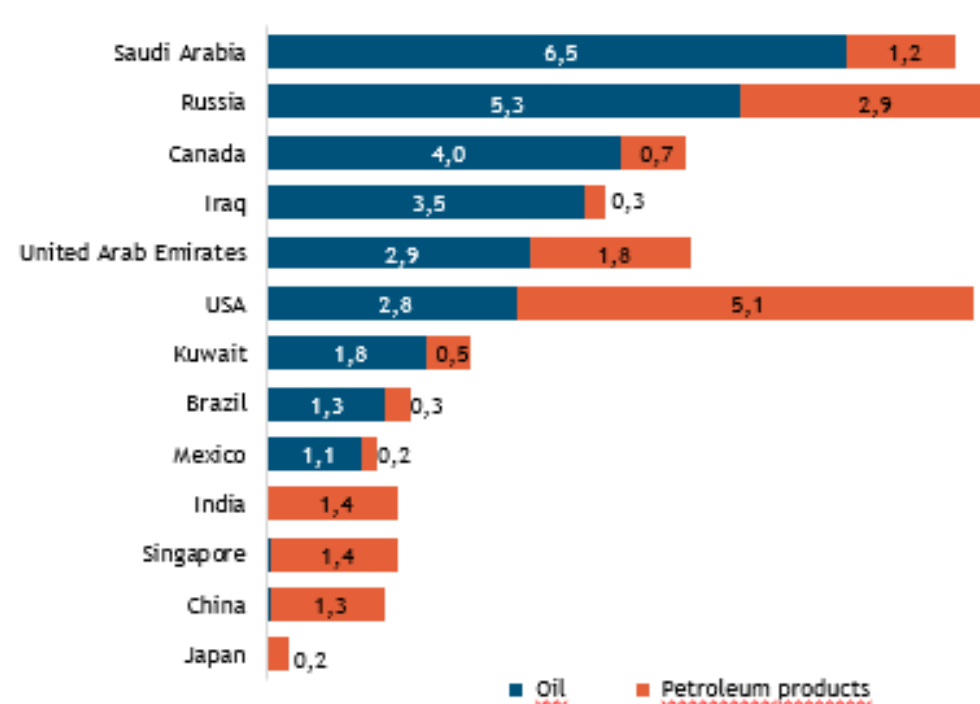
### Oil consumers

2021, million barrels per day



### Oil and petroleum products exporters

2021, million barrels per day



In 2021, Brazil was one of the largest exporters of oil and refined products with a total of 1.6 million barrels per day shipped abroad.

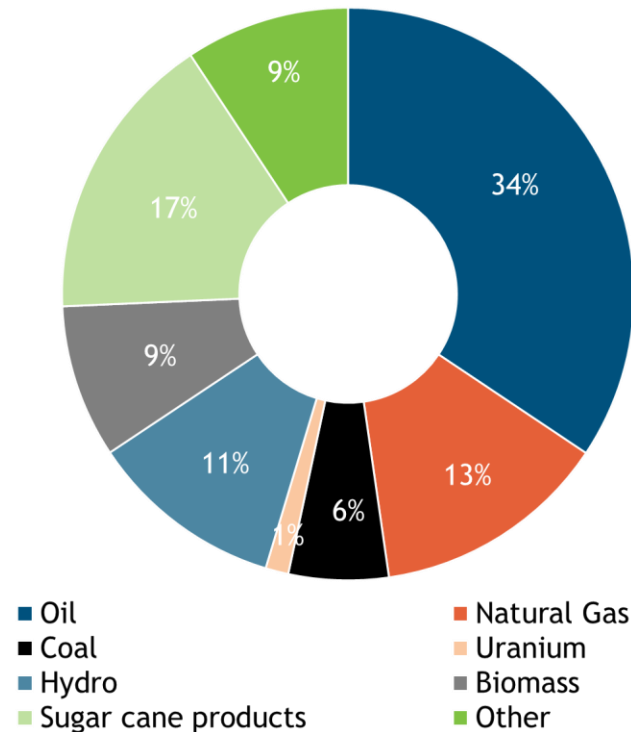
Source: IBP with data retrieved from BP and ANP

# Brazilian O&G Sector Relevance

Energy and Socioeconomic importance

## Domestic Energy Supply

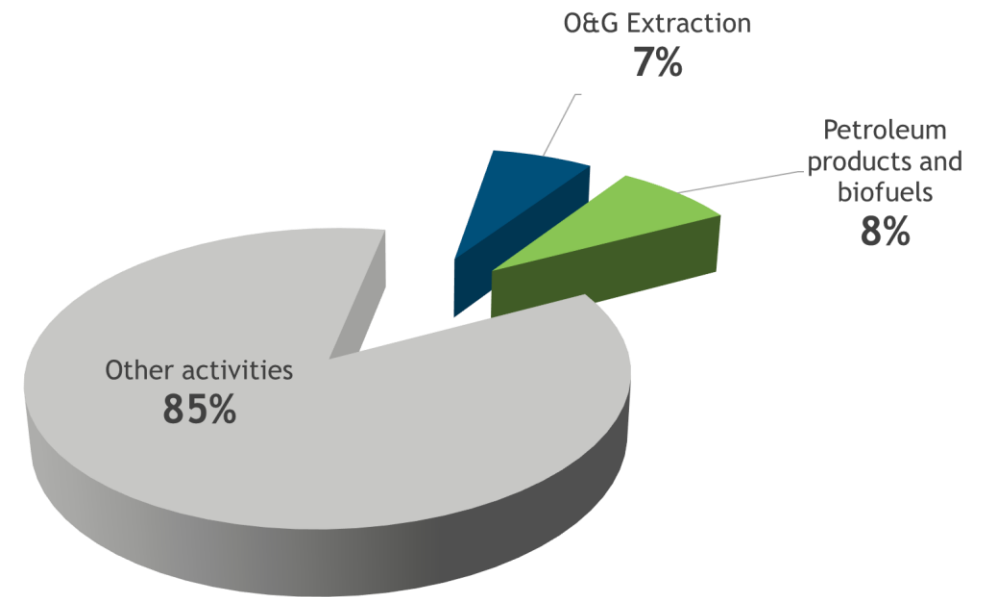
2021, percentage (%)



**In 2021, O&G accounted for 47% of the national energy supply**

## Industrial GDP

2019, percentage (%) by sector



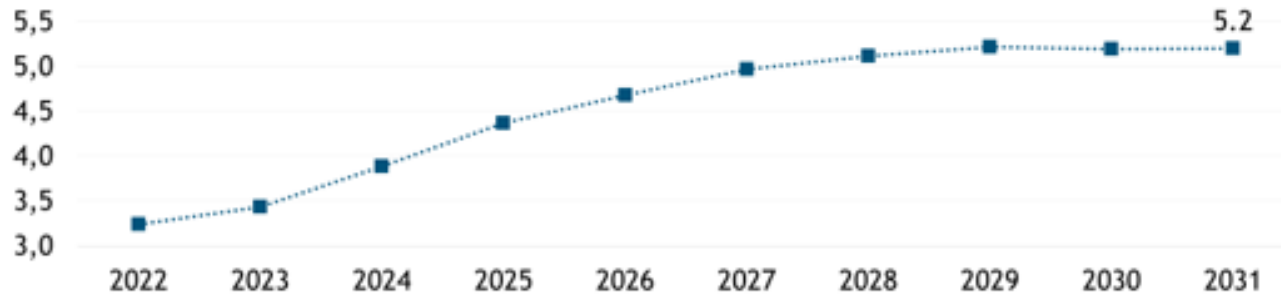
**O&G sector also accounted for 15% of industrial GDP in 2019**

# Brazil - Projected Investments

Work opportunities and production growth

## Brazilian oil production outlook

2022-2031, million barrels per day



## Upstream investments

2022-2031, US\$ billion

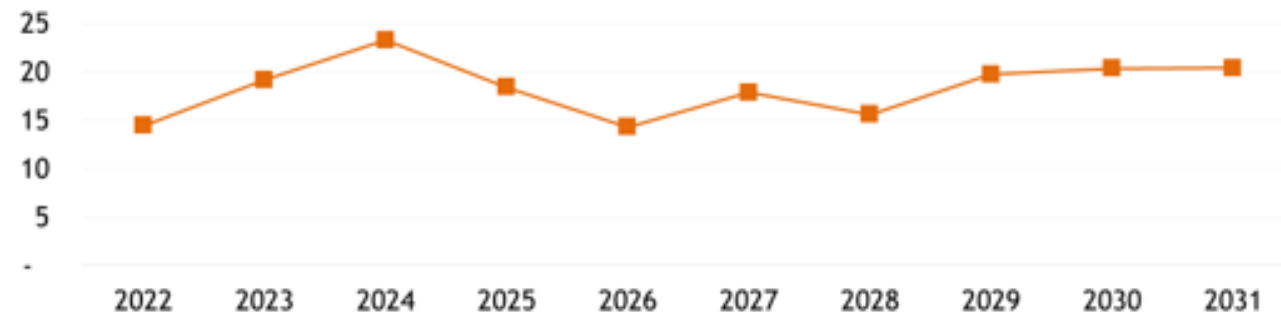
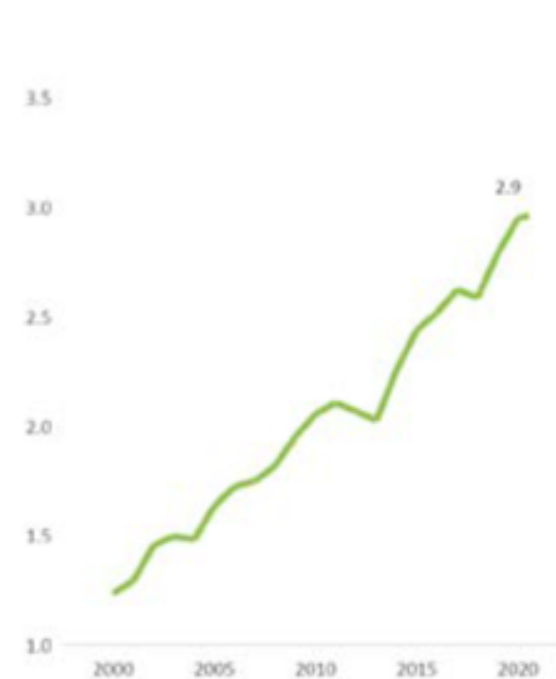


Figure 1: Evolution of national oil production

Millions of barrels per day, 2000-2021



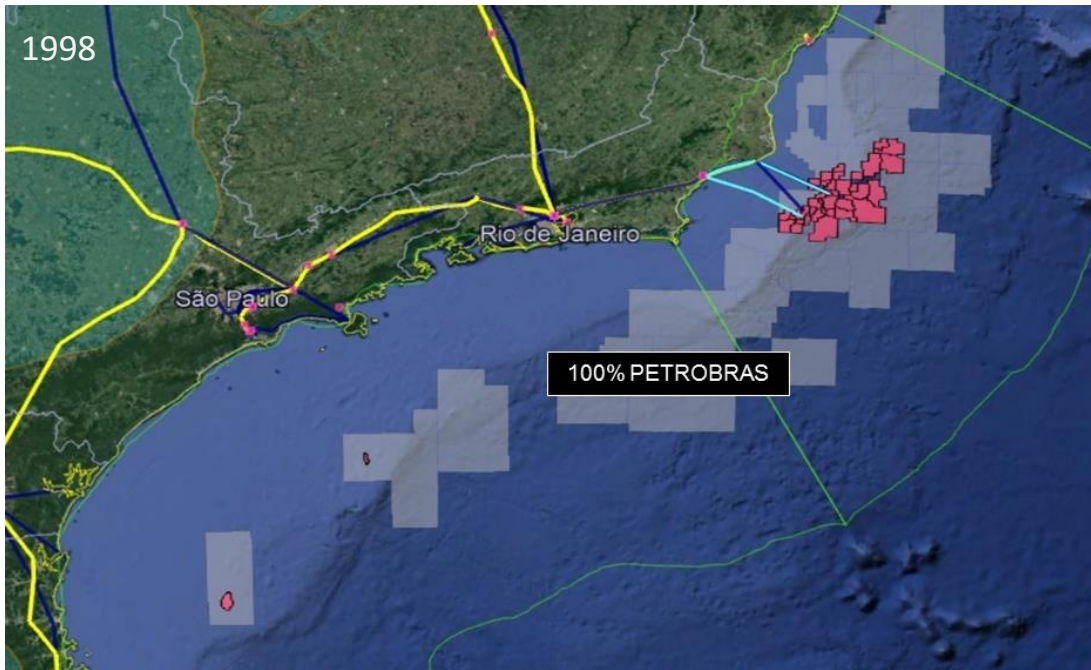
In the upstream segment, between 2022 and 2031 aggregate investment will sum up to US\$ 183 billion, government revenue could reach US\$ 622 billion in the same time period, fostering 445 thousands work positions per year on average

Note: Estimates based on IHS price scenario in 2022  
Source: IBP with data retrieved from Vantage - IHS Markit

# Brazil - Upstream Scenario

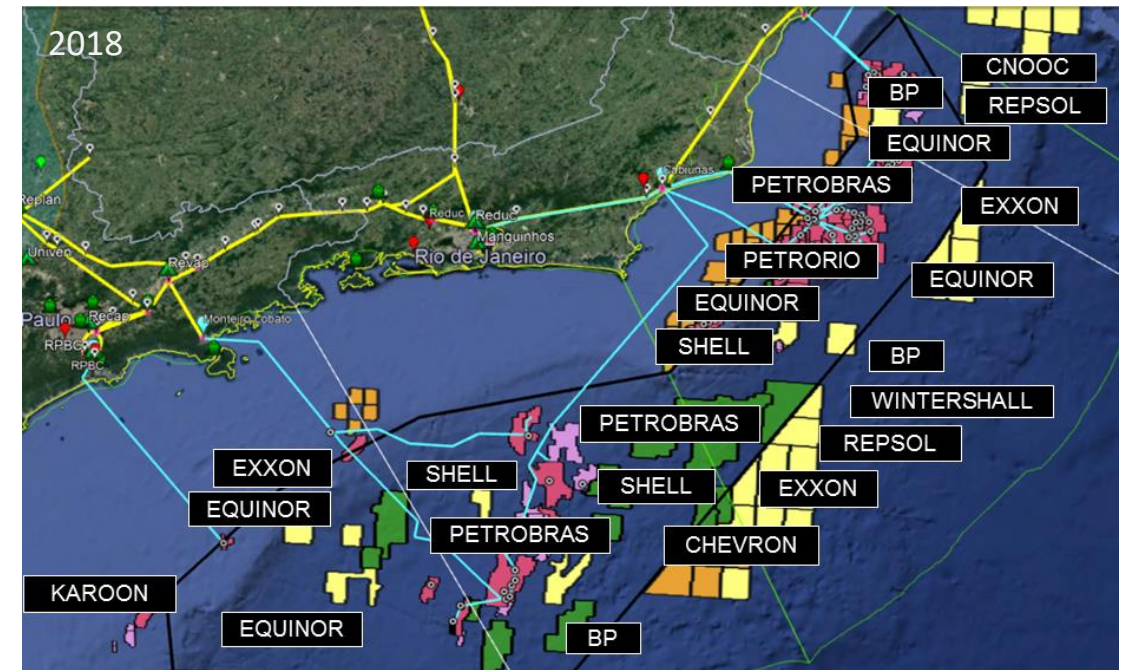
Increase of Upstream players

Campos Basin: Round Zero



1 million barrels/day in 1998

Campos Basin and Santos Basin: after the resumption of bidding rounds



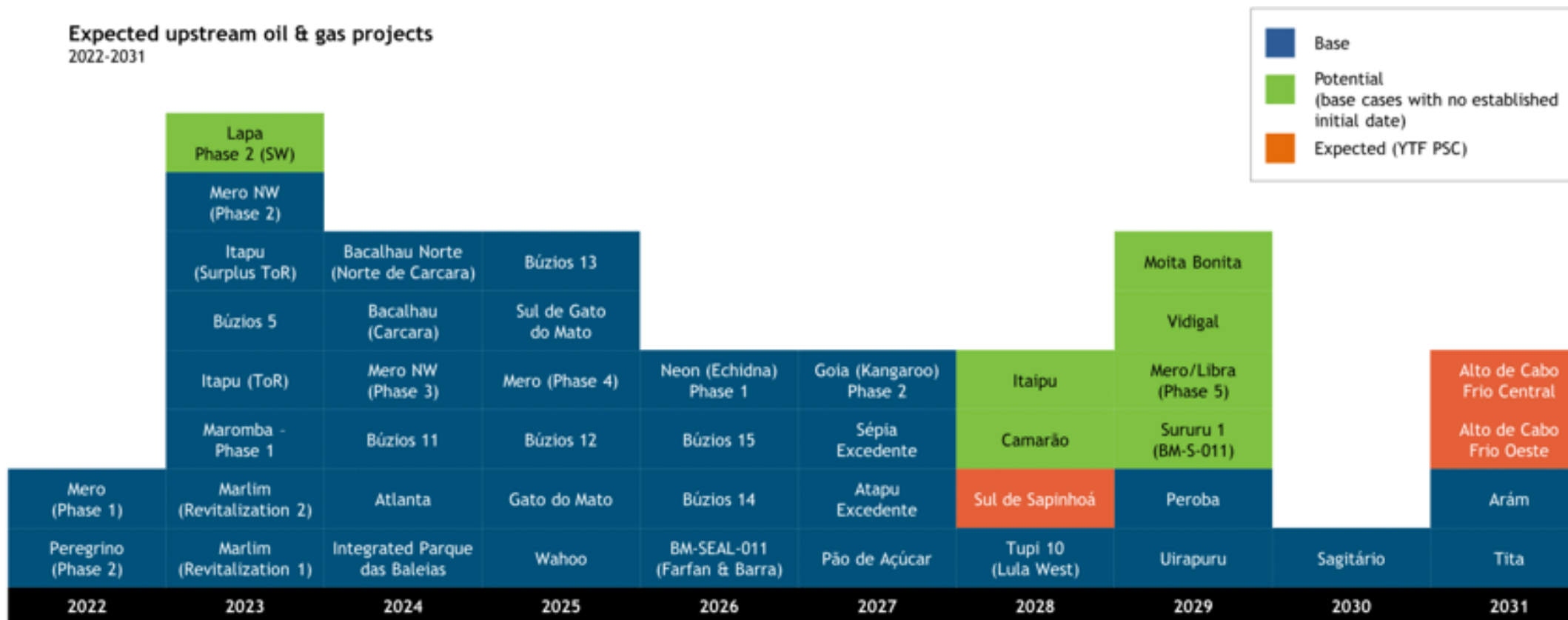
2,9 million barrels/day in 2022

Since the market opening in 1997, the diversification of upstream players and the expansion of offshore infrastructure has been remarkable

# Brazil - Upstream Scenario

## Expected projects

Expected upstream oil & gas projects  
2022-2031



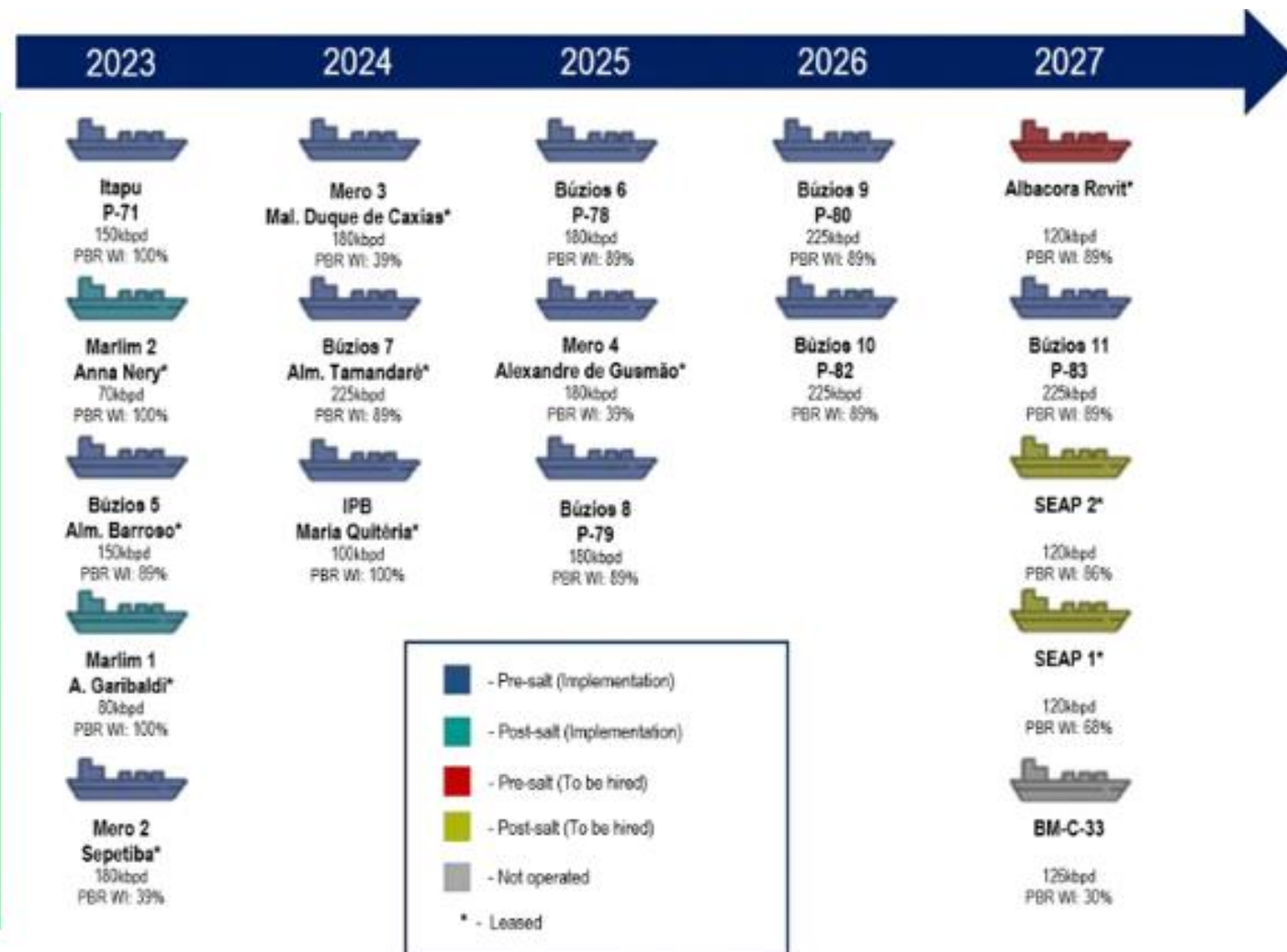
The current oil price scenario encourages investment in new exploration activities in Brazil

Source: IBP elaboration with data from EPE, Petrobras, IHS Markit, Gas Energy



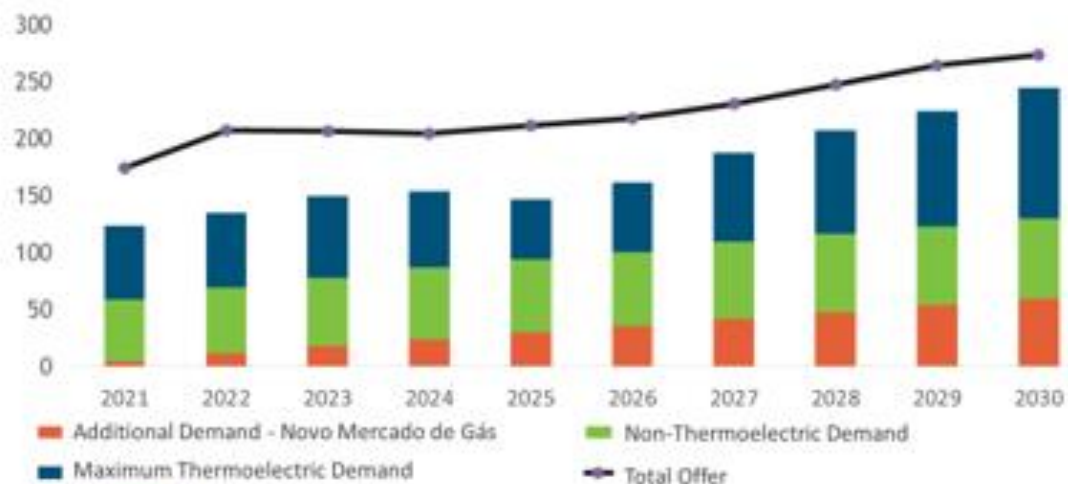
# Brazil - Upstream Scenario

Expected projects

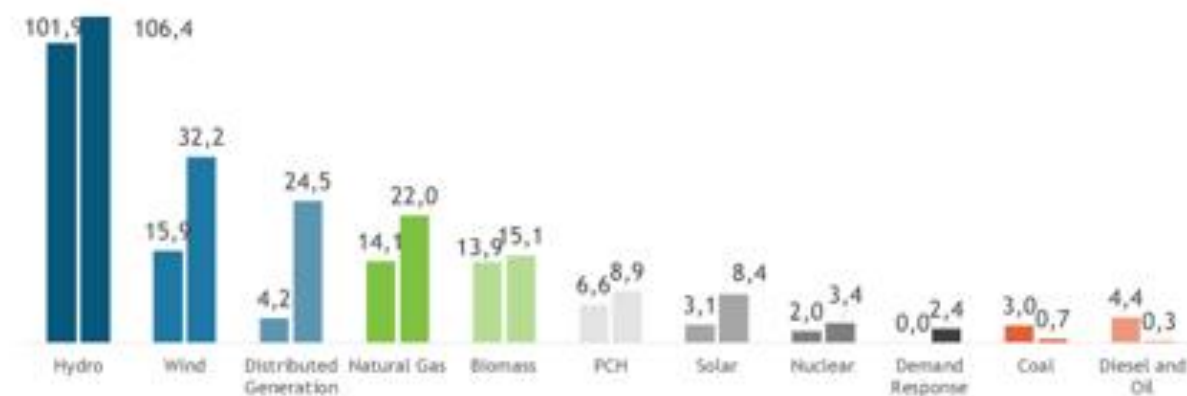


# Brazil - Natural Gas Scenario

Natural gas demand and supply balance with Novo Mercado de Gas  
MMm<sup>3</sup>/day



Evolution of the participation of sources in the installed generation capacity  
GW, 2020-2030



New gas market can bring competitiveness and boost the economy with investments, job and income generation



The sector can count on up to 14 MMm<sup>3</sup>/day of additional national supply, and 60 MMm<sup>3</sup>/d of additional demand



The expansion of intermittent renewable sources demands complementation of thermal generation



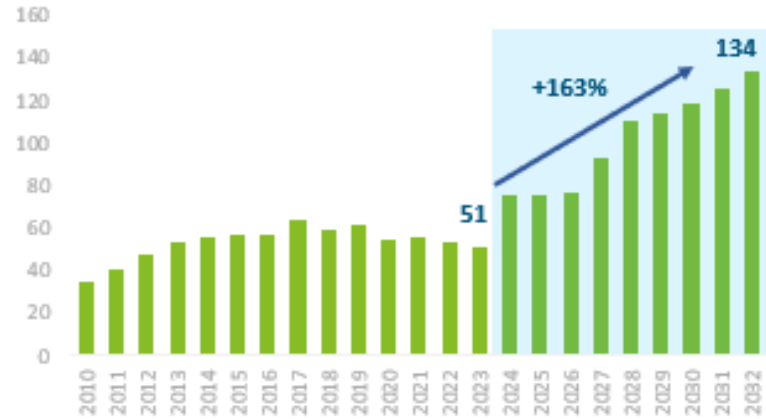
The power sector can act as an anchor for the expansion of gas in the mix

Natural Gas is a transitional fuel that plays an important role in ensuring the country's energy supply and contributes with Brazilian economic development.

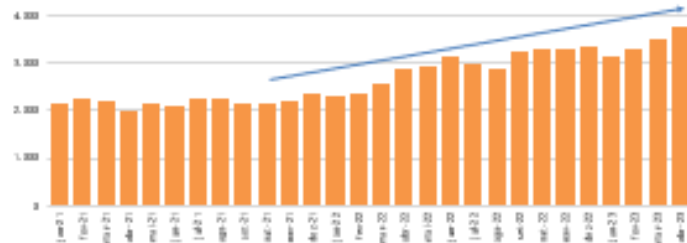
# Brazil - Projected Growth of Gas Supply

Market opening and investments in infrastructure

Projected growth in natural gas net production  
Millions of cubic meters per day (MM m<sup>3</sup>/d)



Onshore gas production  
MM m<sup>3</sup>/d



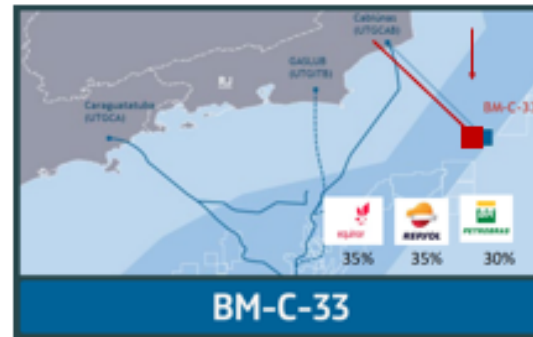
2024



ROTA 3

Flow capacity: 18 MM m<sup>3</sup>/d

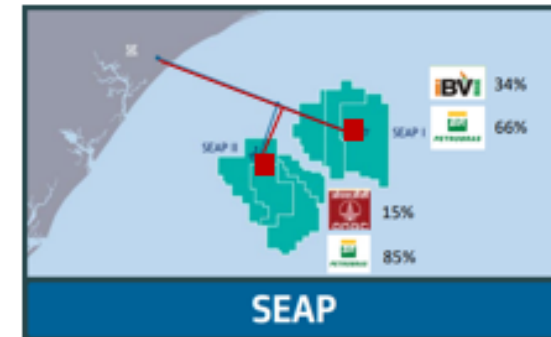
2028



BM-C-33

Operator: Equinor  
Flow capacity: 16 MM m<sup>3</sup>/d

2028



SEAP

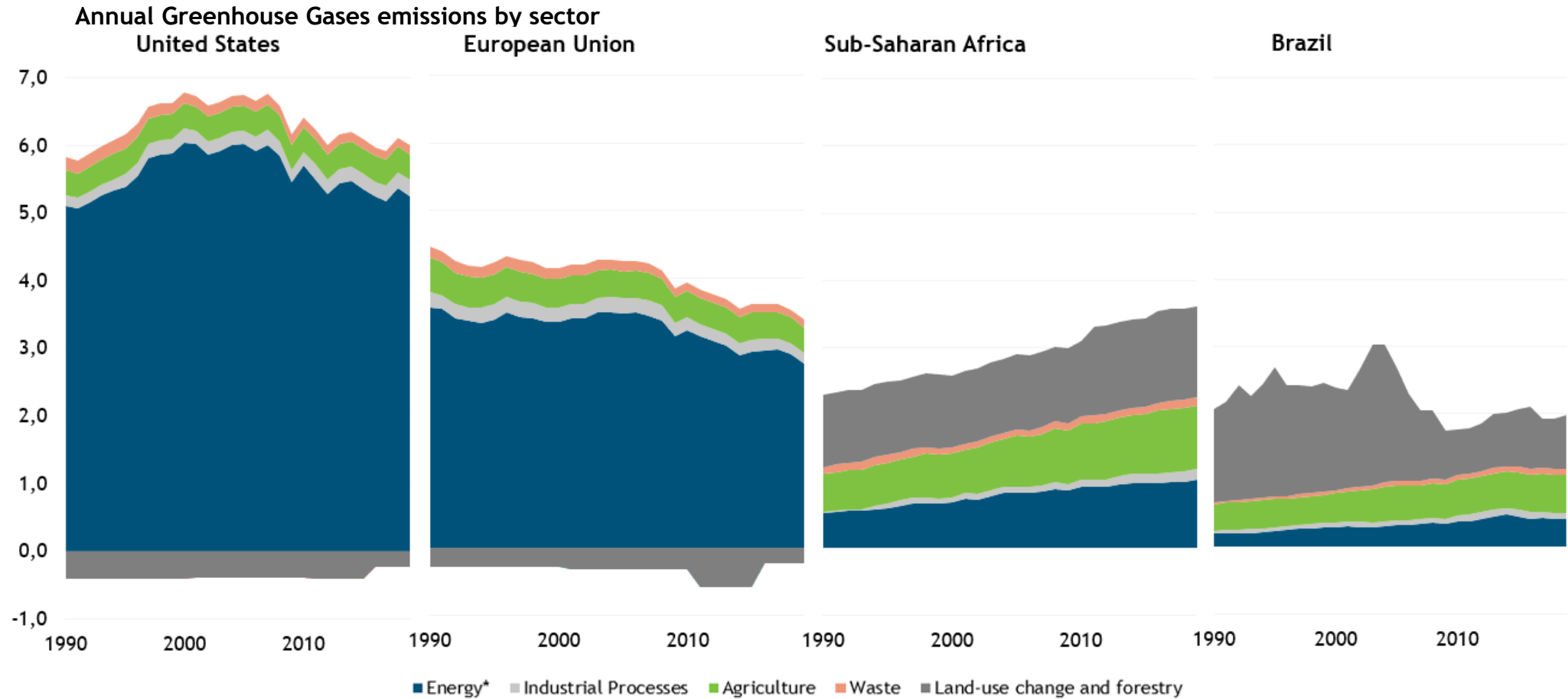
Operator: Petrobras  
Flow capacity: 18 MM m<sup>3</sup>/d



## OIL&GAS DECARBONIZATION AND RENEVABLE ENERGIES

# Brazilian Greenhouse Gas Emissions

## Energy sector



The strategy for reducing emissions must consider the particularities of each country

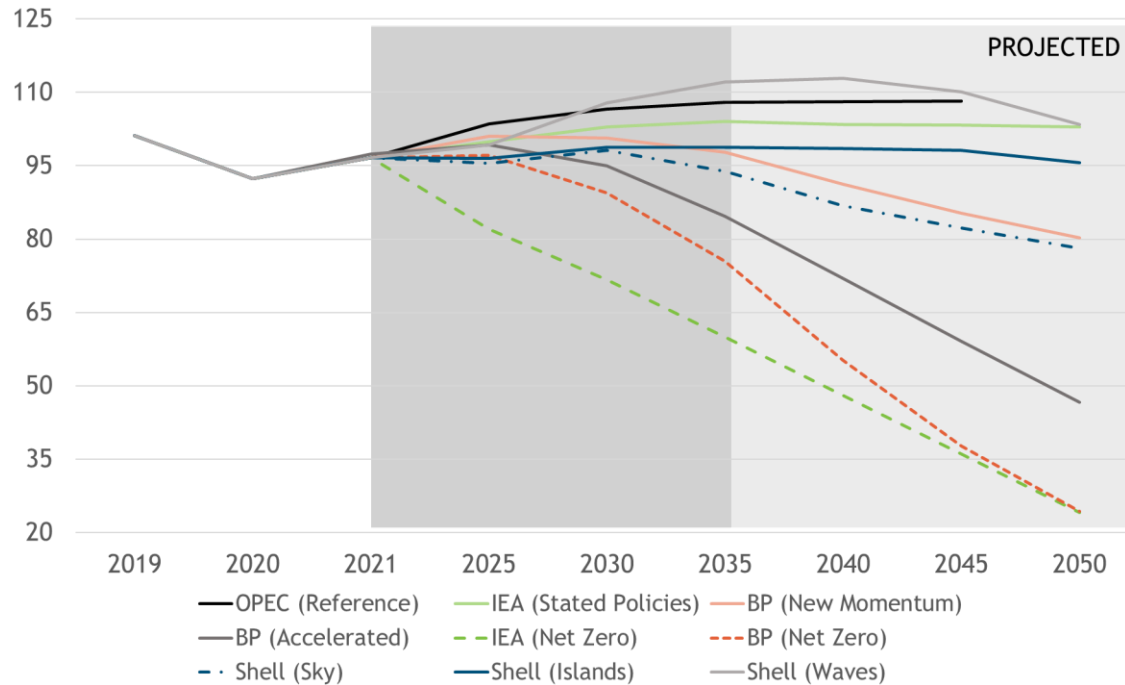
(\*) Includes emissions related to activities such as heating buildings, manufacturing, transport and construction  
Source: IBP with data from Financial Times and SEEG

# Brazilian Oil Quality

Low carbon intensity as a relevant aspect for energy transition context

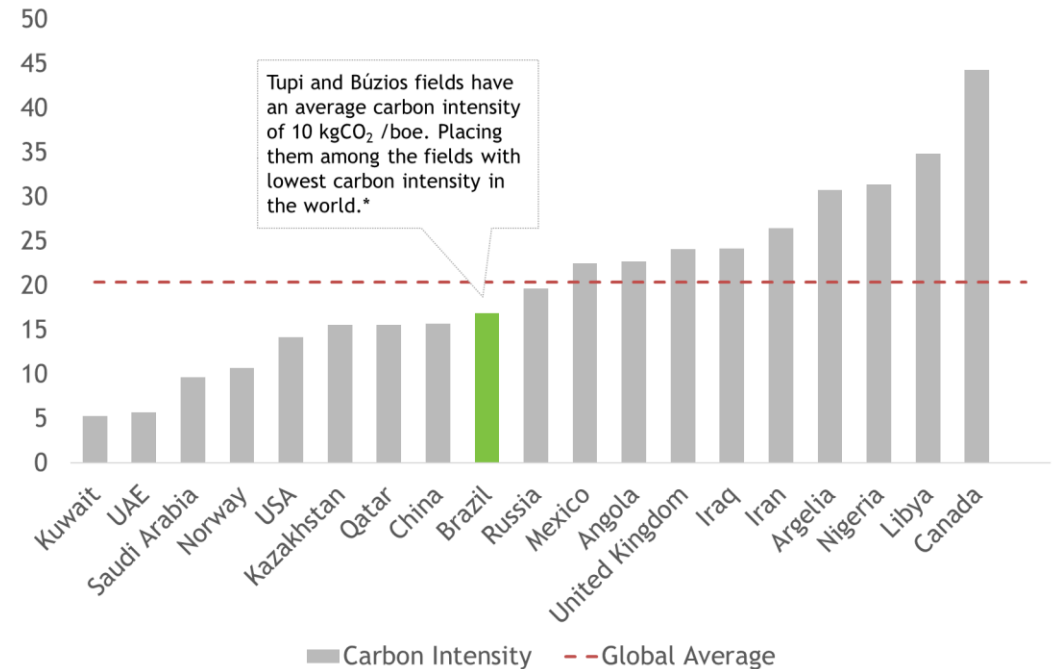
## Long-term oil demand outlook

2019-2050, million barrels per day



## Average carbon intensity of crude oil production

2019, kgCO<sub>2</sub>/boe



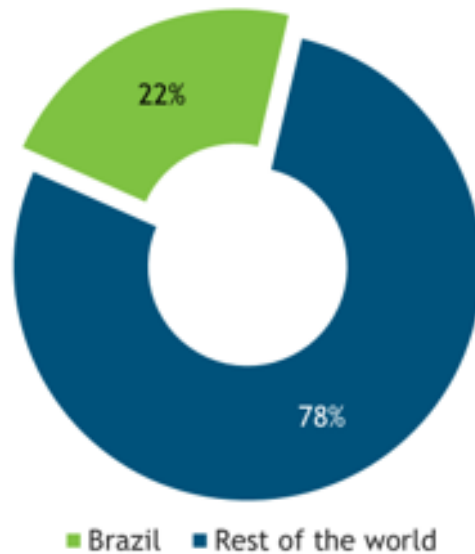
The oil demand trajectory is still uncertain, ranging from 24 to 103 million barrels per day by 2050 depending on the scenario. However, discussions about tackling climate changes and energy transition have been growing in the past years, so this might be the last window of opportunity to explore these assets.

(\*) Note: Digital Oil and Gas Brasil magazine on May 3rd  
Source: IBP with data retrieved from OPEC, IEA, BP and Shell

# Brazil in the Energy Transition

## CCS Project

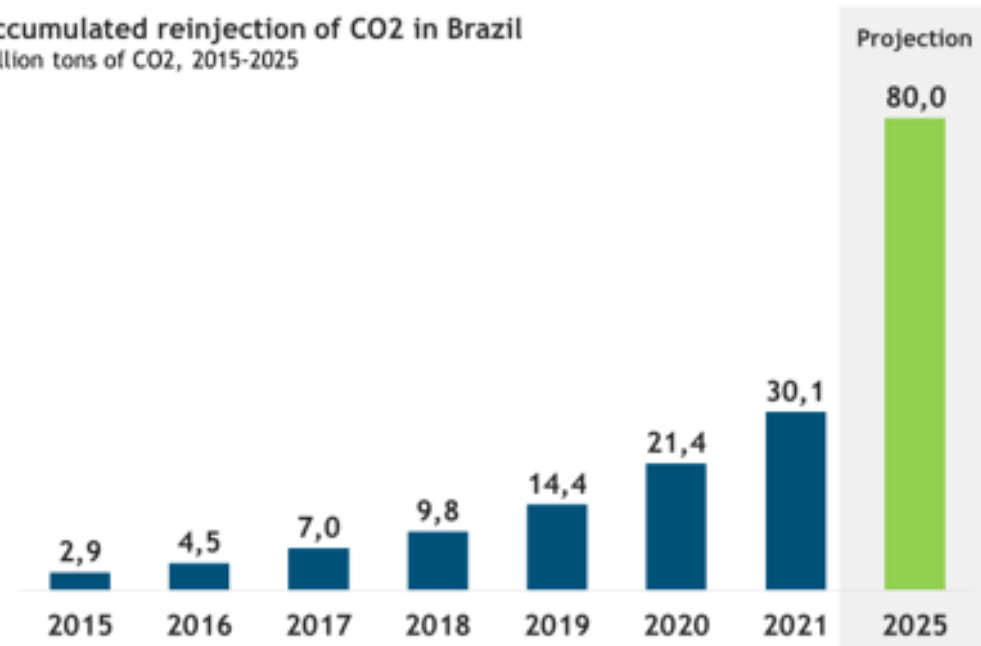
Total global carbon capture capacity  
2021



In 2021, worldwide capacity of CCS projects in operation was around 40 million tonnes per year. In 2021, Brazil reinjected 8.7 Mt, which represents almost 22% of the total.

Fonte: IBP with data of the Global CCS Institute and Petrobras

Accumulated reinjection of CO2 in Brazil  
Million tons of CO2, 2015-2025

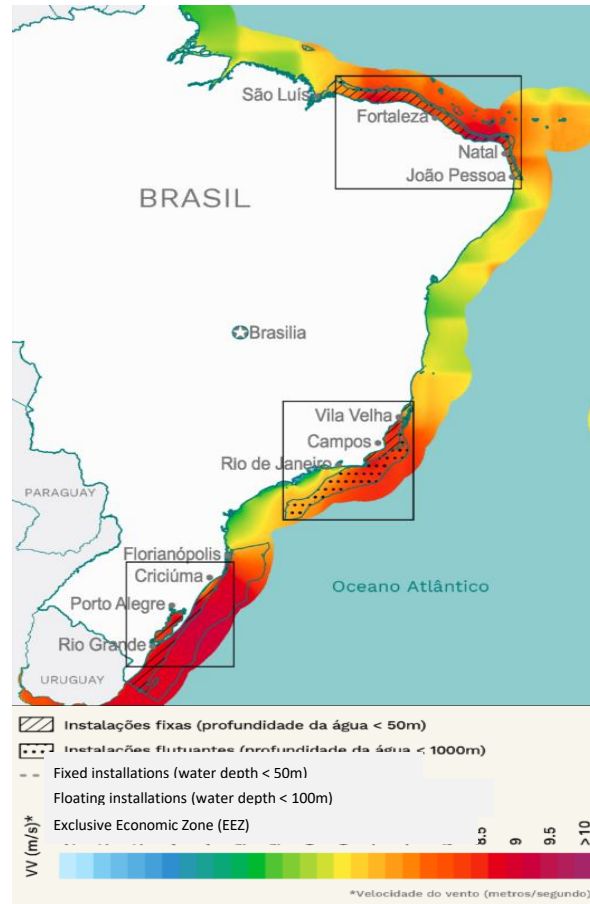


In 2021, 8.7 Mt of CO2 were reinjected in Brazil, reaching an accumulated volume of 30.1 Mt of CO2 between 2008 and 2021. Following this pace, Brazil is projected to reach a total accumulated volume of 80,0 Mt of CO2 by 2025.

# Brazil in the Energy Transition

## Offshore Wind energy

Wind speed  
100 m - ERA5 base



Brazilian offshore wind potential

Total  
**6.91 TW** → **697 GW**  
Up to 50 meters deep  
(7.0 - 7.5 m/s)

Brazilian offshore wind potential by region

Region	Potential (GW)	
	0-20m	20-50m
North	78	119
North-East	146	210
South-East	10	37
South	42	55



There are around 180 GW in offshore wind projects under environmental licensing processing Brazil



Regulatory framework is progressing:  
(i) Decree No. 10,946/2022 (guidelines for offshore wind projects); (ii) PL 576/2021 (regulatory framework for the wind farm concession process).



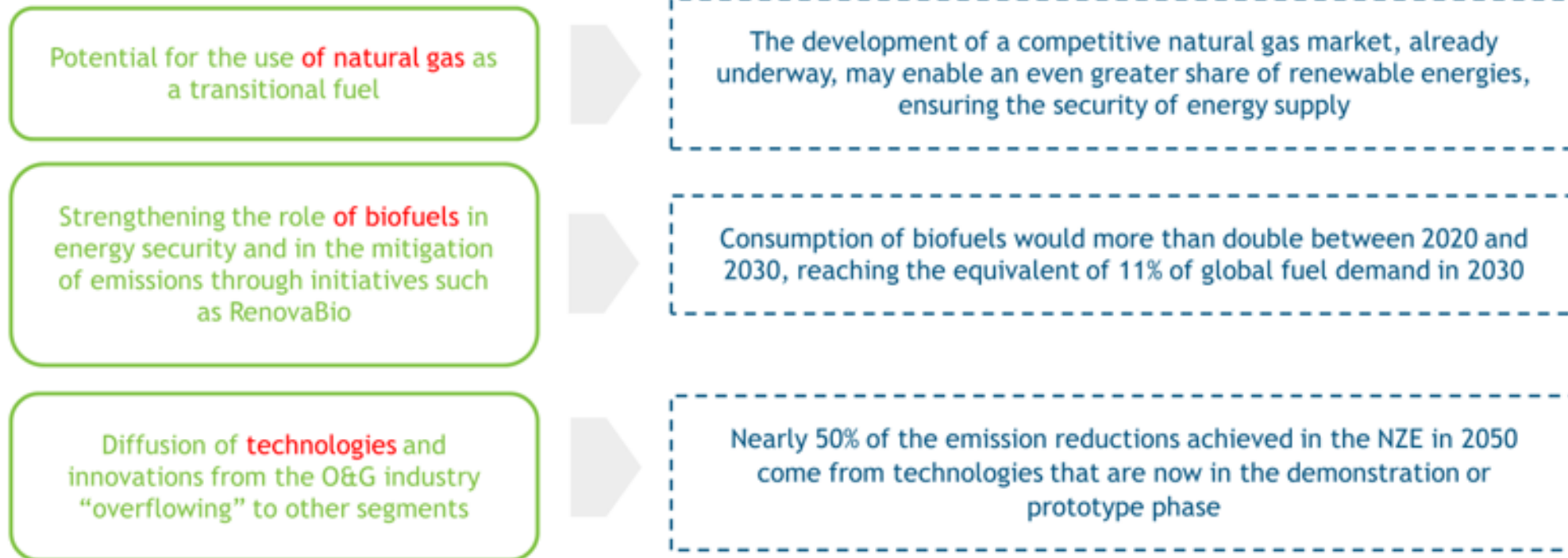
Expansion of offshore wind energy in Brazil converges with the objective of maintaining high share of renewable energies in the energy mix.

Despite recent cost inflation, the offshore wind industry is competitive in terms of inputs, especially considering the increase in fossil fuel prices in recent months.



# Brazil in the Energy Transition

## Opportunities for Brazil



Given the differentiated profile of the Brazilian energy mix in terms of emissions, the energy transition process in the country is associated with opportunities for both the upstream and the downstream.



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