




# BRAZIL – WORLD BIGGEST OFFSHORE MARKET: *Measures to keep production growing in medium and long term*



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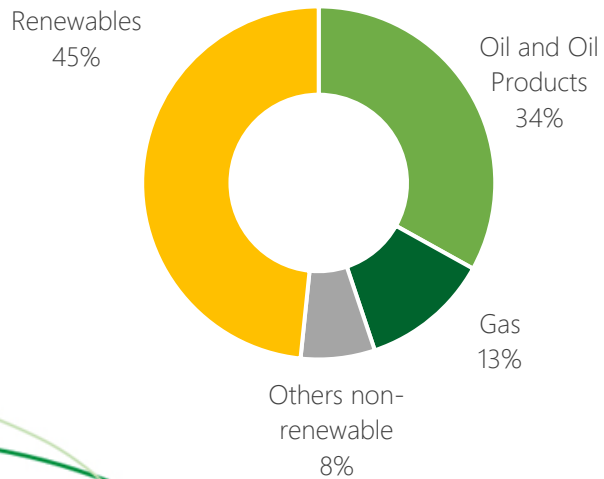
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# Brazil at a glance

A country of plenty and diverse energy resources



Energy Mix



Source: EPE – BEN2022

The largest economy in **Latin America**

**214**

million people  
(6<sup>th</sup> largest population)

**1.44**

Trillion USD GDP  
2020  
(12<sup>th</sup> largest economy)

**9<sup>th</sup>**

Largest **Crude Oil and Condensate producer**  
(BP Statistical Review 2022)

**7<sup>th</sup>**

Largest **Crude Oil Exporter**  
(MME 2021)

**8<sup>th</sup>**

Largest **Oil Products Consumer**  
(BP Statistical Review 2022)

**2<sup>nd</sup>**

Largest Producer and Consumer of **Biofuels**  
(BP Statistical Review 2022)

**2<sup>nd</sup>**

Largest **Hydropower** generation in 2020  
(Our World in Data)

**6<sup>th</sup>**

Largest **Wind Generation Capacity**  
(GWEC 2021)



**#1**

# Exploration & Production Overview

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



## 2022



**8<sup>th</sup>**

Crude Oil and Condensate producer (BP Statistical Review 2021)



**84**

E&P company groups, 46% foreign (Jul 2022)

**Production:**

**2,8M**

Bpd of oil production (Jun 2022)

**133M**

M<sup>3</sup> of gas production (Jun 2022)

**Reserves:**

**13.2B**

Bbl in proved oil reserves (Dec 2021)

**379B**

M<sup>3</sup> in proved gas reserves (Dec 2021)

## Forecast

Potential to reach more than



**4**

million oil bpd in 2025 (ANP) and 5 million oil bpd in 2030 (EPE)

Potential to be the



**5<sup>th</sup>**

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.

**75%** of production  
**131** producer wells  
**21,957** Average well production (boe/d)

Prod: **2,876,333** boe/d

## Post-Salt

Green and brownfields, deep and shallow waters.

**20%** of production  
**321** producer wells  
**2,343** Average well production (boe/d)

Prod: **751,985** boe/d

## Onshore

Mature basins and new frontier basins (gas prone).

**5%** of production  
**5,707** producer wells  
**35** Average well production (boe/d)

Prod: **198,427** boe/d

\*Mar 2022

**26.5B**

Barrels equivalent of O&G produced to date

**375**

Fields under development or production

**250**

Exploratory Blocks

**400+**

Production Installations

**90**

Billion dollars E&P Investments Forecast 2022 – 2026

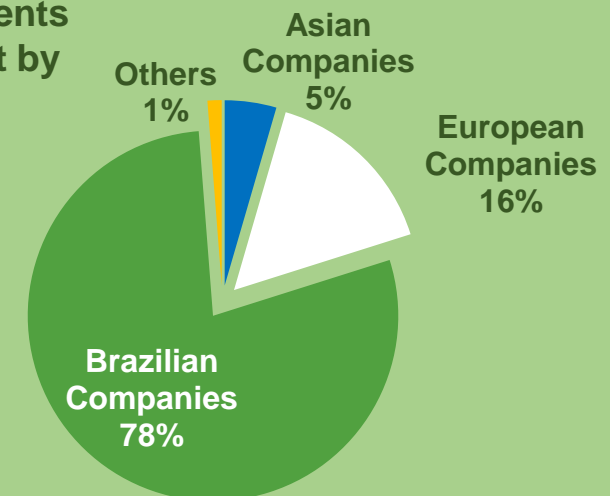
**11**

Billion dollars Decommissioning Costs 2022-2026

**30,000+**  
Wells drilled

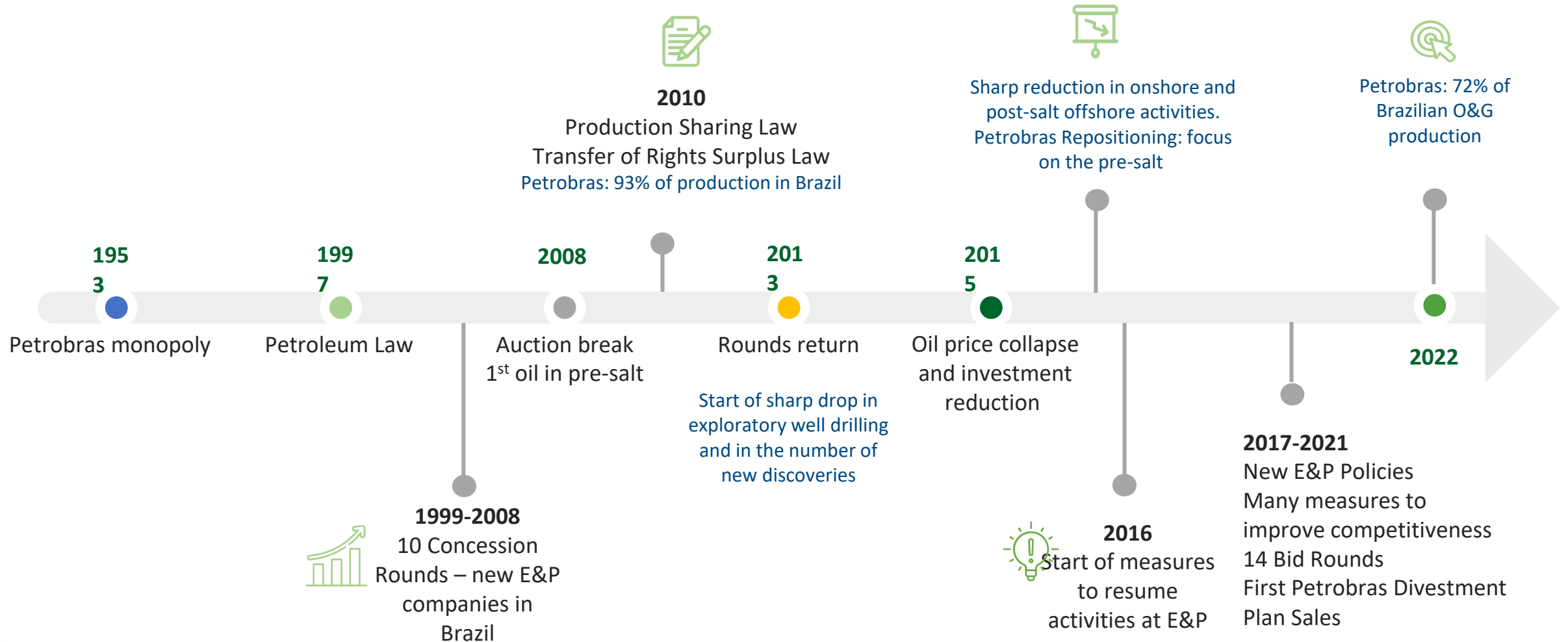
**19,000+**  
Km of O&G pipelines

Investments Forecast by Origin



# E&P history in Brazil

From a monopoly towards an open market



# Many measures have already been taken to encourage E&P activities

## 2017

**A bidding round schedule**  
(CNPE Resolution nº 10/2017)

**New Local Content Policies**  
(CNPE Resolution 07/2017)

**New E&P Policies**  
(CNPE Resolution 17/2017)

**Exploratory Phase Extension for 11<sup>th</sup> and 12<sup>th</sup> Rounds**  
(ANP Resolution nº 708/2017)

**REPETRO Extension**  
(Law 13,586/2017)

## 2018

**Local Content waivers**  
(ANP Resolution nº 726/2018)

**Royalty reduction on the incremental production**  
(ANP Resolution nº 749/2018)

**RBL and M&A made easier**  
(ANP Resolution nº 785/2019)

**Mandatory investment or M&A in onshore and shallow water fields; deadline for Petrobras divestment**  
(RD nº 568/2018)

## 2019

**A new type of auction: Open Acreage**  
**Unlocking the Transfer of Rights Auction**

## 2020

**Regulation of decommissioning**  
(ANP Resolution nº 817/2020)

ANP Resolutions: Flexibility as a result of the pandemic

## 2021

**Royalties reduction for S&M companies**  
(ANP Resolution nº 853/2021)

**Adjustment Agreement to Local Content**  
(ANP Resolution nº 848/2021)

**Area Nomination**  
(ANP Resolution 837/2021)

**Decommissioning Guarantees**  
(ANP Resolution nº 854/2021)

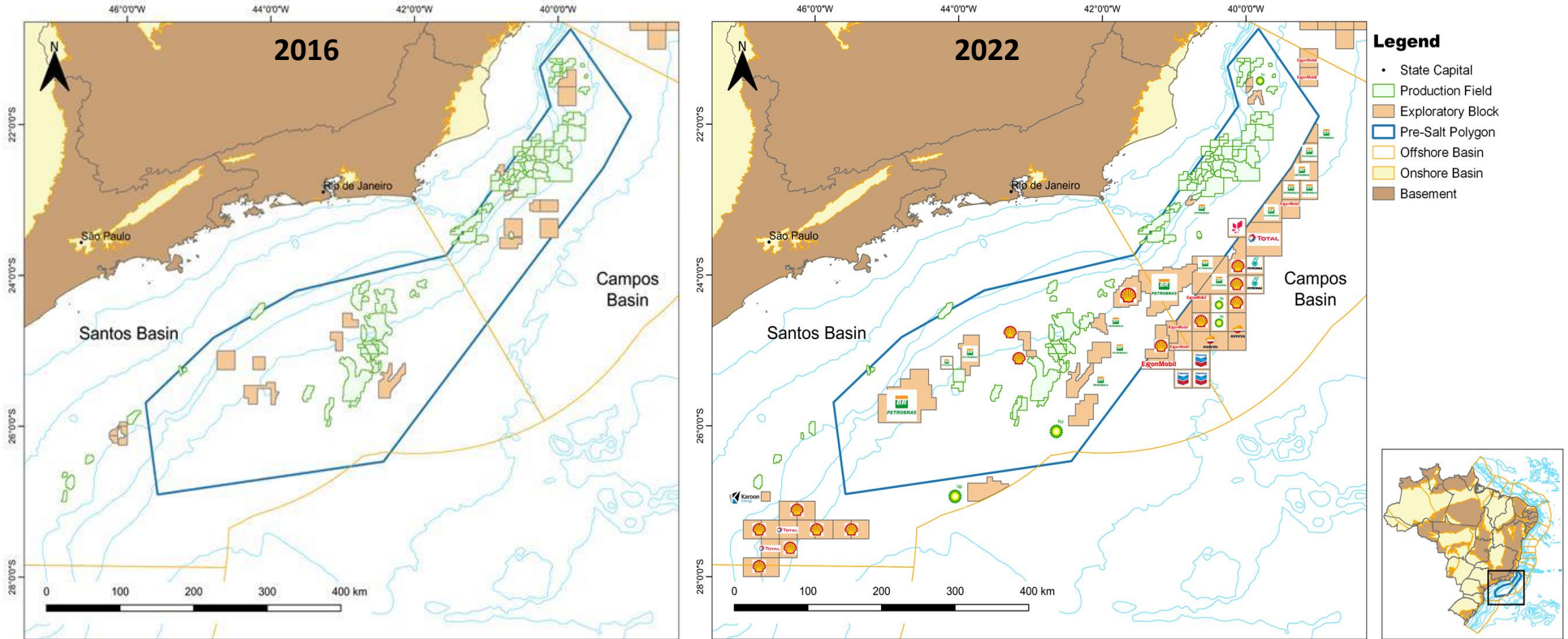


**Bid Rounds**  
R\$ 123.6 B in signature bonuses (2017/2022)

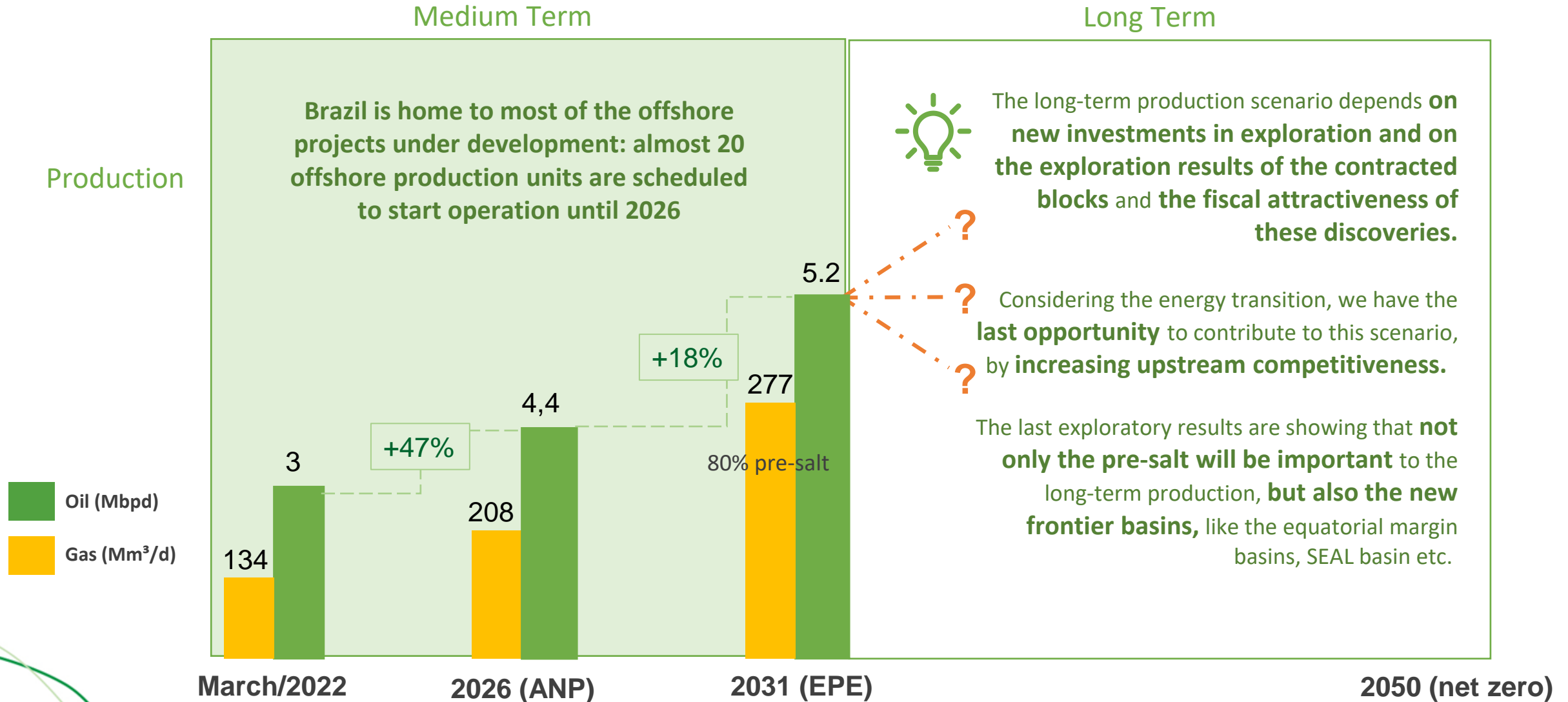




# Results from 2017 bidding rounds in Campos and Santos basins



# 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



## E&P strategic goals



### THE 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 recent events  
accelerated **energy  
transition** discussions  
and reinforced the  
**sense of urgency** in  
exploring our resources



### UNLOCK MARGINAL DISCOVERIES VIABILITY

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

# 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 (km <sup>3</sup> /d)
7-BUZ-10	<b>55,064</b>	<b>1,874</b>
7-BUZ-31D	<b>51,121</b>	<b>2,119</b>

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



## POST-SALT

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

Independents, specialized in mature fields jumping into these opportunities.

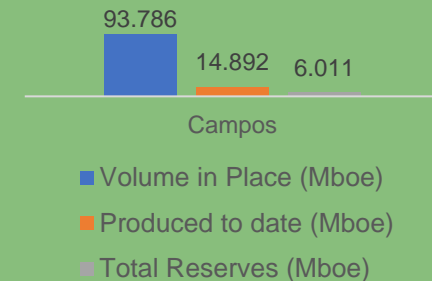
New operators are working on **reducing OPEX and decommissioning costs, revitalizing production facilities and implementing IOR opportunities** to leverage existing underutilized facilities

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 represents almost **1 Bboe** of new oil.



### IHS Markit YTF resource estimates

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

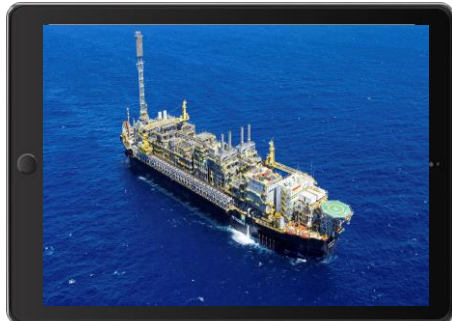
Note: (1) Estimated in 4th quarter of 2019; (2) Estimated in 1st quarter of 2020.

Source: IHS Markit

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# Offshore Projects to start operation until 2026

11 new FPSOs to develop the pre-salt and 6 new production units to revitalize and develop the post-salt



**2023**

Mero 1

Búzios 5

Peregrino  
(Phase 2)

**2024**

Marlim 1

Marlim 2

Itapu

Mero 2

**2025**

Búzios 6

Mero 3

Parque das  
Baleias

Atlanta FDS

Bacalhau

**2026**

Búzios 7

Mero 4

Búzios 8

Neon

\*Operated by non-Petrobras companies

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

## Local content requirements since 2017

<b>EXPLORATION PHASE</b>	Onshore:	50%
	Offshore:	18%

<b>DEVELOPMENT STAGE</b>	Onshore:	50%	
	Offshore	Wells	25%
		Subsea Platform	40%
		Platform	25%

- ✓ No waivers and no longer LC as a bid fator (pre-defined percentages)
- ✓ These requirements are being applied since the 14th bidding round (2017)



# Decarbonization in the upstream

01

Since 2009, O&G production operated by Petrobras (which 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 (~98%).

## 10 Sustainability Commitments



CLIMATE



WATER



WASTE



BIODIVERSITY



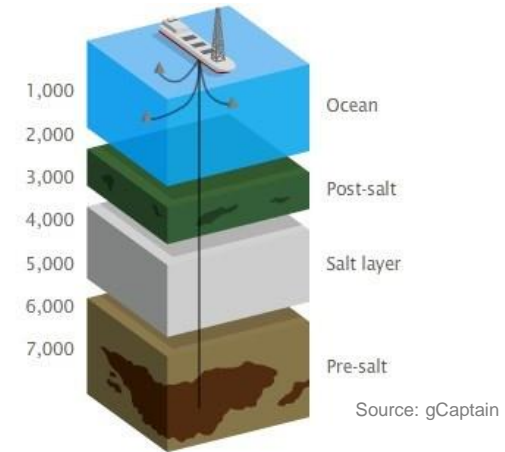
SOCIAL RESPONSIBILITY

1. Zero growth in absolute operating emissions until 2025
2. Zero routine flaring by 2030
3. ~40 MM ton CO<sub>2</sub> 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<sub>2</sub>e/boe
5. 30%-50% reduction in methane emission intensity in the E&P segment by 2025
6. 16% reduction in carbon intensity in the refining segment by 2025, reaching 36 kgCO<sub>2</sub>e/CWT
7. 30% reduction in freshwater capture in our operations with focus on increasing reuse by 2025
8. Zero increase in waste generation by 2025
9. 100% of Petrobras facilities with a biodiversity action plan by 2025
10. Investments in environmental and social projects

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

Source: Petrobras (ESG Presentation, Oct 2020)

02



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

- ✓ Low sulfur content
- ✓ High productivity

Pre-salt projects carbon intensity is around **10kg** of carbon dioxide (CO<sub>2</sub>e) per barrel, against a global average around 20 kg per barrel (OGCI).



**#2**

# Opportunities in the upcoming Bidding Rounds

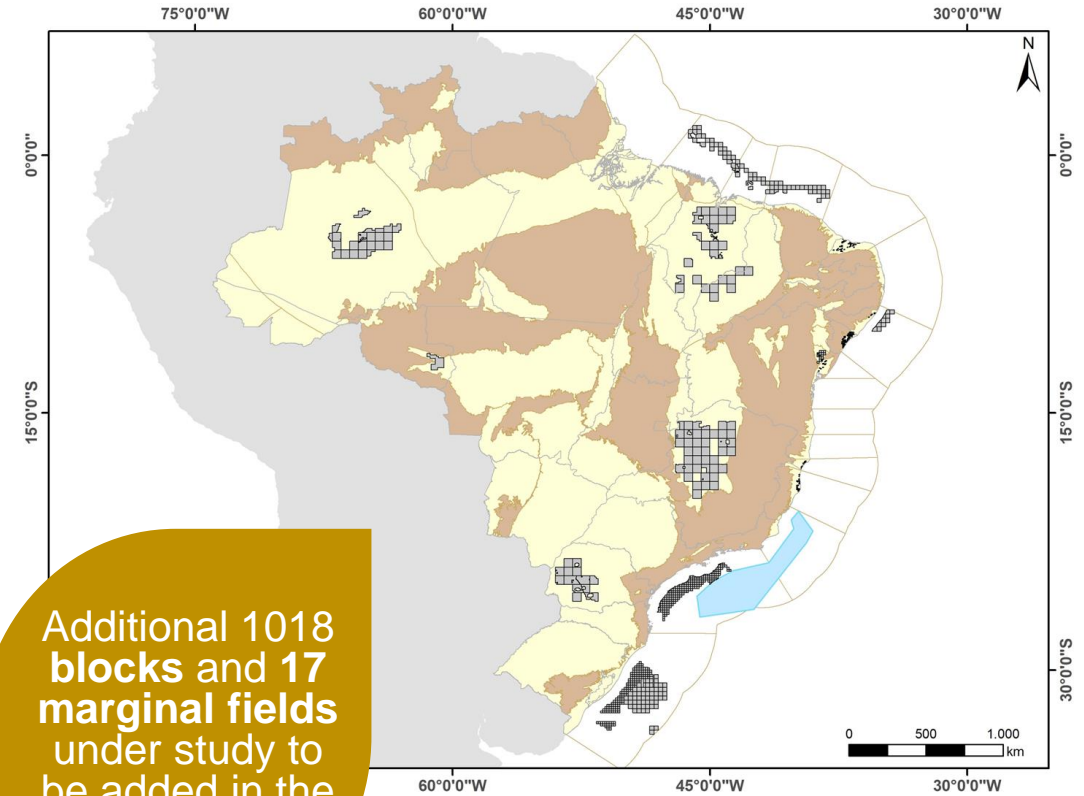
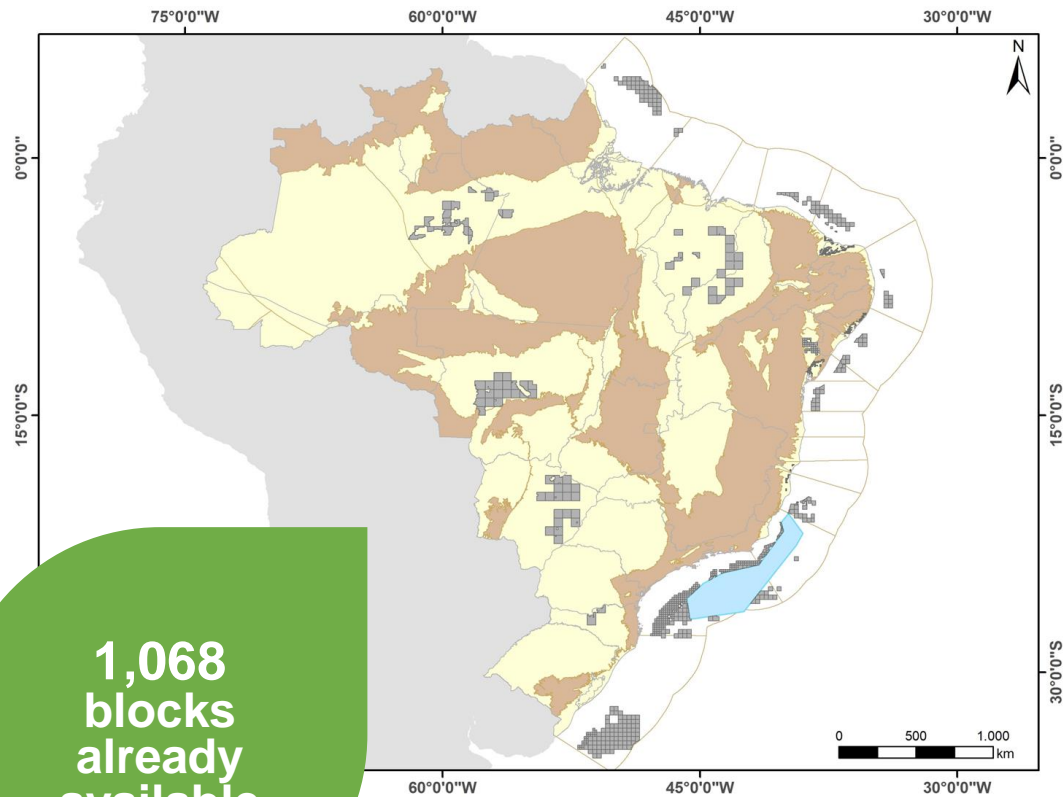


# Opportunities in the Open Acreage Concession

The Open Acreage allows the market to decide when bidding rounds will take place and what areas from the stock will be offered.

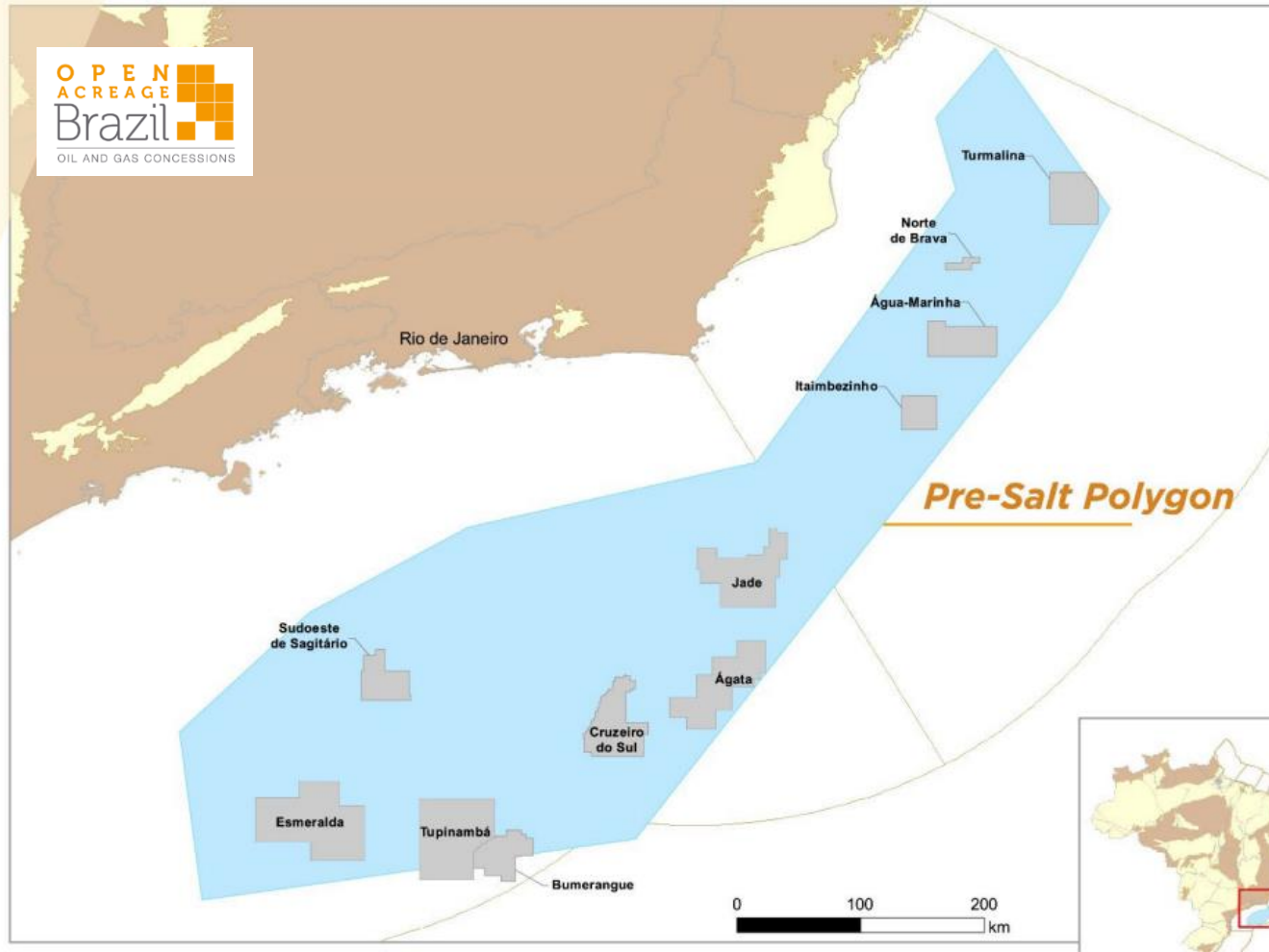
The 4<sup>th</sup> cycle will start when any registered company declares interest in at least one area.

The objective of the Open Acreage is to decentralize exploratory investments in the country, with opportunities being available at any time.



# Opportunities in the Open Acreage PSA

(Production Sharing Contracts)



**11 areas on offer**  
 4 areas in Campos Basin & 7 areas in Santos Basin  
 (+Ametista to be included)

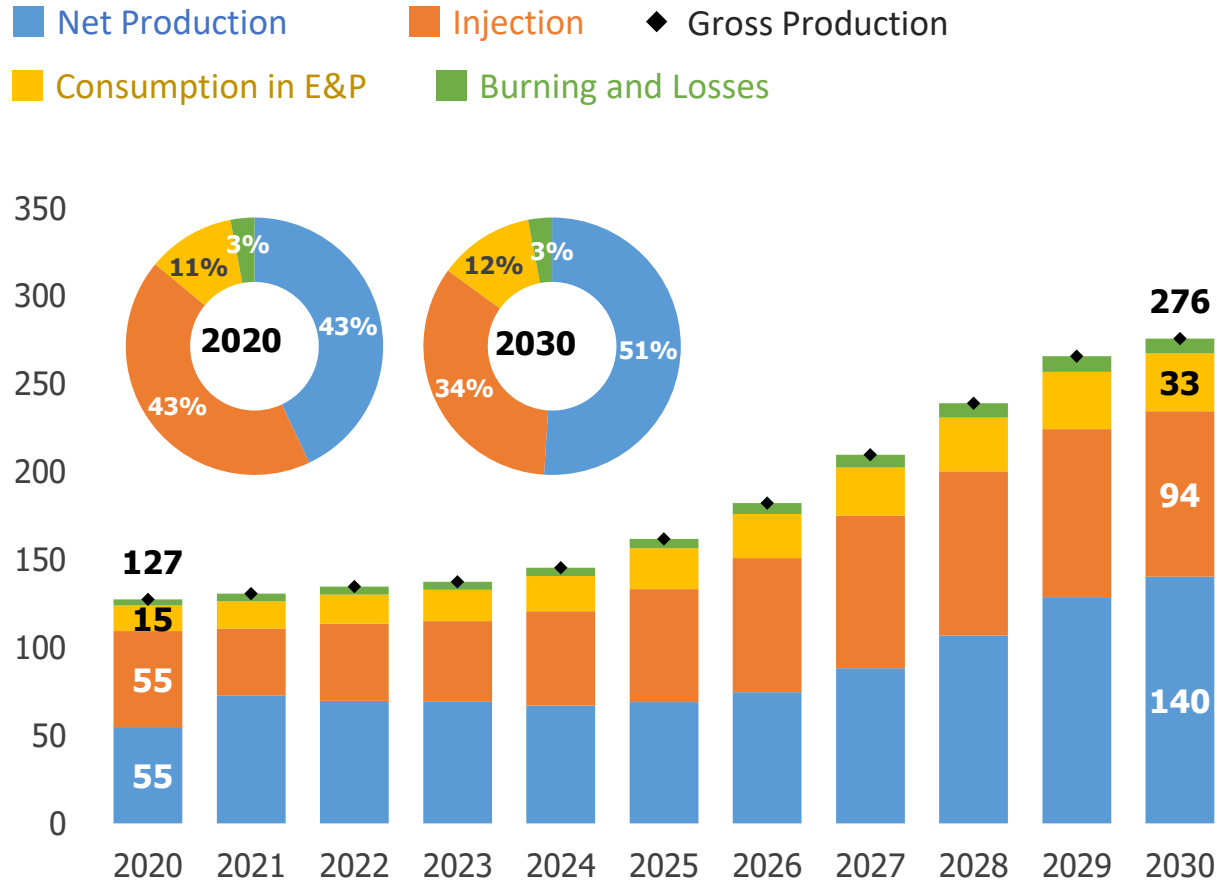
In situ Volumes (unrisked):  
**~27 Billion barrels**

The public bidding session of the 1<sup>st</sup> cycle is scheduled to take place on 12/16/22

**#3**

# Natural Gas Market

# The national gas production has the potential to double by 2030, but all efforts should be done to monetize it



Source: EPE PDE 2030

The main driver of growth will be the **pre-salt production**

EPE expects the pre-salt liquid gas production reach more than **70 million m<sup>3</sup>/d in 2030**

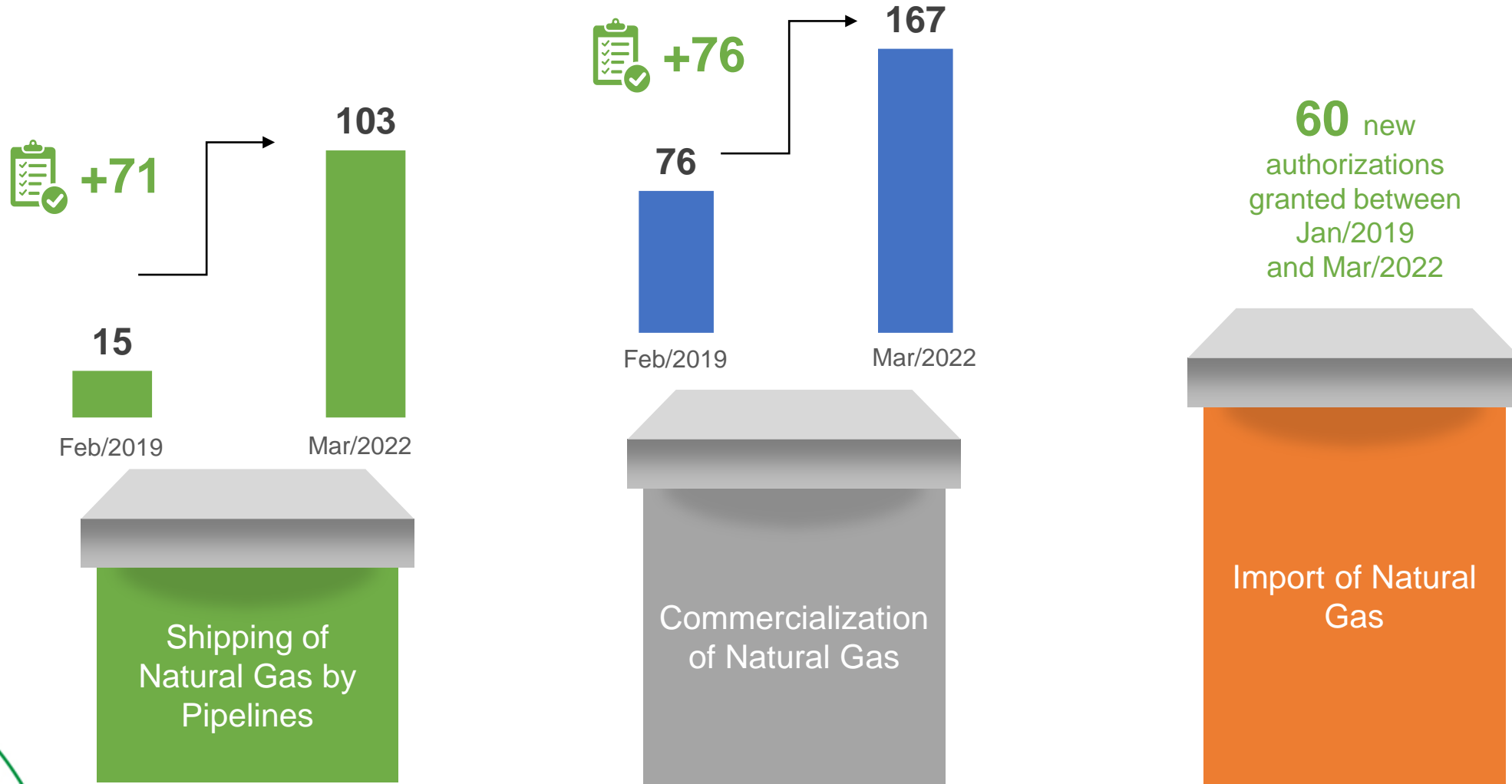
Need to **expand the gas pipeline infrastructure** to bring the gas to shore (**at least 1 or 2 more routes**)

Capacity limit of Routes 1, 2 and 3:  
44-48 million m<sup>3</sup>/d



# The interest in the Brazilian gas market is increasing

Since TBGs 1<sup>st</sup> Open Season, starting in Feb. 2019, many new commercialization, shipping and import authorizations were granted



## Opportunities in the Gas Market

01

Petrobras Divestment Plan in the Transport and Distribution Sectors (CADE agreement)

02

New legislation already approved moving towards an opening and competitive gas market (Law 14,134/2021 and Decree 10,712/2021)

03

National gas production expected to almost double until 2030, with a variety of suppliers

04

Great potential to increase the national gas demand if the market offers competitive prices



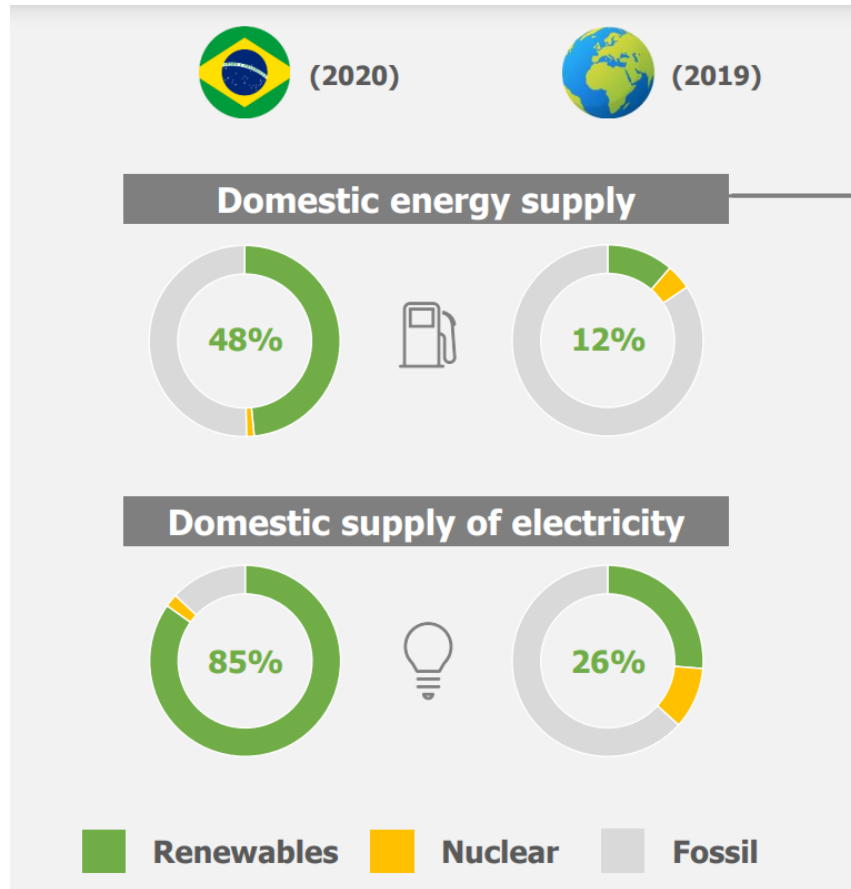


**#4**

# Energy Transition

# Brazil in the energy transition context

Iceland, Norway and Brazil have the largest share of primary energy from renewables sources in the world

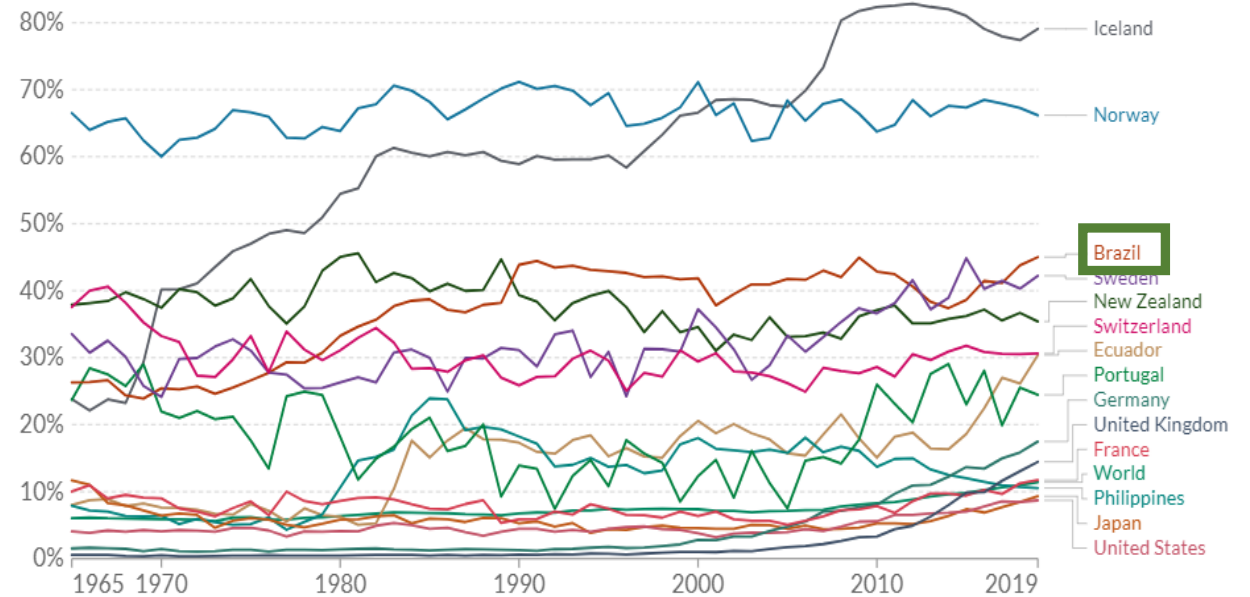


## Share of primary energy from renewable sources

Renewable energy sources includes hydropower, solar, wind, geothermal, bioenergy, wave and tidal. It does not include traditional biofuels, which can be a key energy source especially in lower-income settings.

Our World in Data

+ Add country



Source: Our World in Data based on BP Statistical Review of World Energy (2020) OurWorldInData.org • CC BY  
 Note: Primary energy is calculated using the 'substitution method' which takes account of the inefficiencies energy production from fossil fuels.

Source: EPE; Our World In Data



# Emissions in the energy sector represent less than half of world average

01

Brazil is not ranked in the top emitters in the energy sector

## Top Emitters in Energy Sector (All GHG)

2018	CO <sub>2</sub> e
● Others	12.57Gt
● China	10.32Gt
● United States	5.27Gt
● India	2.42Gt
● Russia	2.28Gt
● Japan	1.09Gt
● Iran	716.76Mt
● Germany	713.82Mt
● Canada	626.07Mt
● South Korea	617.23Mt
● Indonesia	598.17Mt

...  
**Brazil (437,33 Mt)**

Source: Climate Watch (CAIT)

02

Energy makes up nearly three-quarters of global emissions, but in Brazil it represents around 30% of the total emissions

## Emissions by Sector – World (All GHG)

2018	
● Energy	76%
● Agriculture	12%
● Industrial Processes	5.9%
● Waste	3.3%
● Land-Use Change and Forestry	2.8%

## Emissions by Sector – Brazil (All GHG)

2018	
● Agriculture	35%
● Energy	31%
● Land-Use Change and Forestry	27%
● Waste	4.9%
● Industrial Processes	2.0%

03

Brazil accounts for 1.3% of global fossil fuel and cement emissions

## Top Fossil Fuel and Cement Emitters (CO<sub>2</sub>)

2019	
● Others	34%
● China	28%
● United States	15%
● India	7.2%
● Russia	4.6%
● Japan	3.0%
● Iran	2.1%
● Germany	1.9%
● Indonesia	1.7%
● South Korea	1.7%
● Saudi Arabia	1.6%

...  
**Brazil (1,3%)**

Source: Climate Watch (GCP)

**CO<sub>2</sub> emissions per capita:** on average, each Brazilian emits 1/7 of what an American emits and 1/3 of what a citizen of the European Union or a Chinese emits in the production and consumption of energy

# Brazil is well-positioned in the energy transition



Brazil has huge and diverse potential for renewables (solar, hydrogen, wind, biofuels, biogas/biomeythane). Brazil is currently among the five most attractive emerging markets for investments in renewable energy. (<https://global-climatescope.org/>)



Brazil is the 2<sup>nd</sup> largest producer and consumer of biofuels and benefits from a longstanding well-established industry: 70% to 80% of our automobiles are flex-fuel; 30% of the vehicle matrix is fueled by renewables



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.



Public policies like Renovabio Program show the country will continue to advance in this agenda. In 2020, more than **14 million tons of greenhouse gas emissions were avoided**. A new government program (**Fuel of the future**) is in place, dealing with advanced fuels.

**#5**

**Final Remarks**

## Brazil is a country of great opportunities



### Our Strengths

Sanctity of Contract

Geological potential

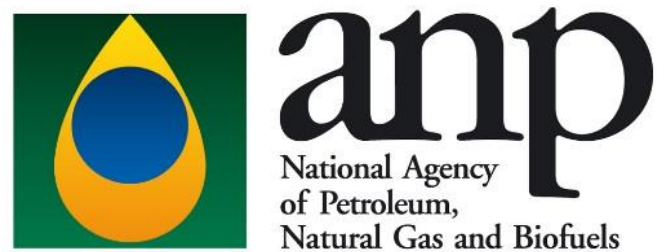
Pre-salt: world-class assets with low carbon intensity

Huge opportunities in Petrobras divestment plan (brownfields opportunities with cash flow)

Market Opening in the midstream (New Gas Law) and downstream

One of the largest fuel market

Great Potential for renewables



<http://rodadas.anp.gov.br/pt/>

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