THE O&G INDUSTRY IN BRAZIL

An overview and opportunities for Japanese Investors in the E&P and gas market

BRASIL
駐日ブラジル大使館

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anp

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An unprecedent transformation

We continue to make progress in opening the O&G sector

E&P

A completely **diverse sector** will emerge from Petrobras Divestment Plan. All onshore and shallow water fields are being sold, as well as some great offshore post-salt concessions.

With new investments in mature fields, pre-salt fields and offshore blocks in the exploratory phase, Brazil is ready to grow production and take a leading position in the sector.

Downstream

Half of the Brazilian refining capacity (REFAP • RNEST • REPAR • RLAM • LUBNOR • REGAP • REMAN • SIX) is being sold by Petrobras, paving the way for a **competitive and open refining** and fuel market for the first time ever.

ANP is taking measures to deal with the transition to this new environment and to bring competitiveness to the distribution sector.

Gas

First-ever **effective opening in the natural gas market** with Petrobras leaving the transport and distribution sectors.

A new legal framework has just been put in place for the gas market (Law 14,134/2021 and Decree 10,712/2021) and a strong regulatory agenda is underway to create opportunities for suppliers, free consumers and distributors. An open season calendar is set for this year.

Even at challenging times, Brazil's O&G Industry has responded with remarkable resilience

2020

5% of production growth and exports record

Pre-salt high performance

Exports of oil and fuel oil with low sulfur content

2nd Cycle of Open Acreage

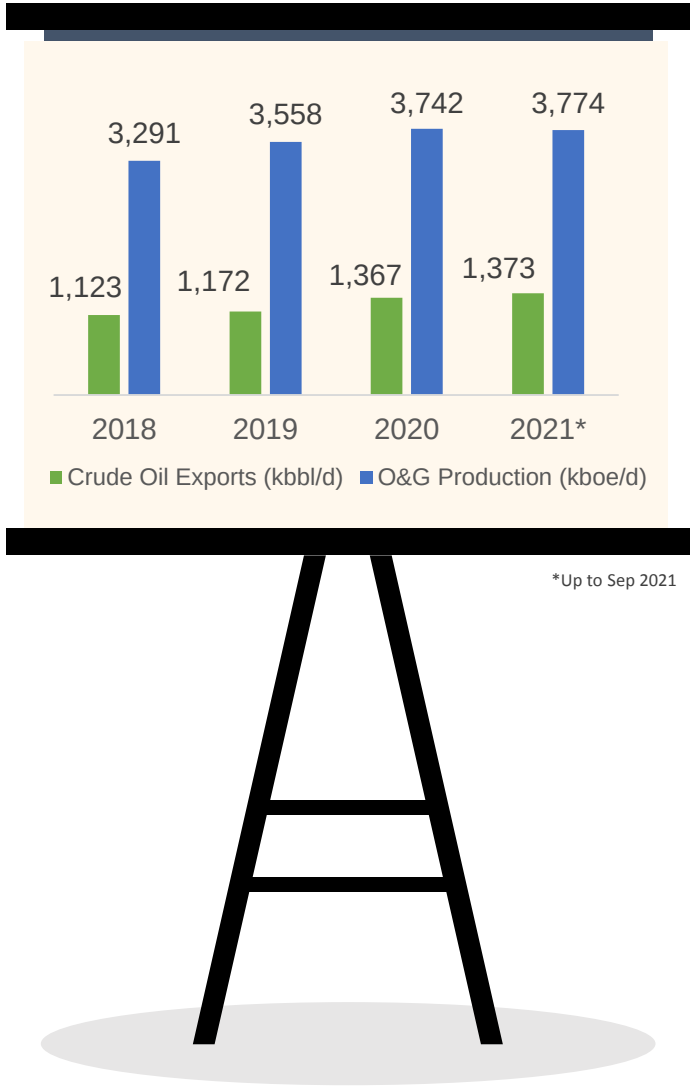
Performed in December: 18 areas sold

Assets Acquisition

50 M&As approved by ANP

COVID 19

Flexible emergency measures - supportive approach by ANP



2021

Slightly growth of O&G production and exports

Potential new records

2 Bidding Rounds

5 areas sold in the 17th Round

ToR BID scheduled to Dec 2021

1,068 areas available in the Open Acreage

Assets Acquisition increased

~50 M&As approved by ANP only up to July 2021

COVID 19

Returning to business-as-usual, but continued flexibility available where required

Brazil is taking a leading role in the E&P sector

2021

8th
Crude Oil and Condensate producer (BP Statistical Review 2021)

86
E&P company groups, ~50% foreign (Oct 2021)

Production:

3M
Bpd of oil production (Sep 2021)

133M
M³ of gas production (Sep 2021)

Reserves:

12B
Bbl in proved oil reserves (Dec 2020)

337B
M³ in proved gas reserves (Dec 2020)

Forecast

Potential to reach more than

5
million oil bpd in 2030 (EPE)

Potential to be the

5th
Largest crude oil exporter in 2030 (EPE)

E&P at a glance

Pre-Salt

One of the best plays in the world and the most competitive deepwater assets.

74%	130	21,886
of production	producer wells	Average well production (boe/d)

Prod: **2,845,213** boe/d

Post-Salt

Green and brownfields, deep and shallow waters.

20%	332	2,284
of production	producer wells	Average well production (boe/d)

Prod: **758,366** boe/d

Onshore

Mature basins and new frontier basins (gas prone).

6%	5,779	41
of production	producer wells	Average well production (boe/d)

Prod: **236,111** boe/d

*Sep 2021

26B
Barrels equivalent of O&G produced to date

375
Fields under development or production

249
Exploratory Blocks

400+
Production Installations

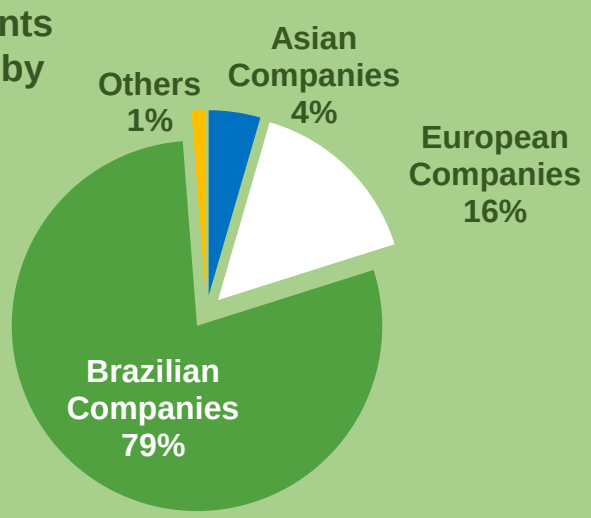
50
Billion dollars E&P Investments Forecast 2021 – 2025

5
Billion dollars Decommissioning Costs 2021-2025

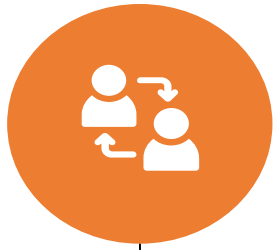
30,000+
Wells drilled

19,000+
Km of O&G pipelines

Investments Forecast by Origin



E&P strategic goals



RIGHT ASSETS IN THE RIGHT HANDS

Petrobras **Divestment Plan** plays key role in this goal.
Support small and medium producers market

INCREASE THE RECOVERY FACTOR

Brazil's Current RF: 10%
This represents an enormous opportunity in the **mature fields**. Need to reduce OPEX and decommissioning costs

INCREASE EXPLORATORY ACTIVITIES

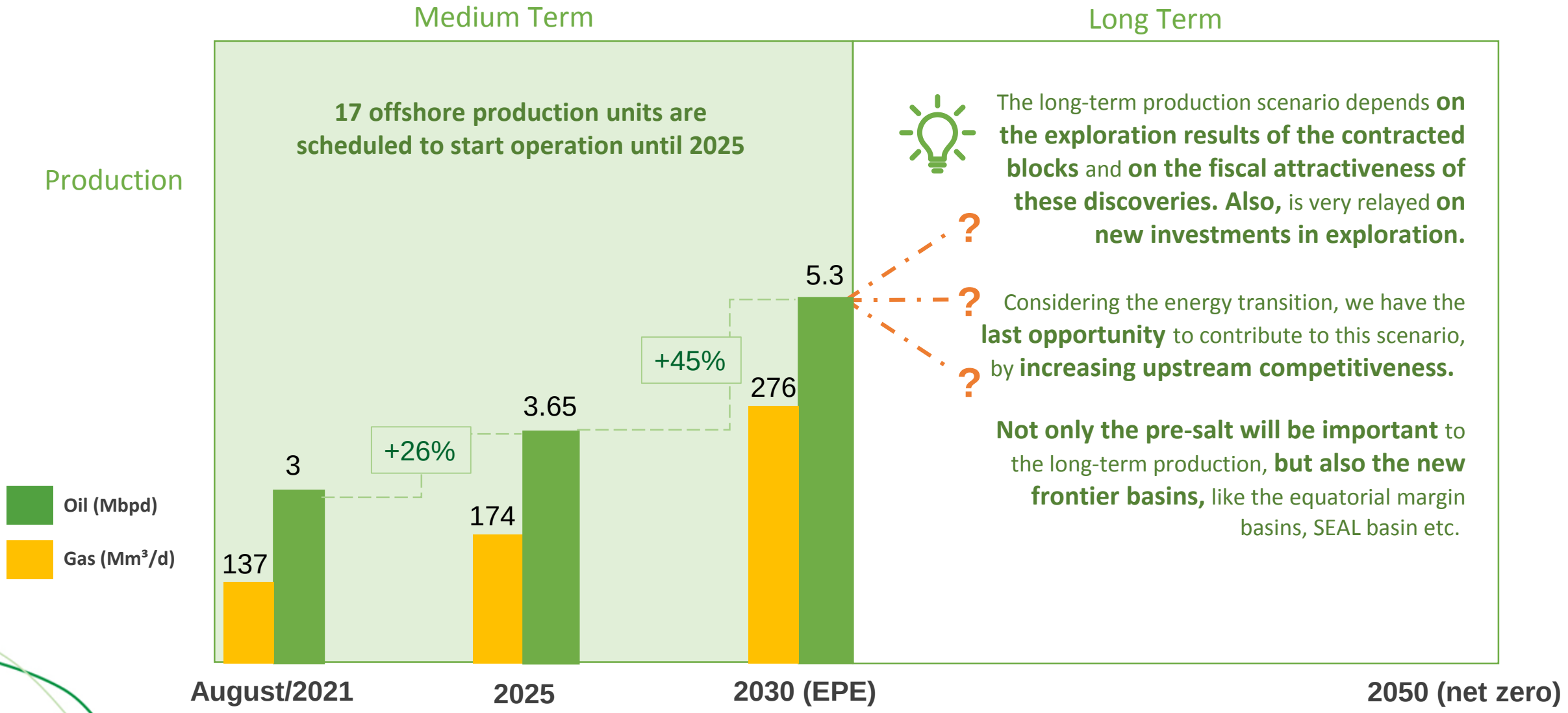
The COVID-19 pandemic accelerated **energy transition** discussions and reinforced the **sense of urgency** in exploring our resources

MAKE VIABLE THE MARGINAL DISCOVERIES

There are **many marginal discoveries** in the **different environments** that could be developed if we address the correct incentives to make them viable

We need to keep increasing **above ground competitiveness** in order to achieve our main goals

Brazil is poised to be one of the key sources of growth over the medium term, but still need to keep taking measures for the long term



The long-term production scenario depends **on the exploration results of the contracted blocks** and **on the fiscal attractiveness of these discoveries. Also,** is very relayed **on new investments in exploration.**

Considering the energy transition, we have the **last opportunity** to contribute to this scenario, by **increasing upstream competitiveness.**

Not only the pre-salt will be important to the long-term production, **but also the new frontier basins,** like the equatorial margin basins, SEAL basin etc.

Offshore Projects to start operation until 2025

10 new FPSOs to develop the **pre-salt** and **7 new production units** to revitalize and develop **the post-salt**

2022	2023	2024	2025
Mero 1	Marlim 1	Búzios 6	Búzios 7
Búzios 5	Marlim 2	Mero 3	Mero 4
Peregrino (Phase 2)	Itapu	IPB – Parque das Baleias	Búzios 8
	Mero 2	Atlanta FDS	Neon
	Enchova & Pampo	Bacalhau	

*Operated by non-Petrobras companies

Brazil is home to **most of the offshore projects** under development in the world

Offshore Highlights & Opportunities

PRE-SALT

Giant oil reserves **with lower costs and emission rates.** One well can produce more than 50,000 bpd of oil

Well (July/21)	Oil (bpd)	Gas (km³/d)
7-BUZ-10	**55,064**	**1,874**
7-BUZ-31D	**51,121**	**2,119**

IHS yet to be found resources estimates in the pre-salt: more than **50Bboe**

IHS Markit YTF resource estimates

Basin name	Play name	Total (billion boe)
Sergipe-Alagoas	Deepwater cretaceous(1)	6.92
Espirito Santo	Pre-salt	1.60
Campos	Post-salt(2)	1.26
	Pre-salt	18.00
Santos	Post-salt(2)	1.78
	Pre-salt	36.01

Note: (1) Estimated in 4th quarter of 2019; (2) Estimated in 1st quarter of 2020.

Source: IHS Markit

POST-SALT

All shallow water fields being divested, as well as some of the deepwater assets.

Independents, specialized in mature fields jumping into these opportunities.

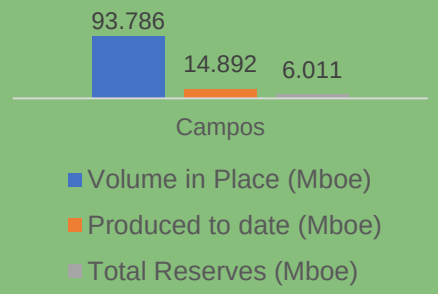
New operators are working on **reducing OPEX and decommissioning costs, revitalizing production facilities and implementing IOR opportunities** to leverage existing underutilized facilities

Investment commitment of **more than 1.5 billion dollars** in the new Development Plans presented for shallow water assets of Trident, Perenco and BW.

CAMPOS BASIN: home to most opportunities of improving RF

Since the first discover in 1974 (Garoupa Field), we have produced only **16% of the volume in place** and we estimate 22% of RF.

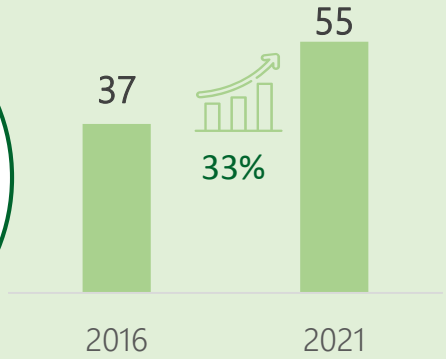
Each 1% more in Campos Basin RF representes almost **1 Bboe** of new oil.



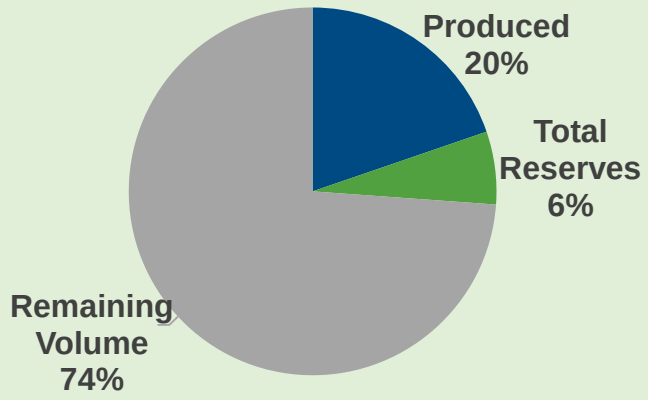
Also, a new onshore market is being set up

A new onshore market with small and medium companies is being established with Petrobras Divestment Plan, supported by foreign and national investors

Onshore E&P Groups in Brazil



Recovery Factor in Brazil



Key Messages

All onshore fields are being sold by Petrobras

The numbers of E&P groups acting in onshore activities increased more than **30%** since 2016

New operators are increasing production

Huge investment opportunities in mature fields (IOR/EOR). 1% more in the onshore RF means **200Mboe**

Ongoing measures to attract investments

KEEP OFFERING AREAS

2nd ToR Surplus Open Acreage
+
Ongoing Petrobras Divestment Plan

ONSHORE DATA AVAILABLE FOR FREE

Download:
Reate.cprm.gov.br/anp

Studies in progress to also public offshore data

MARGINAL FIELD DEFINITION

Draft under public consultation. Specific incentives should be discussed afterwards

ROYALTIES REDUCTION FOR SMALL AND MEDIUM COMPANIES

New ANP Resolution approved by ANP

Already implemented: royalties reduction for incremental production

OTHER REGULATORY MEASURES TO REDUCE ABOVE GROUND RISKS AND IMPROVE FISCAL TERMS

Measures under REATE, PROMAR and BIDSIM programs, including studies to improve environmental licensing process and competitiveness of marginal discoveries

Also, the new gas law was a decisive step towards a competitive gas market, with great opportunities

Opportunities in the 2nd ToR Surplus Round

TRANSFER OF RIGHTS SURPLUS Brazil PRODUCTION SHARE

SÉPIA

Pre-salt field
157km²

In Place Volume:
5.3 Bbbl oil
124 Bm³ gas

Signature Bonus:
R$7.138 billion

Minimum Profit Share:
15,02%

Prod Sep/21 (FPSO **Carioca**):
Oil: 44 Kbpd
Gas: 1 Mm³/d

ATAPU

Pre-salt field
229km²

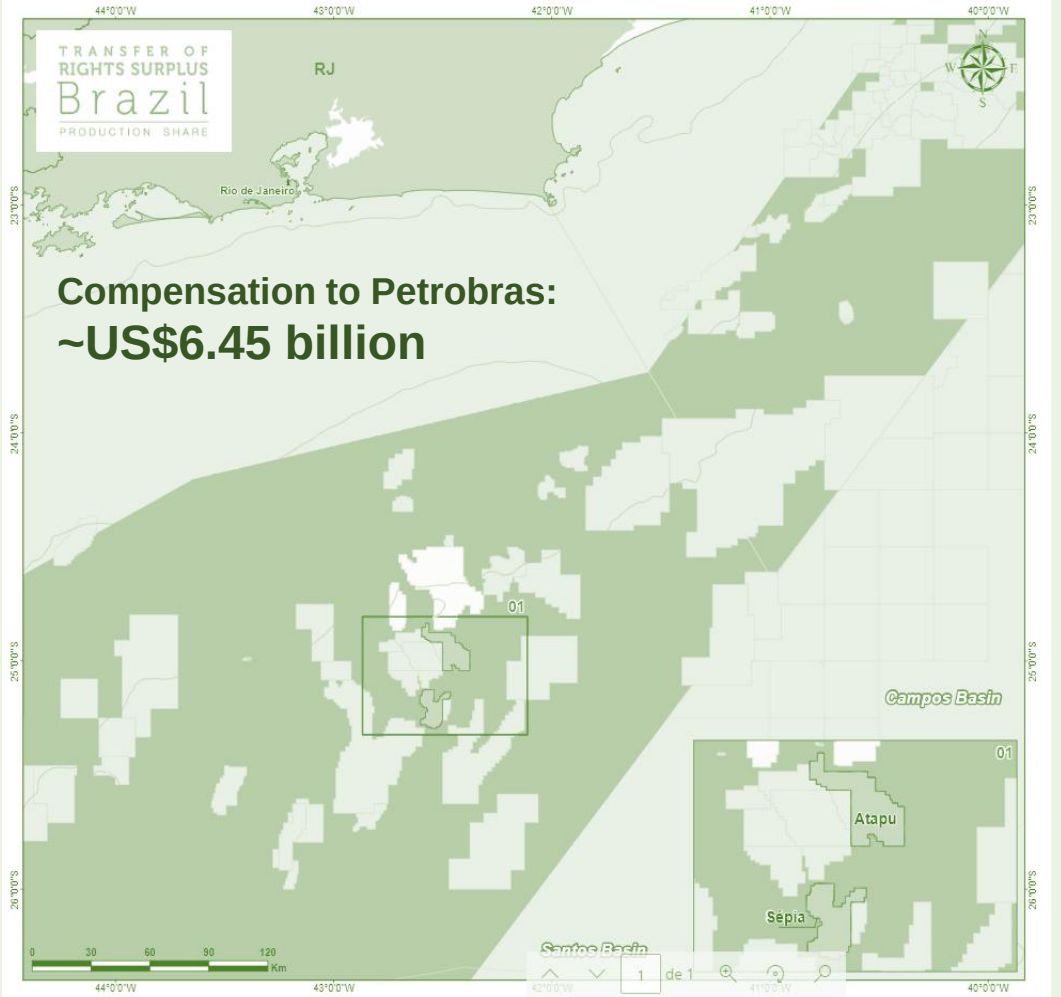
In Place Volume:
7.2 Bbbl oil
179 Bm³ gas

Signature Bonus:
R$4,002 billion

Minimum Profit Share:
5,89%

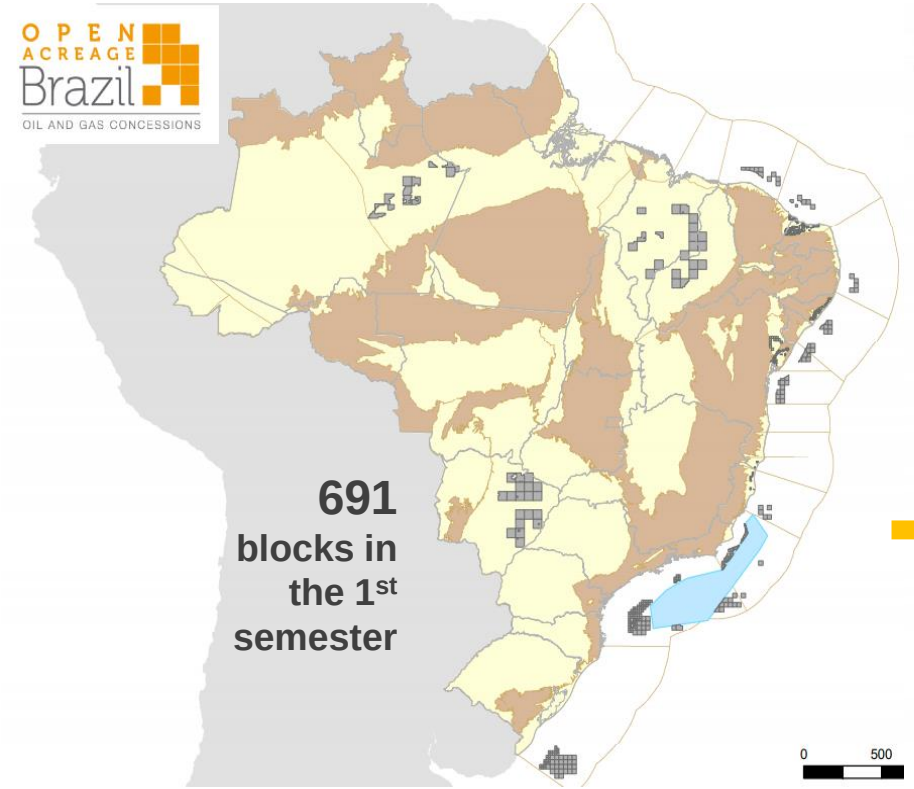
Prod Sep/21 (P-70):
Oil: 132 Kbpd
Gas: 4.5 Mm³/d

Auction: December 17th



Opportunities in the Open Acreage

The Open Acreage allows the market to decide when bidding rounds will take place and what areas from the stock will be offered.
The 3rd cycle will start when any registered company declares interest in at least one area.
The objective of the Open Acreage is to decentralize exploratory investments in the country, with opportunities being available at any time.



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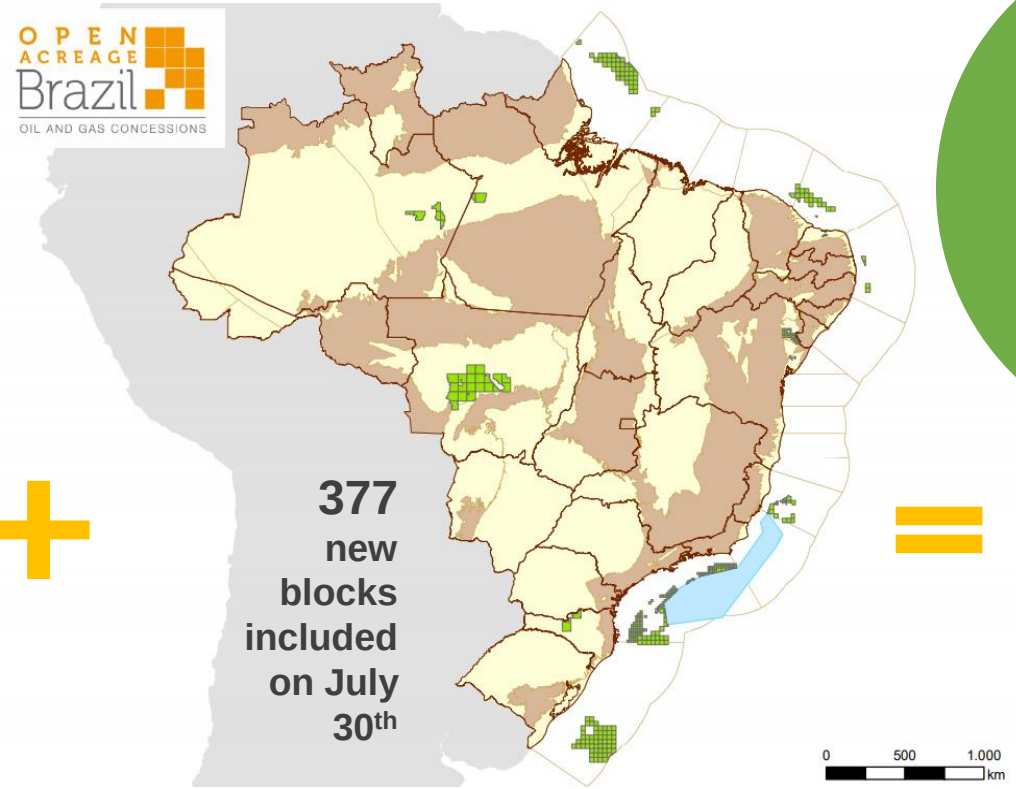


Onshore: 72
Offshore: 305
12 Basins

=

1,068 blocks already available for the 3rd cycle

Additional **350 blocks** and **11 marginal fields** under study to be added in the future

#3

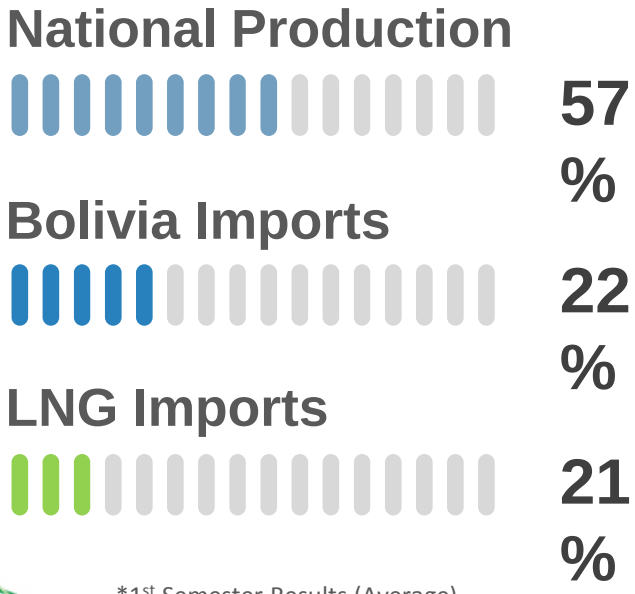
Natural Gas Market

The natural gas market in numbers

Natural gas production in Brazil is mainly associated with oil produced in offshore fields
Other sources include imports through pipelines from Bolivia and LNG through regasification terminals
Only around 40% of the national production is consumed by the Brazilian market due to lack of demand/infrastructure and high gas prices
Recently, we saw a great increase in gas demand due to the economic recovery and the worst drought in more than 90 years

SUPPL

90 Million m³/d

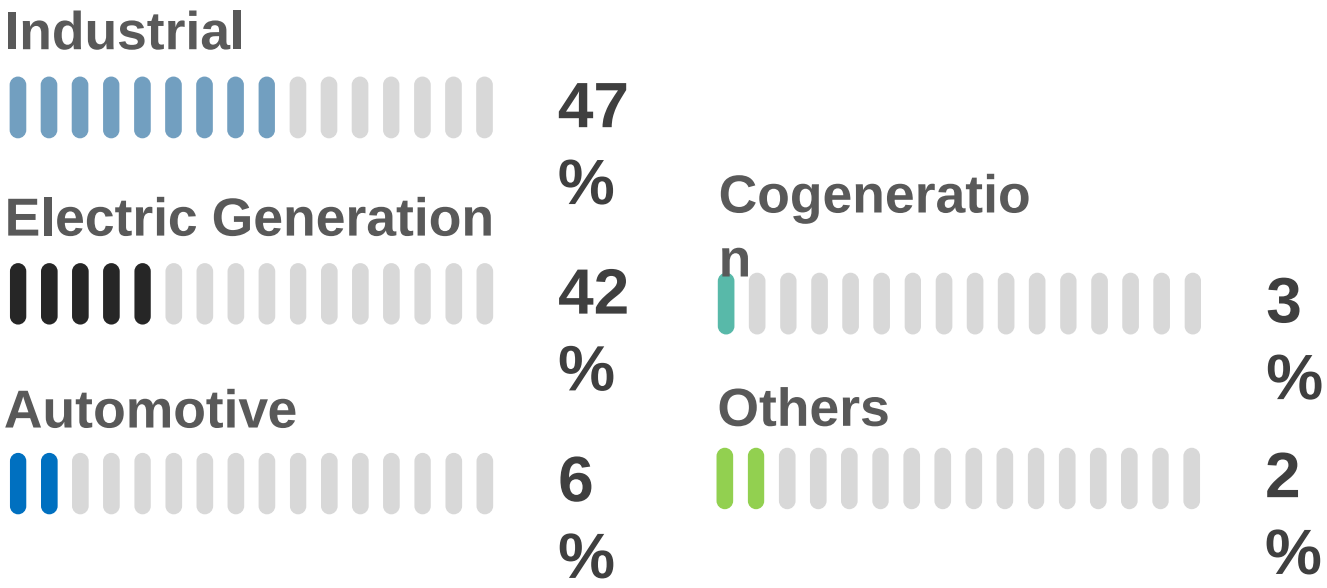


*1st Semester Results (Average)

DEMAND

86 Million m³/d

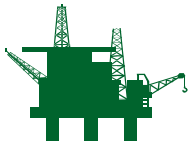
Consumption by sector



Natural gas: a big opportunity

Towards an open and competitive natural gas market

Offshore gas potential



Huge gas potential in the pre-salt.

All efforts are being made so that this gas can be monetized

Onshore gas potential

4 paleozoic basins with potential for natural gas: Parnaiba, Solimões, Amazonas, Paraná basins

Most of the onshore exploration in new frontier basins is to produce gas. Relevant reservoir-to-wire projects in Parnaiba and Amazonas Basins

New gas market

The new Gas Law (Law 14,134 / 2021) is a decisive step towards an open, liquid and competitive market

A robust regulatory agenda is underway to build the new natural gas market, which is creating big opportunities in Brazil

Open Season Calendar

Annual Open Season to offer available capacity		
	Tender and Contracts Publication	Estimated Conclusion
TBG	October 25th 2021	December 2021
NTS	2022	
TAG	2022	

Incremental Open Season		
	Tender and Contracts Publication	Estimated Conclusion
TBG	November/2021	March/2022
NTS	December/2021	March/2022
TAG	2022	

#4

Energy Transition

The role of the O&G Industry in the pathway to net zero

O&G will continue to play an important role

O&G play a critical role in today's energy and economic systems (more than 50% of primary energy), being affordable, reliable and providing supplies that are necessary in the pathway to net zero. Also, the O&G industry has the skills, infrastructure and capital to help unlock net zero solutions such as CCS, low-carbon hydrogen and offshore wind.

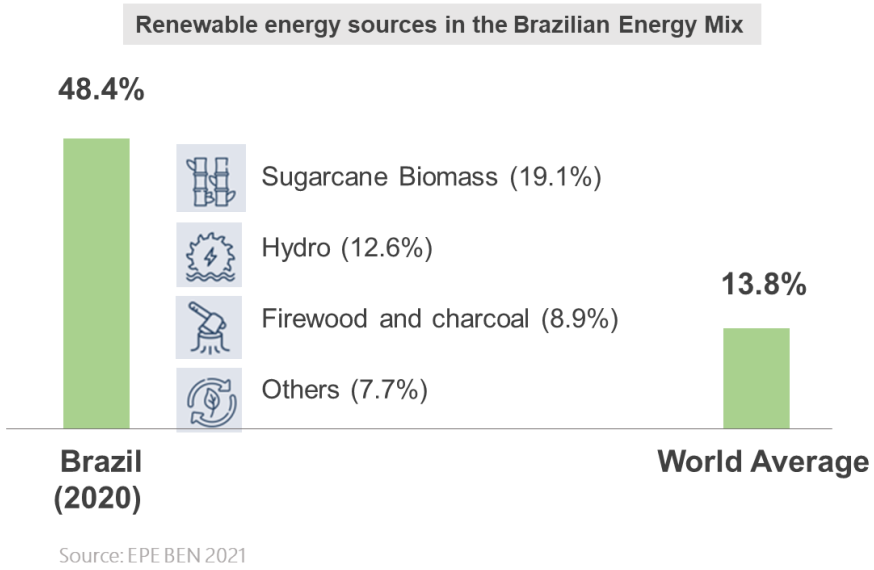
Carbon reduction is imperative in the O&G sector

Regardless of the speed and the pathways of the transition, climate impacts will become more visible and severe over the coming years. Emissions reduction are not an option if the sector wants to retain its social license to operate. The competitive landscape will also be about the lower carbon footprint.

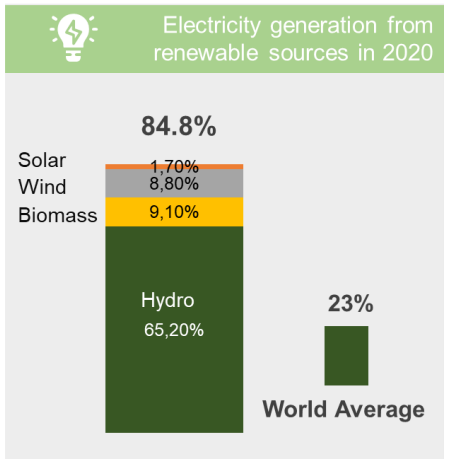
O&G demand should decrease before supply

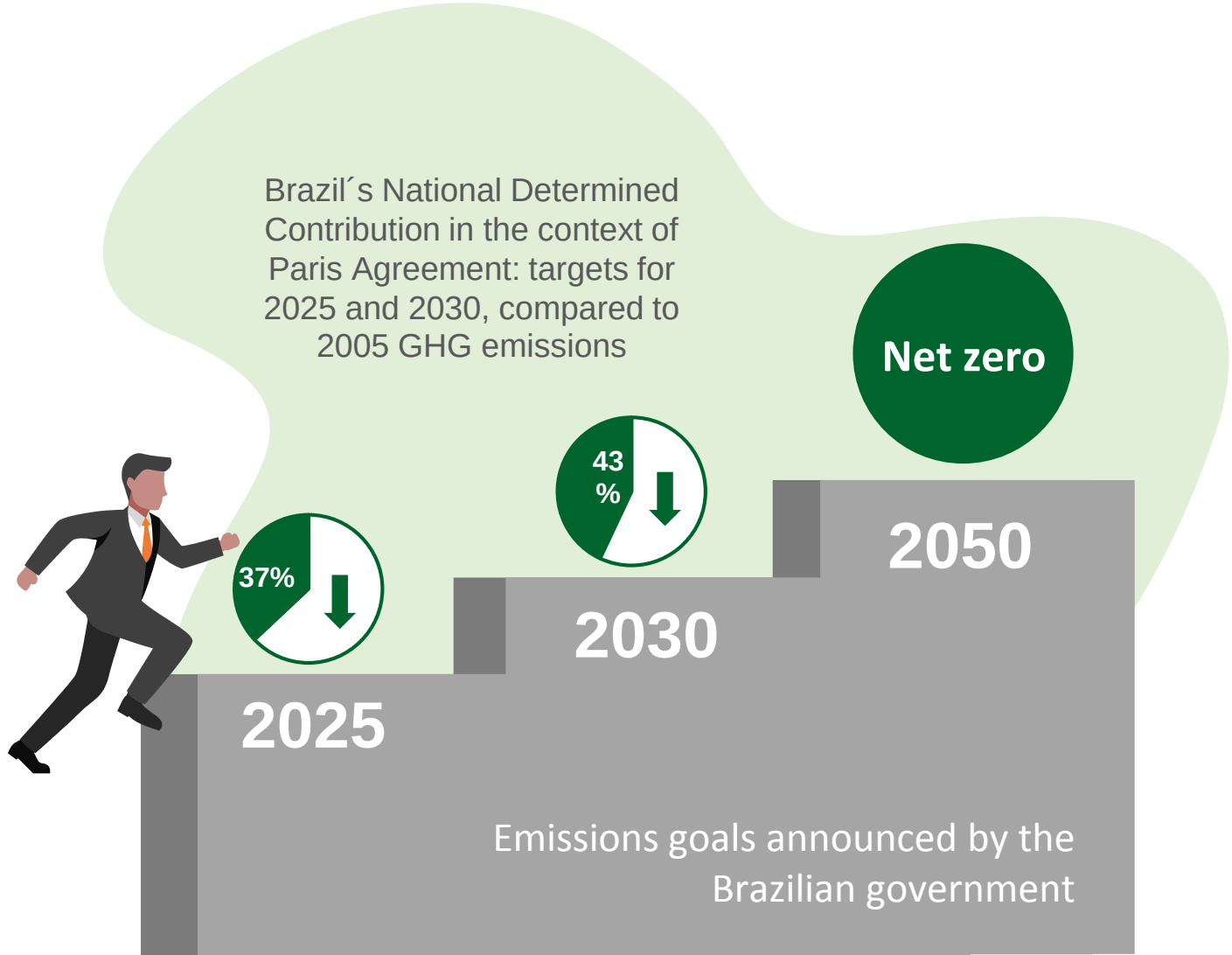
Hydrocarbon demand is not falling fast enough to match the potential underinvestment in fossil fuels nowadays. Therefore, the gas, coal, and electricity crisis shows that investments in traditional sources are still needed if there is demand, like the one motivated by the rapid economic rebound from the covid recession and weather factors, and to create redundancy.

Brazil has one of the cleanest energy mix in the word, but is also committed to decarbonization



Source: EPE BEN 2021





Energy Transition: Highlights in the upstream

01

Since 2009, O&G production operated by Petrobras (who operates more than 90% of the O&G production in Brazil) increased more than 40% without increasing absolute emissions. Also, Petrobras established several ESG commitments in the E&P like **zero routine flaring by 2030, 32% reduction in carbon intensity and 30-50% reduction in methane emissions by 2025.** Brazil has already a high produced gas utilization rate (more than 97,7% in Aug 2021).

10 Sustainability Commitments

PETROBRAS

CLIMATE	1. Zero growth in absolute operating emissions until 2025
	2. Zero routine flaring by 2030
	3. -40 MM ton CO_2 reinjection in CCUS (*Carbon Capture, Utilization and Storage*) projects
	4. 32% reduction in carbon intensity in the E&P segment by 2025, reaching 15 $kgCO_2e$/boe
WATER	5. 30%-50% reduction in methane emission intensity in the E&P segment by 2025
WASTE	6. 16% reduction in carbon intensity in the refining segment by 2025, reaching 36 $kgCO_2e$/CWT
BIODIVERSITY	7. 30% reduction in freshwater capture in our operations with focus on incresing reuse by 2025
	8. Zero increase in waste generation by 2025
	9. 100% of Petrobras facilities with a biodiversity action plan by 2025
SOCIAL RESPONSABILITY	10. Investments in environmental and social projects

*Note: Carbon commitments related to 2015 base. Other commitments based on 2018.

2

Source: Petrobras (ESG Presentation, Oct 2020)

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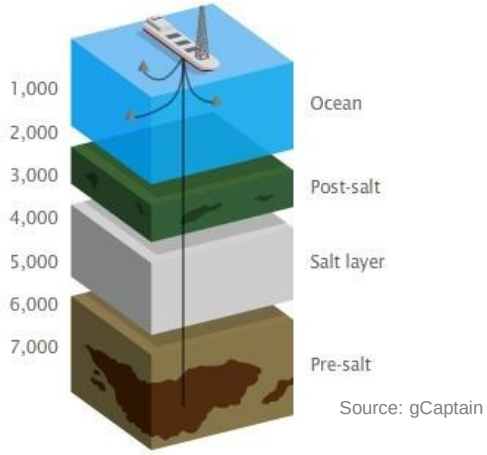


Source: gCaptain

Pre-Salt: globally competitive assets in the energy transition scenario, with low breakeven and low GHG emissions

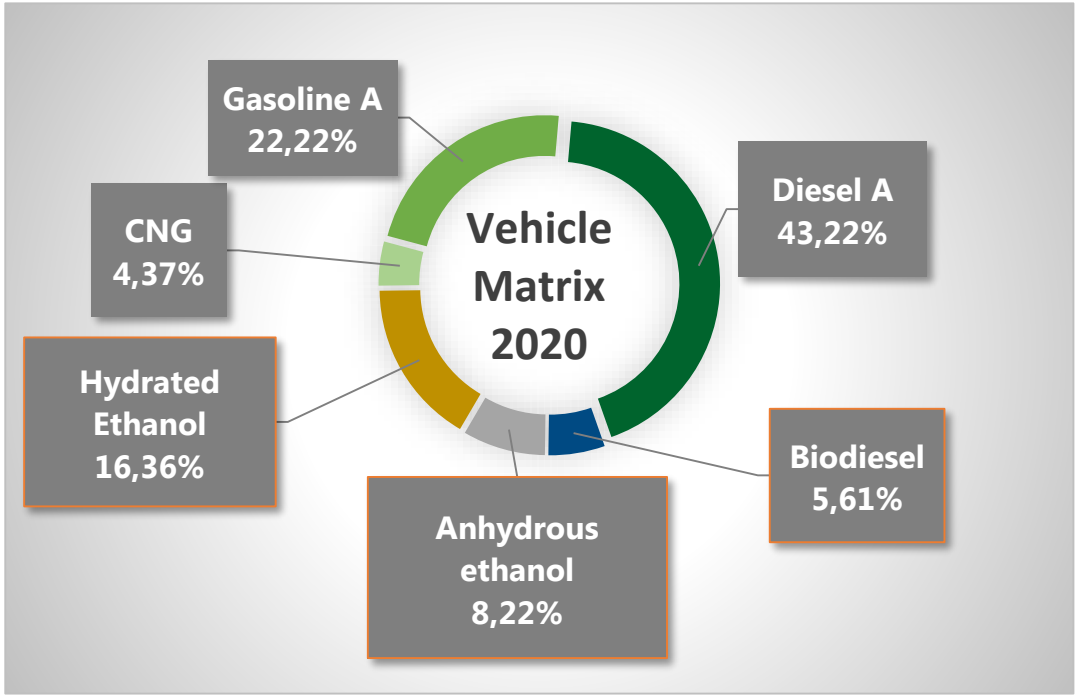
- Low sulfur content
- High productivity

Bacalhau oil discovery, to be operated by Equinor, is expected to produce about 9 kg of carbon dioxide (CO2) per barrel, against a global average of more than 17 kg per barrel.

Source: Reuters

Energy Transition: Highlights in the downstream

Brazil is **the 2nd largest producer and consumer of biofuels. 30% of the vehicle matrix is fueled by renewables** and 70% to 80% of our automobiles are flex-fuel



Main Government Programs

Renovabio: in 2020, more than **14 million tons of greenhouse gas emissions were avoided.**

Fuel of the Future: incentives to the large-scale use of 2nd generation ethanol; R&D to encourage fuel-cell technology; creation of green corridors to supply heavy vehicles powered by biomethane; introduction of BioJetFuel; BioCCS etc

Refineries: investments on **increase energy efficiency, reduce emissions, increase water reuse and generate lower sulfur products** or products with renewable content

Brazil has huge and diverse potential for renewables

Brazil is currently among the five most attractive emerging markets for investments in renewable energy. (https://global-climatescope.org/)
Oil majors are also betting on the Brazilian renewables market. We believe they will integrate their portfolio with cleaner energy projects, while capitalizing on synergies and tapping the huge potential in Brazil for renewable energy projects.

Biofuels	Brazil has large experience in producing biofuels and benefits from a longstanding well-established industry. Shell (Raízen) and BP (BP Bunge Bioenergia) are betting high in this market.
Biogas/ Biomethane	Biogas has every condition to achieve greater participation in the Brazilian energy matrix. The sugarcane industry represents a large opportunity for biogas generation. One example is the Raízen Geo Biogas plant.
Hydrogen	National Hydrogen Program has been established recently. Possible investments in green hydrogen announced so far in Ceará, Pernambuco and RJ States are only from companies in the renewable energy sectors.
Solar	Solar and Wind energies represent a good proportion of our energy matrix. Total operates three solar plants and is developing new wind projects through its affiliate Total Eren. Also, the first solar plant in Equinor's global portfolio is located at Ceará State (Apodi solar power plant).
Wind	Brazil enjoys great potential for offshore wind plants. Brazil's shallow waters alone hold potential for 700GW of offshore wind generation. Equinor plans to install 4GW of offshore wind energy in Rio and Espírito Santo States.

#5

Final Remarks

Brazil is a country of great opportunities

Our Strengths

Sanctity of Contract

Geological potential

Pre-salt: world-class assets with low carbon intensity

Huge opportunities in onshore and post-salt offshore mature fields (Petrobras divestment plan)

Past and future bidding rounds (including open acreage)

Market Opening (New Gas Law etc)

Great Potential for renewables

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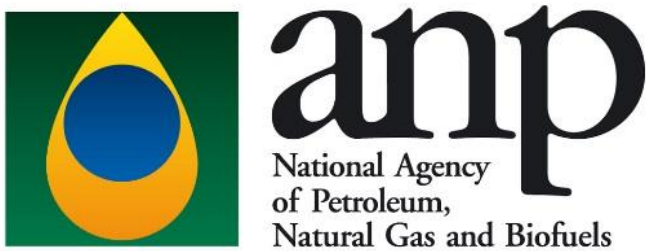

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