

THE OIL AND GAS INDUSTRY IN BRAZIL






Marina Abelha
Substitute Director

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About ANP

ANP is the **regulatory body** for the oil, natural gas and biofuels industry in Brazil



Regulate

Establish the regulation of the oil, natural gas and biofuels industry. ANP must assure **free competition, national supply, and consumers protection** in terms of price, quality and product offer.



Contract

Grant **authorizations** for the O&G and biofuels activities; to promote **E&P bidding rounds** and **sign contracts** on behalf of the Federal Estate.



Inspect

Enforce the standards and rules by the regulated industry. It covers the administrative process, judgment and sanction.

ANP is responsible for **implementing the energy public policies**, but also **subsidizes**, technically, the **National Energy Policy Council**



#1

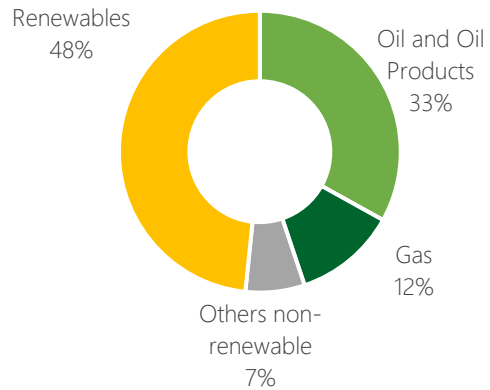
Brazil and its great energy opportunities

Brazil at a glance

A country of plenty and diverse energy resources



Energy Mix



The largest economy in **Latin America**

214

million people
(6th largest population)

1.44

Trillion USD GDP
2020
(12th largest economy)

8th

Largest Crude Oil and Condensate producer
(BP Statistical Review 2021)

7th

Largest Crude Oil Exporter
(MME 2021)

7th

Largest Oil Products Consumer
(BP Statistical Review 2021)

2nd

Largest Producer and Consumer of Biofuels
(BP Statistical Review 2021)

2nd

Largest Hydropower generation in 2020
(Our World in Data)

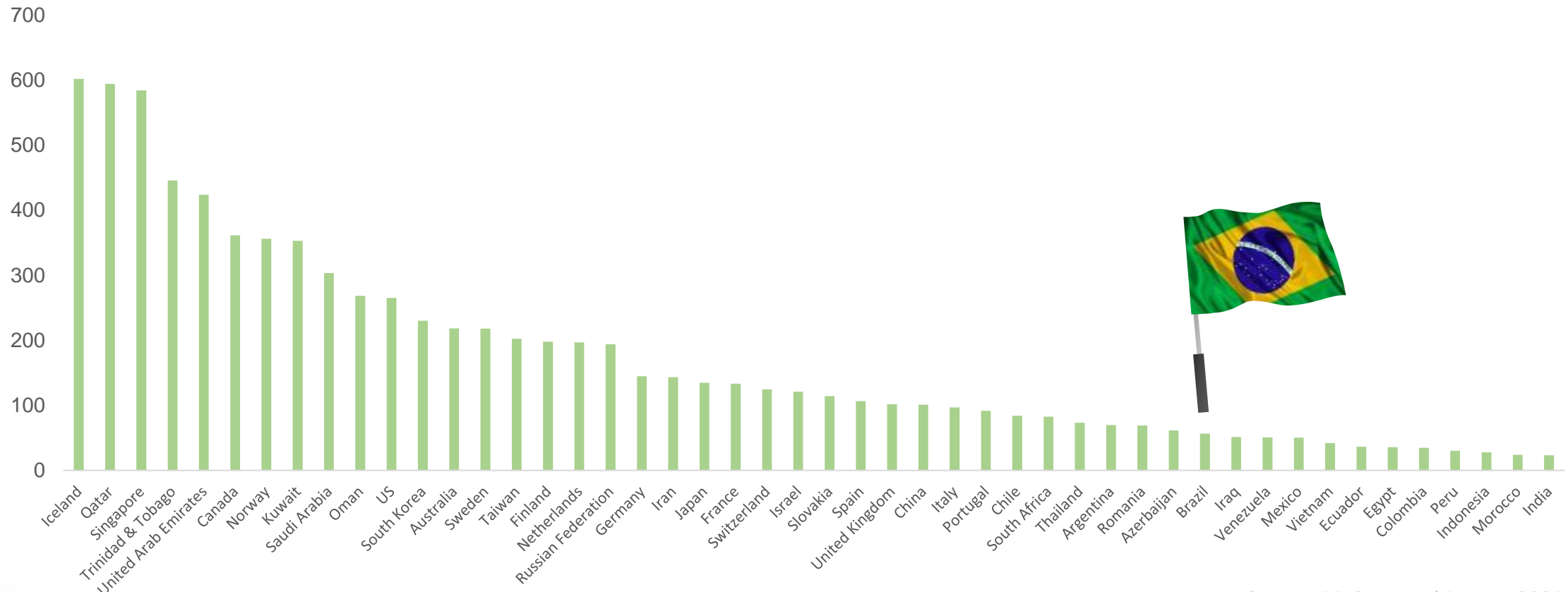
6th

Largest Wind Electricity Generation in 2020
(Our World in Data)

Brazilian energy consumption will grow, opening great investment opportunities

Primary Energy Consumption per capita (Gigajoule)

Low energy consumption per capita when compared to many countries



An unprecedented transformation in the O&G Sector

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 or has been sold by Petrobras, paving the way for a **competitive and open refining** and fuel market for the first time ever. RLAM and SIX have already been sold.

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.



#2

The E&P Sector

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



3rd Cycle of Open Acreage

Performed in Apr/22: 59 areas sold



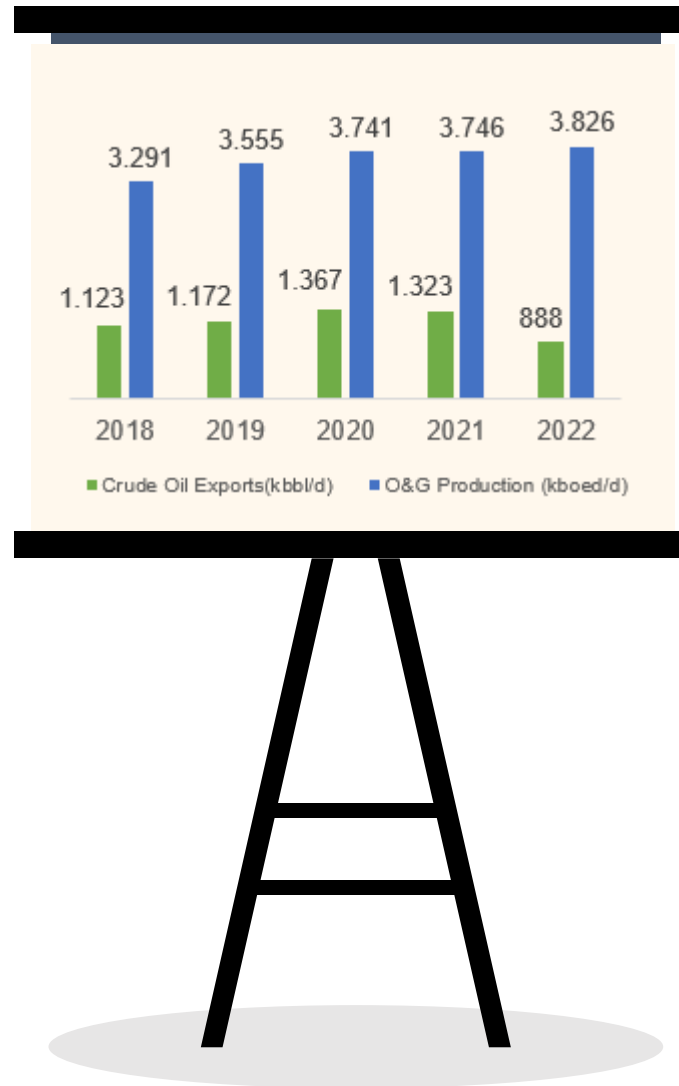
Assets Acquisition

56 M&As approved by ANP



COVID 19

Flexible emergency measures - supportive approach by ANP



2021/2022



Maintenance of O&G production and crude oil exports

*Jan-Feb results as shown in the graph



2 or 3 Bidding Rounds

In the 2nd semester (total of 1,162 areas available, considering the Open Acreage)



Assets Acquisition increased

138 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



2022



8th

Crude Oil and
Condensate
producer
(BP Statistical
Review 2021)



84

E&P company
groups, 50% foreign
(April 2021)

Production:

3M

Bpd of oil
production
(February 2022)

133M

M³ of gas
production
(February 2022)

Reserves:

13B

Bbl in proved oil
reserves
(Dec 2021)

379B

M³ in proved gas
reserves
(Dec 2021)

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.

75% of production
127 producer wells
22,375 Average well production (boe/d)

Prod: **2,841,633** boe/d

Post-Salt

Green and brownfields, deep and shallow waters.

19% of production
468 producer wells
1,544 Average well production (boe/d)

Prod: **722,963** boe/d

Onshore

Mature basins and new frontier basins (gas prone).

5% of production
5,681 producer wells
33 Average well production (boe/d)

Prod: **189,888** boe/d

*February, 2022

27_B

Barrels equivalent of O&G produced to date

375

Fields under development or production

248

Exploratory Blocks

400+

Production Installations

90

Billion dollars E&P Investments Forecast 2021 – 2025

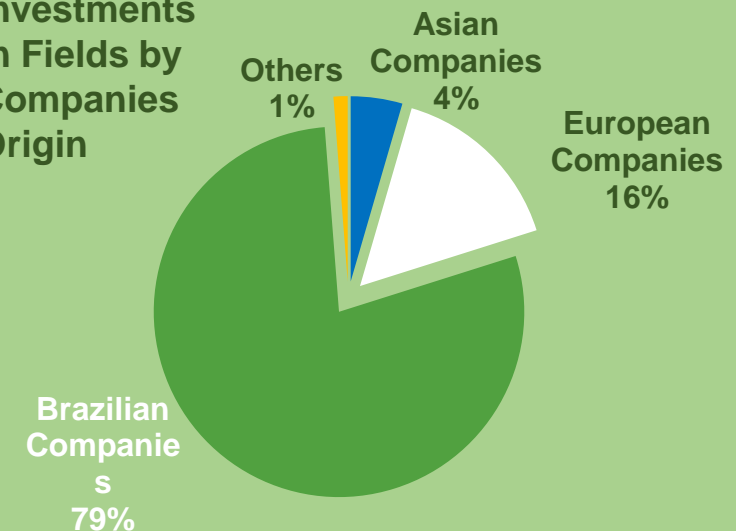
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Billion dollars Decommissioning Costs 2022-2026

30,000+
Wells drilled

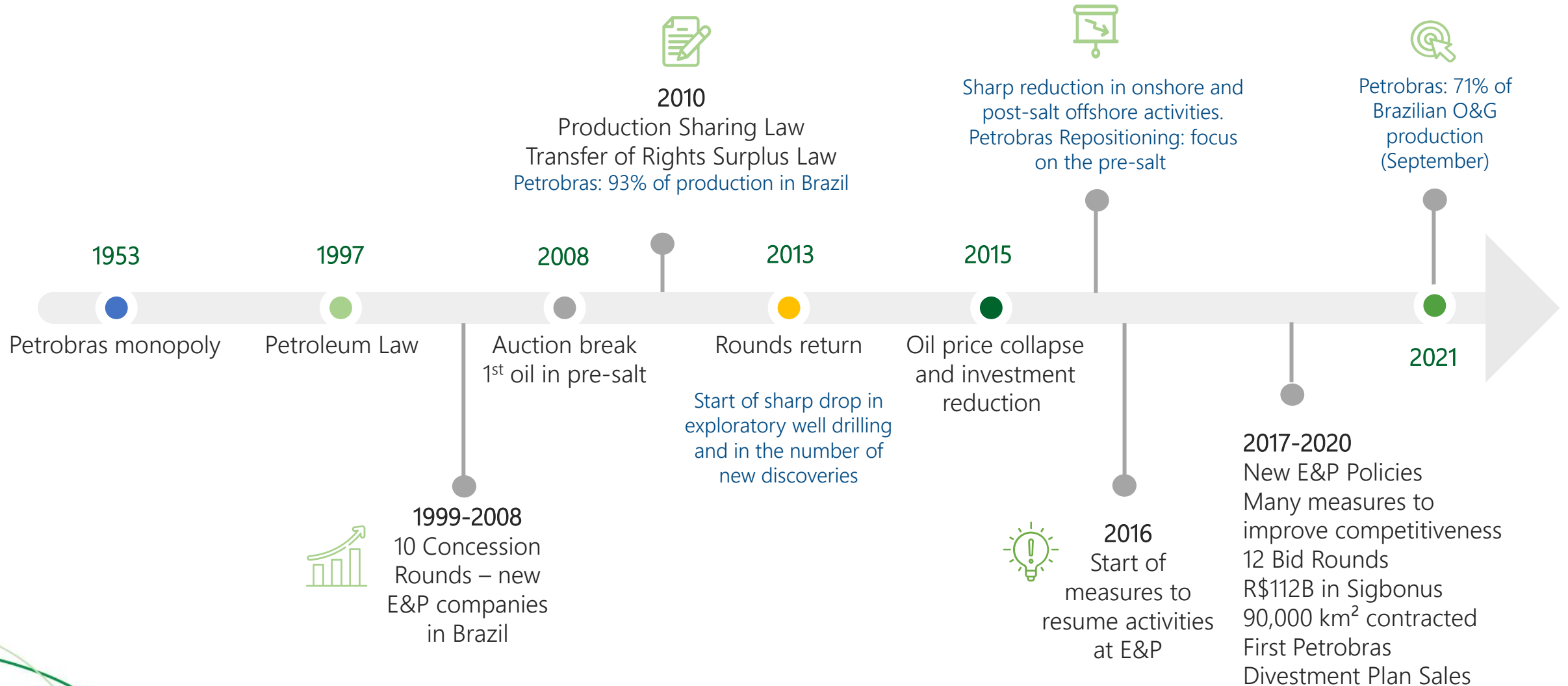
19,000+
Km of O&G pipelines

Investments in Fields by Companies Origin

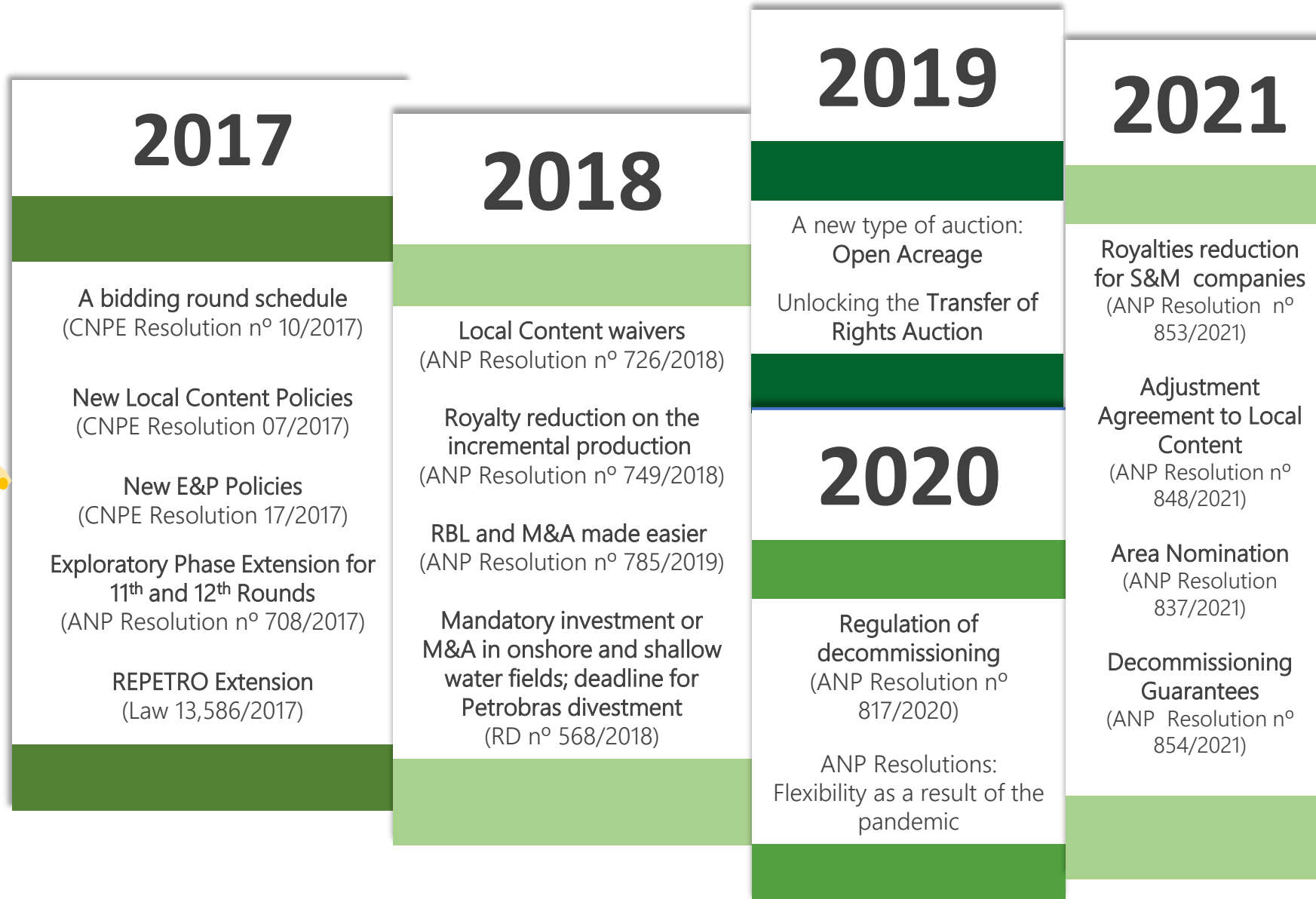


E&P history in Brazil

From a monopoly towards an open market

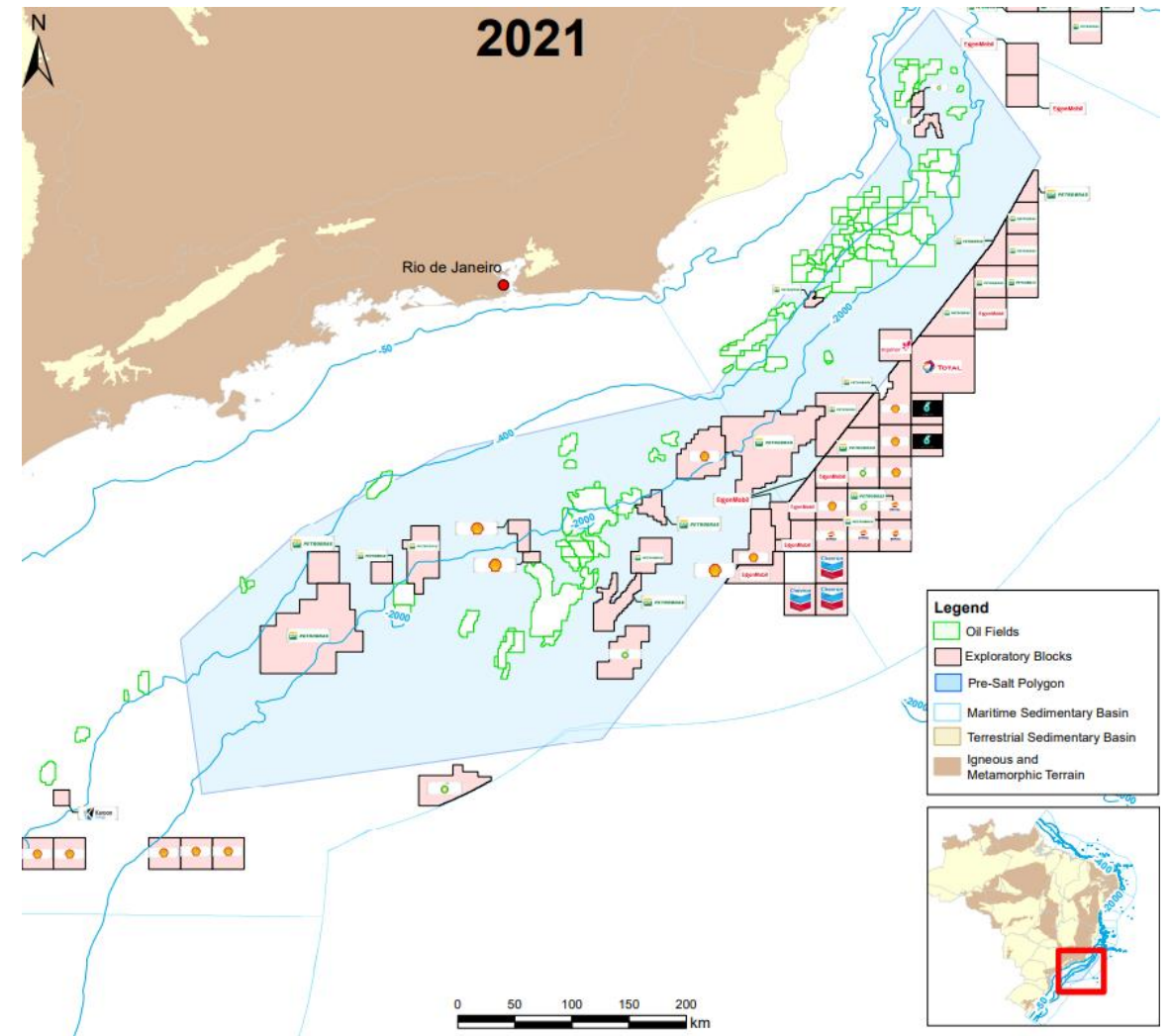
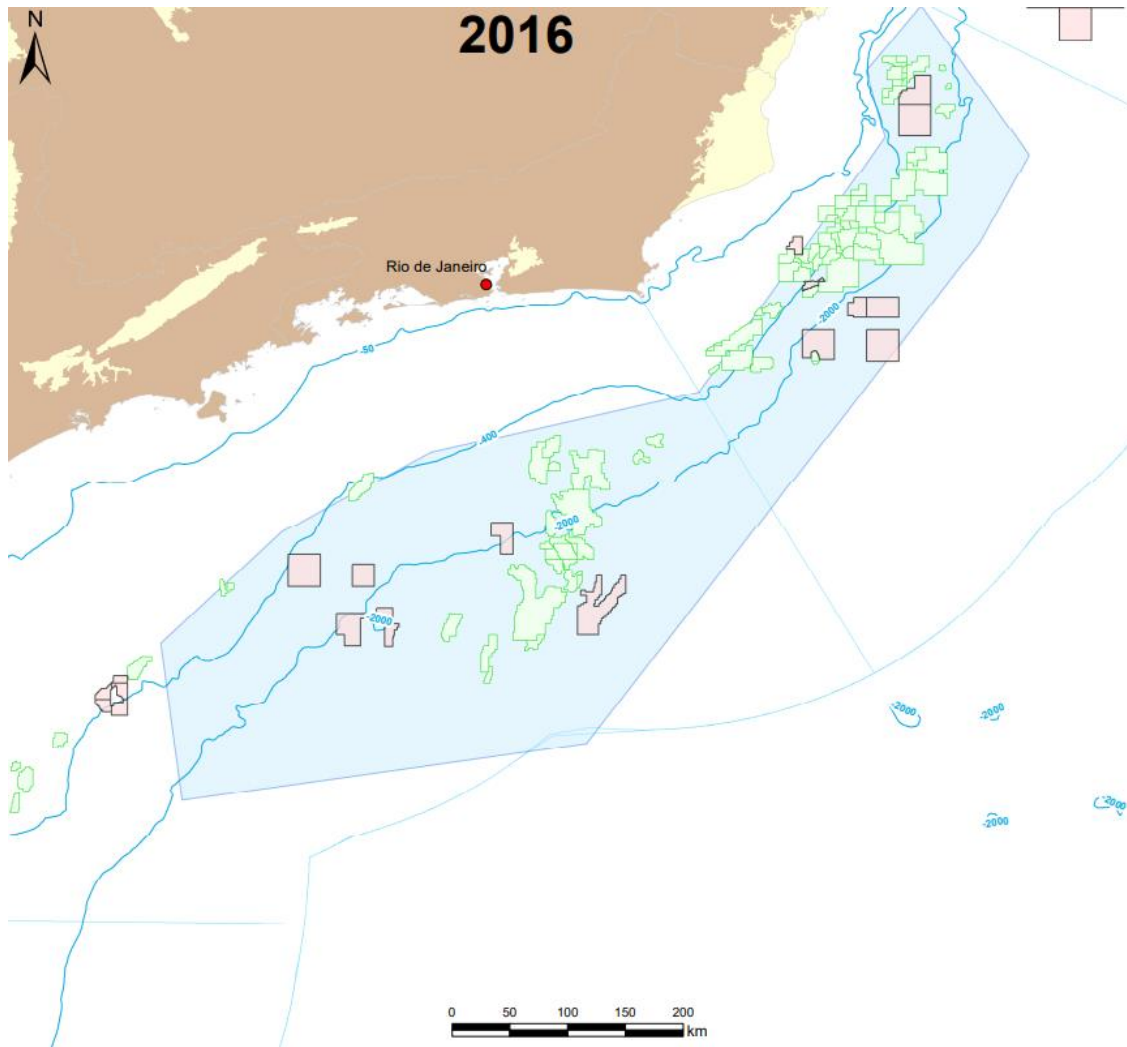


Many measures have already been taken to encourage E&P activities

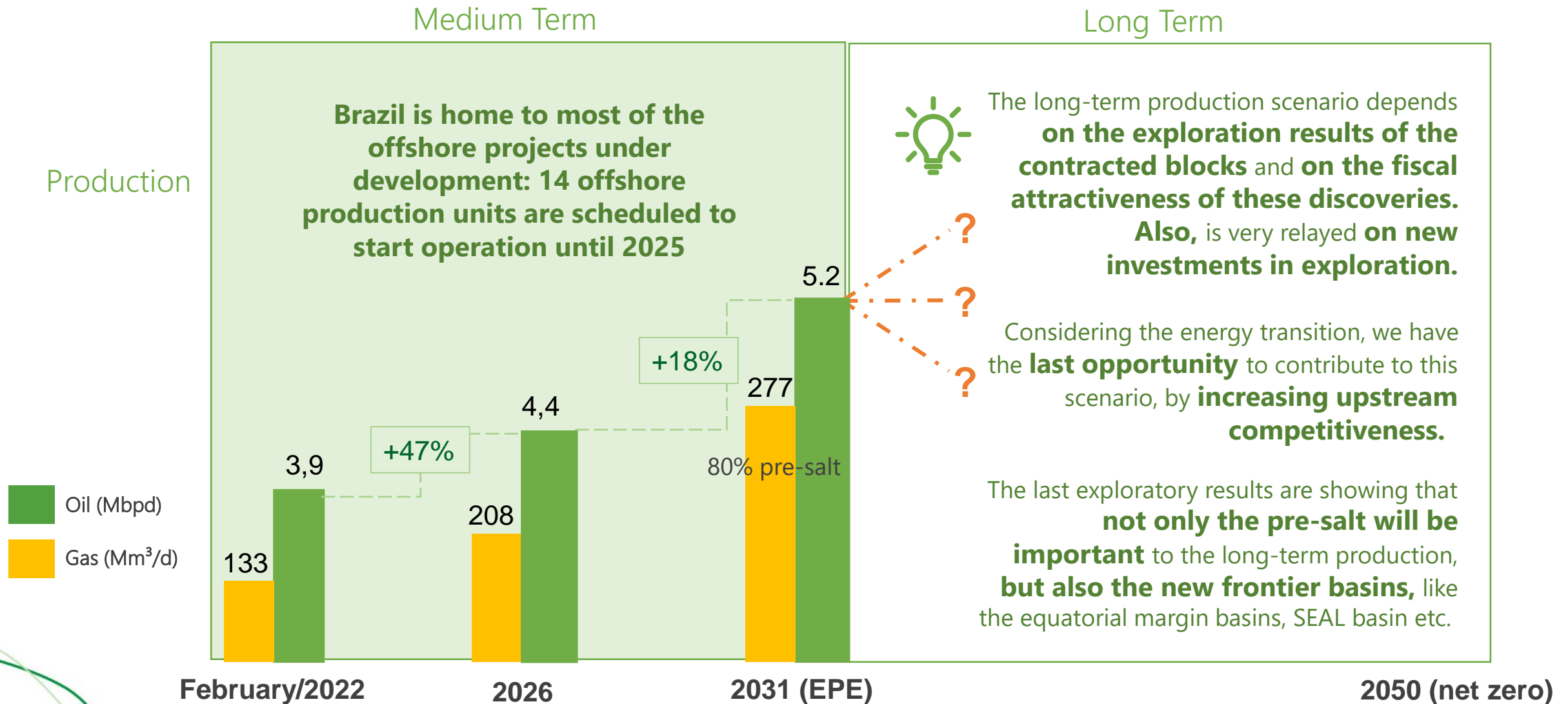


Bidding Rounds (2017/2022)

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



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

Exploration and Appraisal Activities

72% of the exploratory blocks operated by non-Petrobras companies

Exploratory Blocks

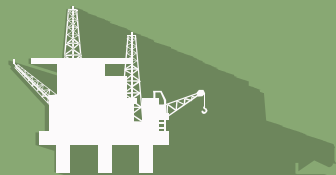
188,327 km² in exploratory areas



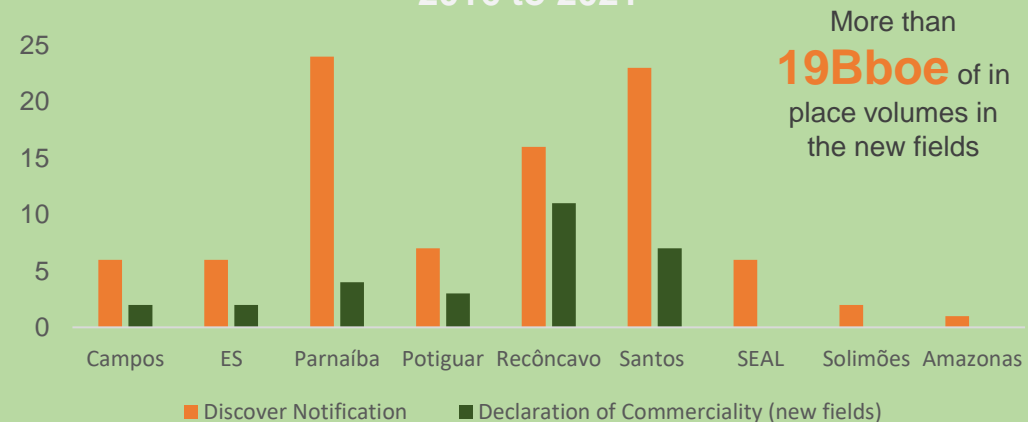
Exploratory Wells Drilled



30% - Economic Exploration Success Rate (2016 – 2020)



Discoveries and New Fields by Basin from 2016 to 2021



Exploration activity was hit by pandemic

Extension of Exploratory Activities approved by ANP (9 months) and CNPE (more 18 months)

Onshore Overview

- Exploratory activities concentrated in mature basins and gas prone basins (Parnaíba and Solimões)
- Discoveries and new fields onshore concentrated in Parnaíba and Recôncavo basins

Offshore Overview

- Focus on Campos and Santos basins (pre-salt)
- Discoveries and new fields offshore concentrated on Santos basin
- Decrease in exploration activities in offshore new frontiers

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 ³ /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



POST-SALT

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

Independents, specialized in mature fields jumping into these opportunities.

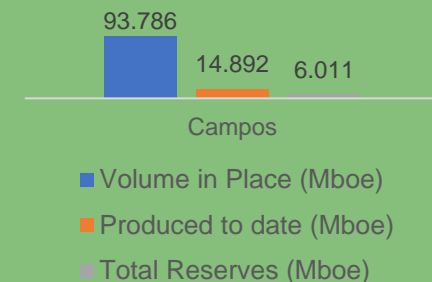
New operators are working on **reducing OPEX and decommissioning costs, revitalizing production facilities and implementing IOR opportunities** to leverage existing underutilized facilities

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



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.

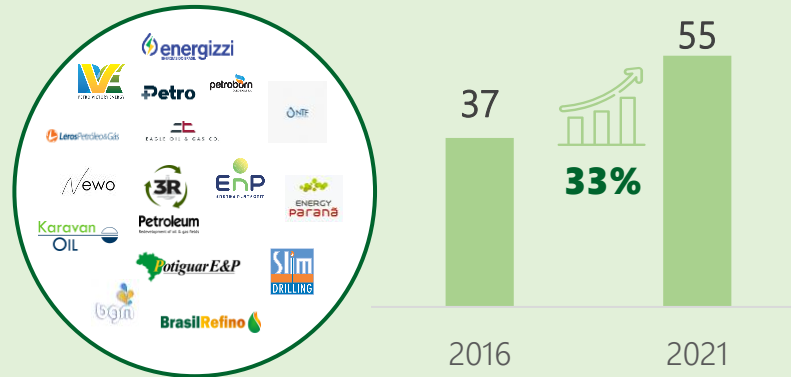
Source: IHS Markit

© 2021 IHS Markit

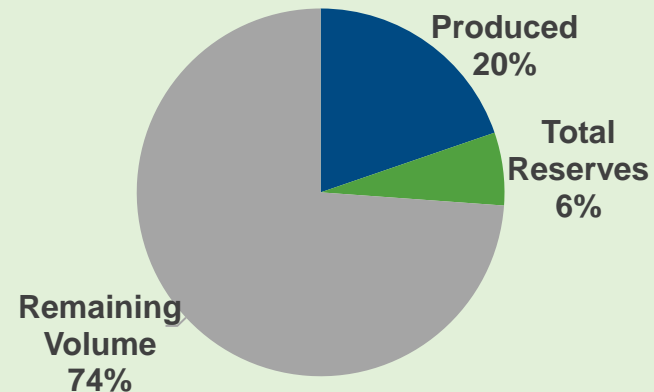
Also, a new onshore market is being set up

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

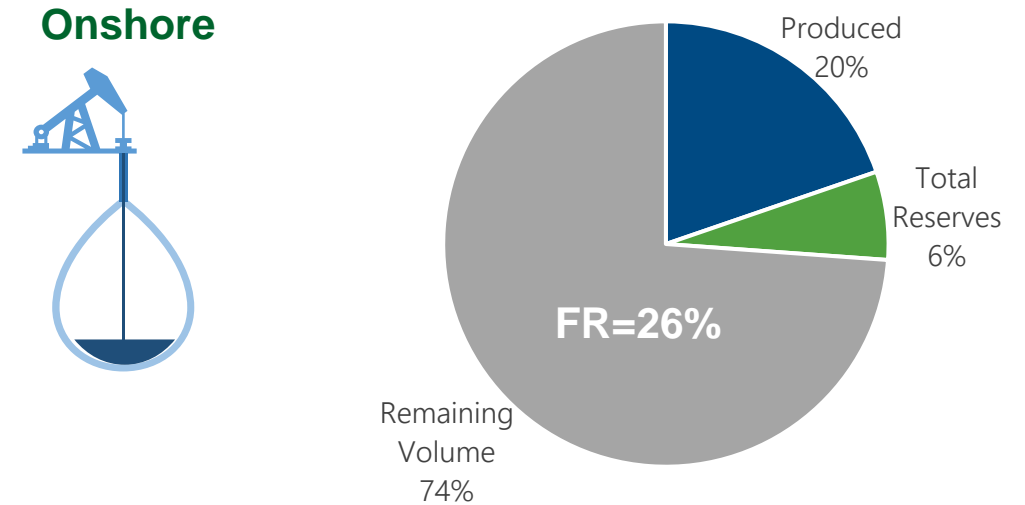
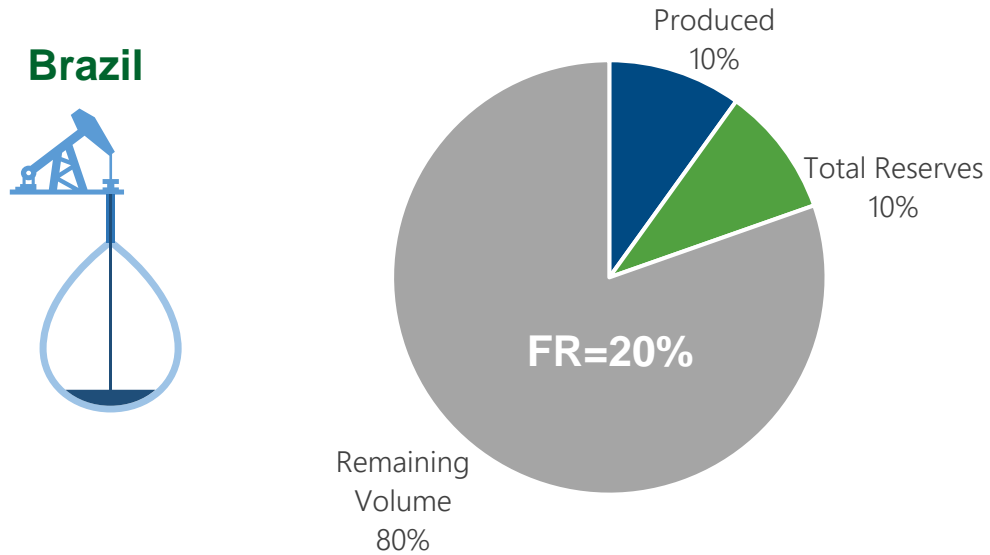
The numbers of E&P groups acting in onshore activities increased more than **30%** since 2016

New operators are increasing production

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

What we have already produced and our potential

Brazil has produced only 10% of the volumes discovered in fields
 World average RF: 35%



	Brazil	Campos Basin	Onshore
1% more in the RF	2.4Bboe	1Bboe	200Mboe

Increasing the RF is an energy policy goal and must be pursued by all agents as per best practices

Ongoing measures to attract investments



KEEP OFFERING AREAS

Open Acreage
+
Ongoing Petrobras
Divestment Plan



PUBLIC DATA AVAILABLE FOR FREE

Download:
Reate.cprm.gov.br/anp



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



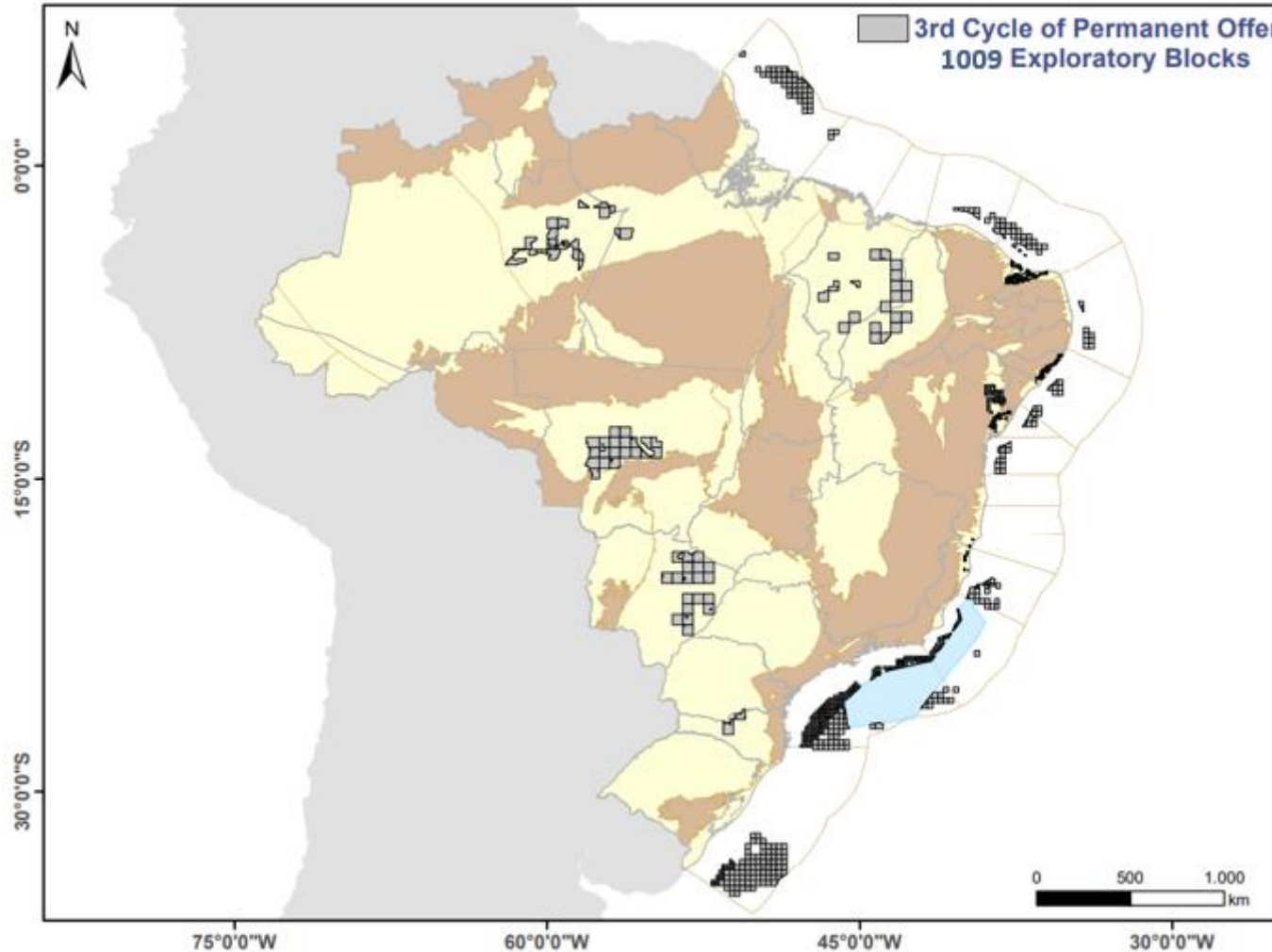
OTHER REGULATORY MEASURES TO REDUCE ABOVE GROUND RISKS AND IMPROVE FISCAL TERMS

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 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.



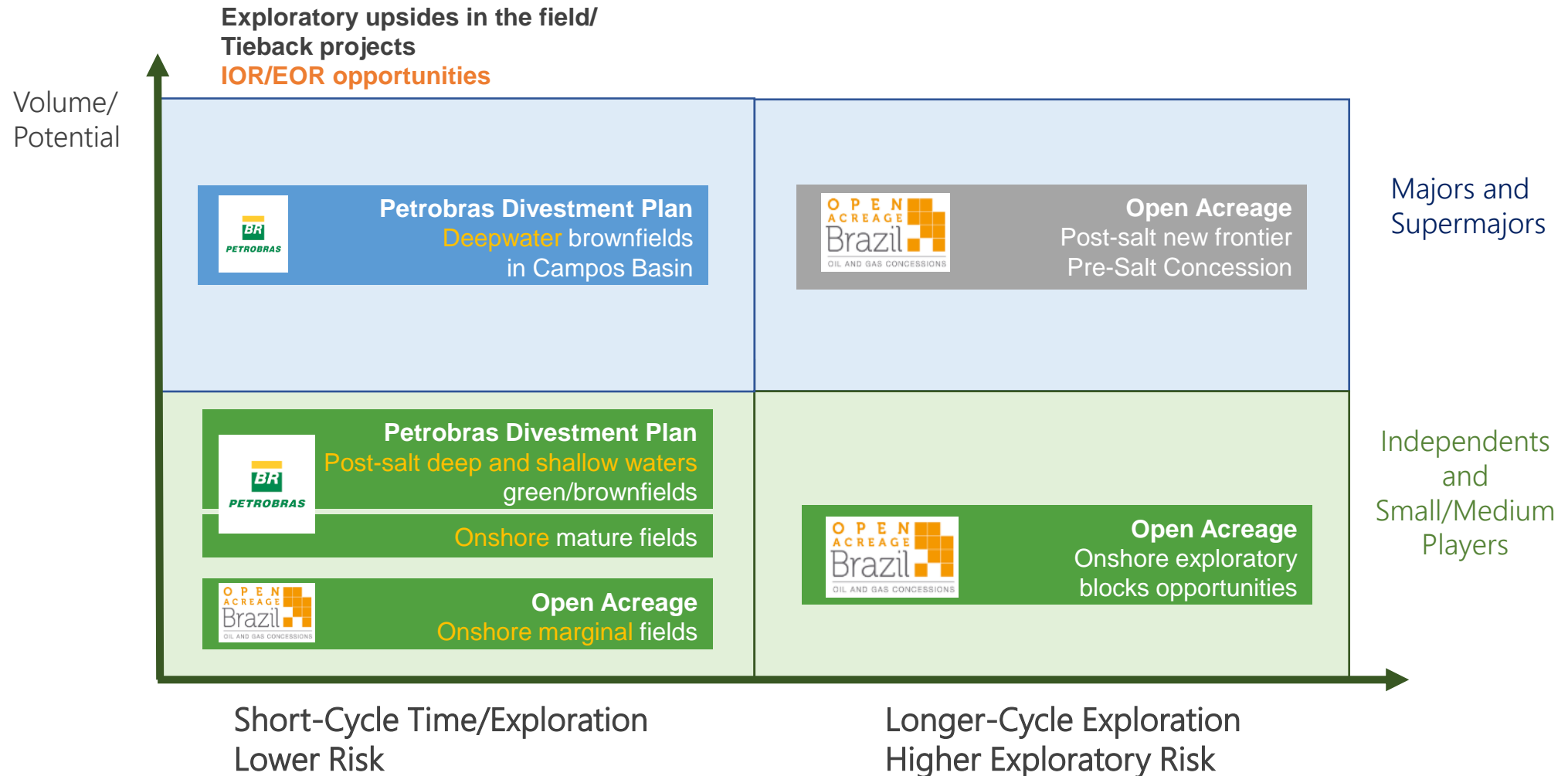
**1,009
blocks
already
available for
the 3rd cycle**



**Additional 800
blocks and 14
marginal fields
under study to
be added in the
future**

E&P Opportunities attractiveness in a post pandemic world

Brazil has strong opportunities for low and high-risk investors.
Greater attractiveness for shorter cycle return projects.





#3

The Natural Gas Market

The natural gas market

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

SUPPLY



DEMAND



National Production



Industrial



Bolivia Imports



Electric Generation



Cogeneration



LNG Imports



Automotive



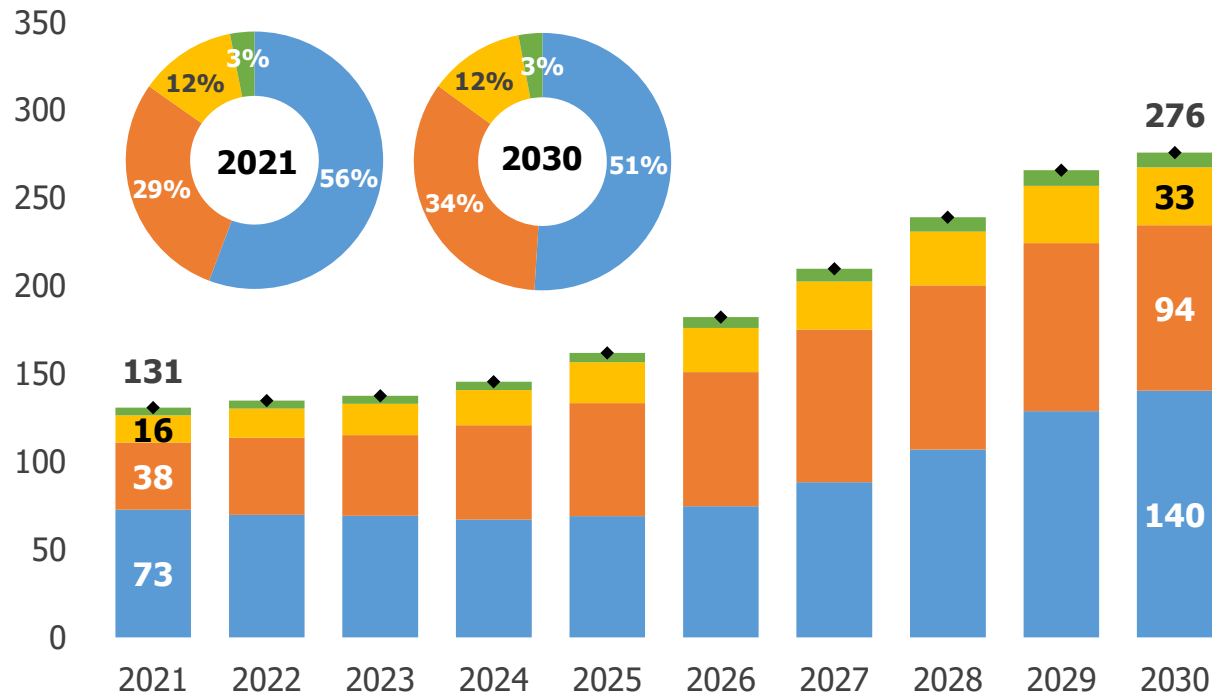
Others



*Jan-Dez 2021 (Average)

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

■ Net Production ■ Injection ◆ Gross Production
■ Consumption in E&P ■ Burning and Losses



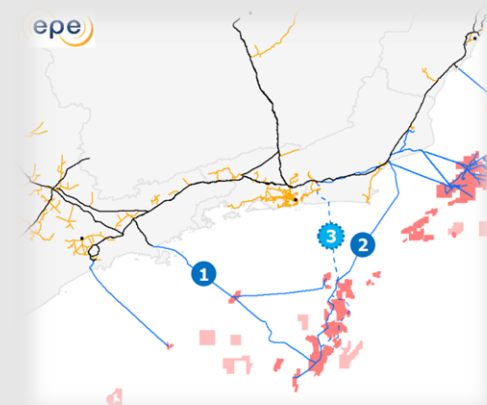
Source: EPE PDE 2030

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

EPE expects the pre-salt liquid gas production reach more than **70 million m³/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 m³/d**



There is also plenty of opportunities to increase national gas production in the onshore



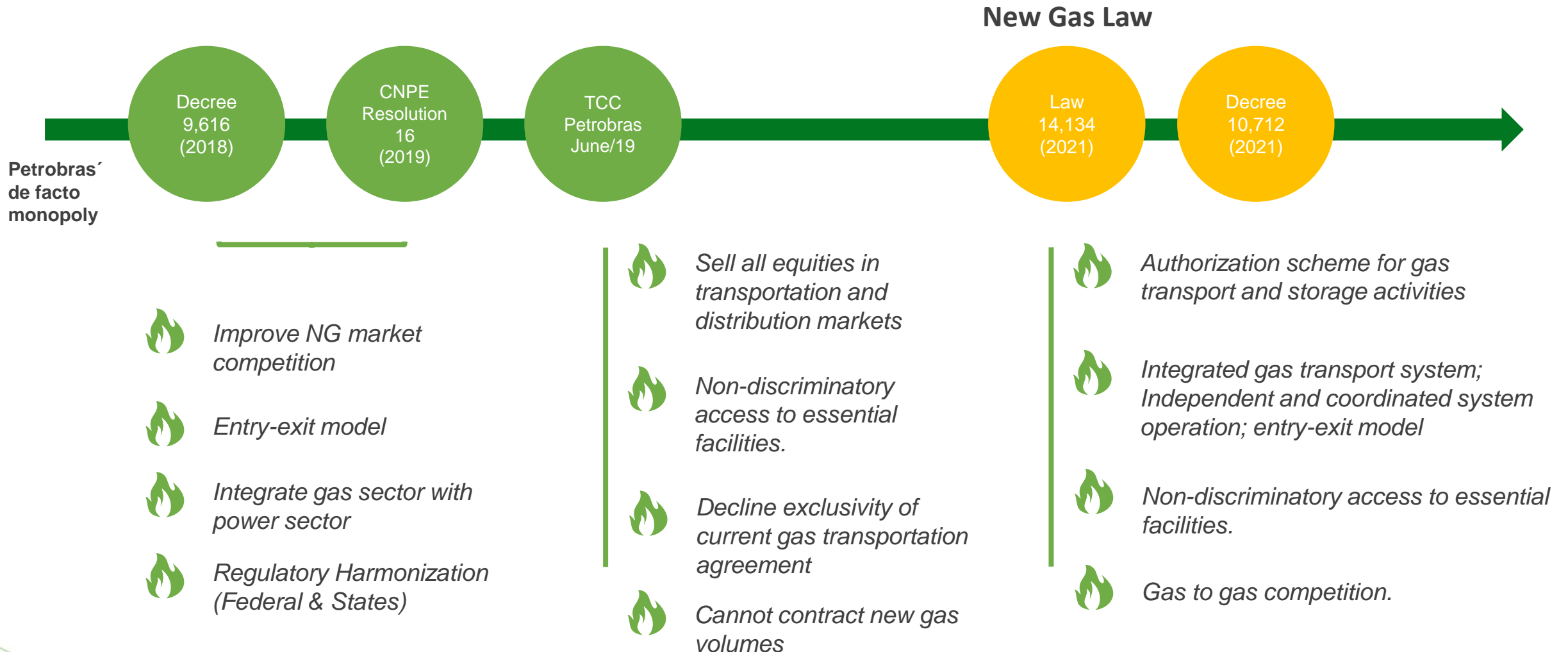
4 paleozoic basins with potential for natural gas: Parnaíba, Solimões, Amazonas, Paraná basins

Most of the onshore exploration in new frontier basins is to produce gas. Open Acreage and Petrobras Divestment Plan can untap more gas opportunities.

Reservoir to Wire Model: Competitive production costs. Relevant projects in Parnaíba and Amazonas Basins



Brazil is moving towards a competitive gas market



Main regulatory challenges in the new gas market



Lack of competitive forces

More suppliers, carriers and free consumers are needed



Lack of third-party access

Essential Facilities Doctrine



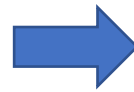
Lack of market driven gas price mechanisms

Trade hubs and exchanges



Lack of transportation infrastructure

Authorization of new pipelines infrastructure



ANP's Conceptual Model of the Gas Market

The document deals with commercialization and shipping of natural gas as well as balancing mechanisms (3 workshops were promoted by ANP throughout 2021)

ANP is working on a new resolution dealing with 3rd Party Access (Multi study group dedicated to this subject)

Open seasons are being conducted considering 1 year contracts

ANP expects the new granting regime established by the new Gas Law will give rise to new pipelines

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



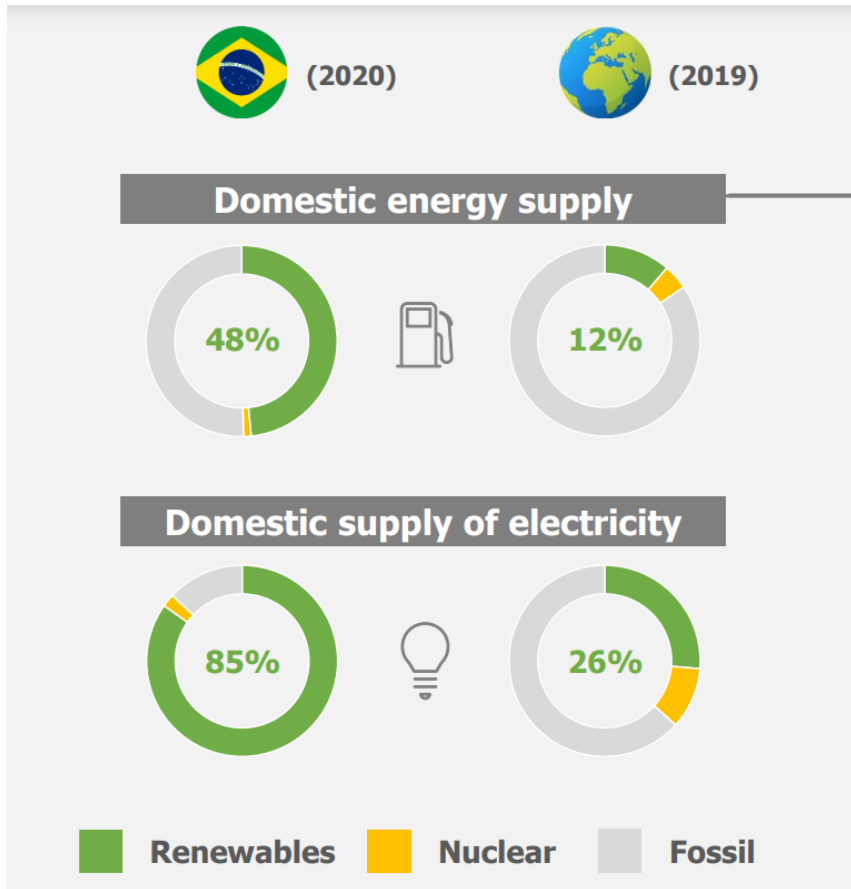


#6

Brazil in the energy transition

Brazil in the energy transition context: a leader

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

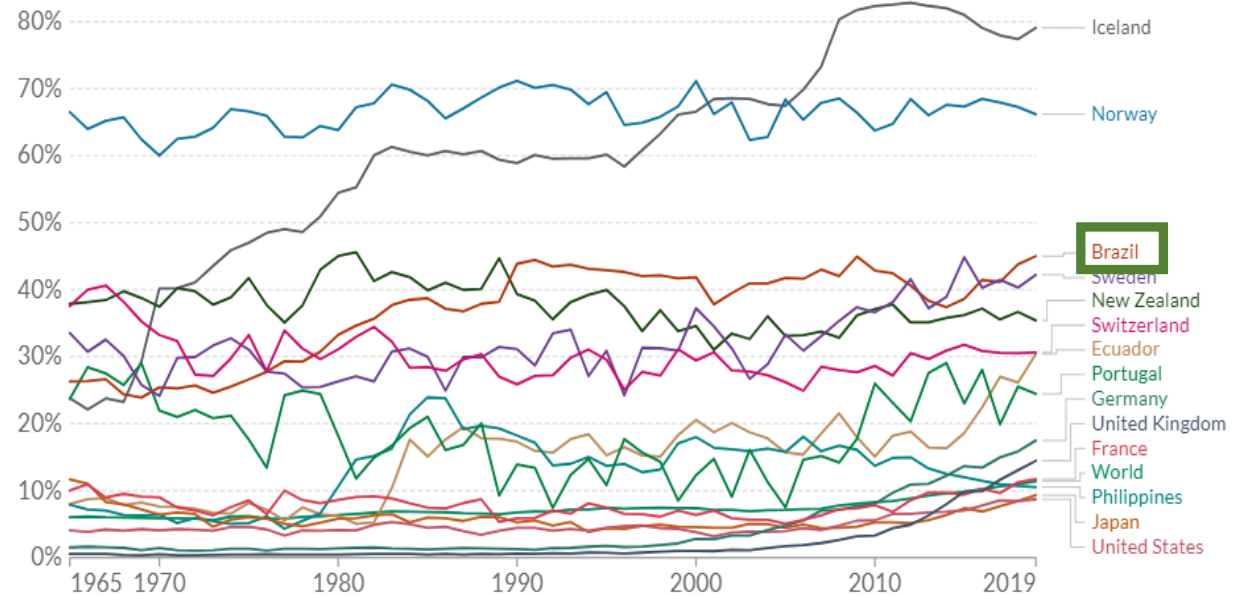


Share of primary energy from renewable sources

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)

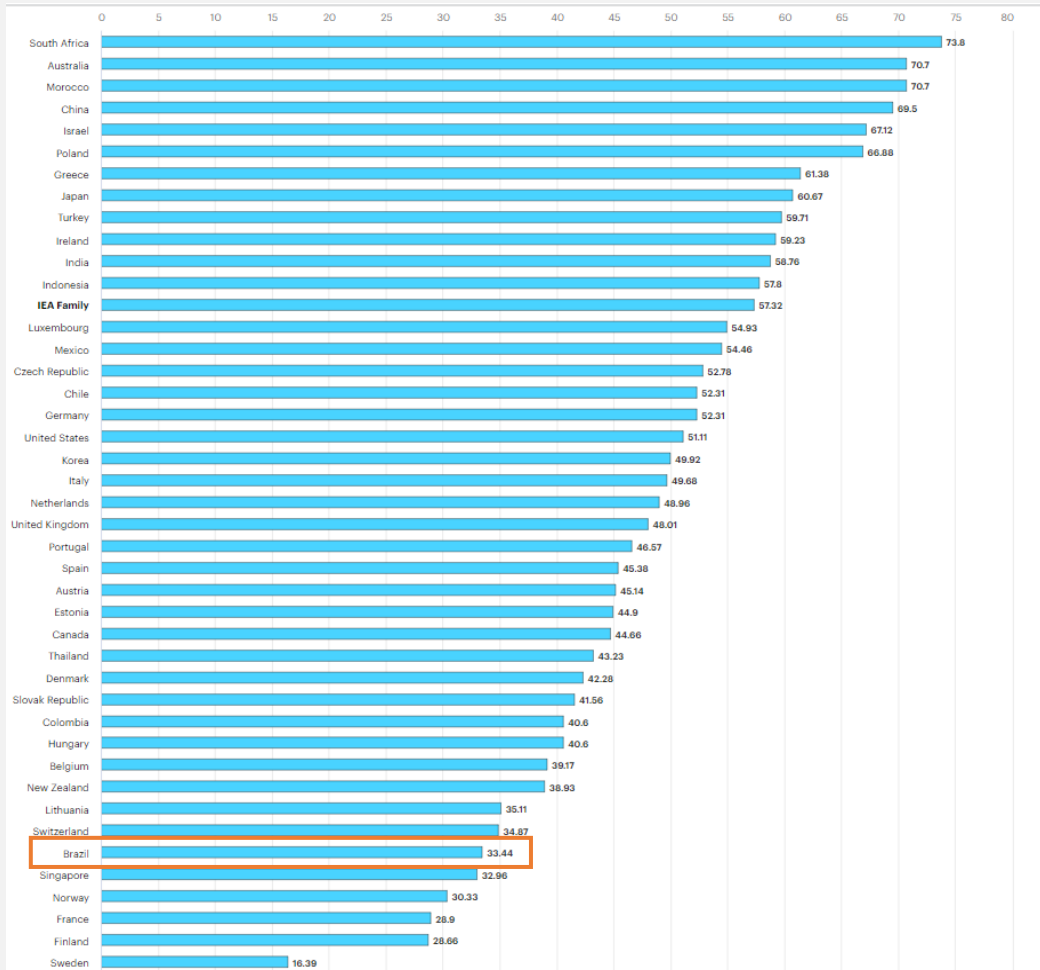
OurWorldInData.org • CC BY

Note: Primary energy is calculated using the 'substitution method' which takes account of the inefficiencies energy production from fossil fuels.

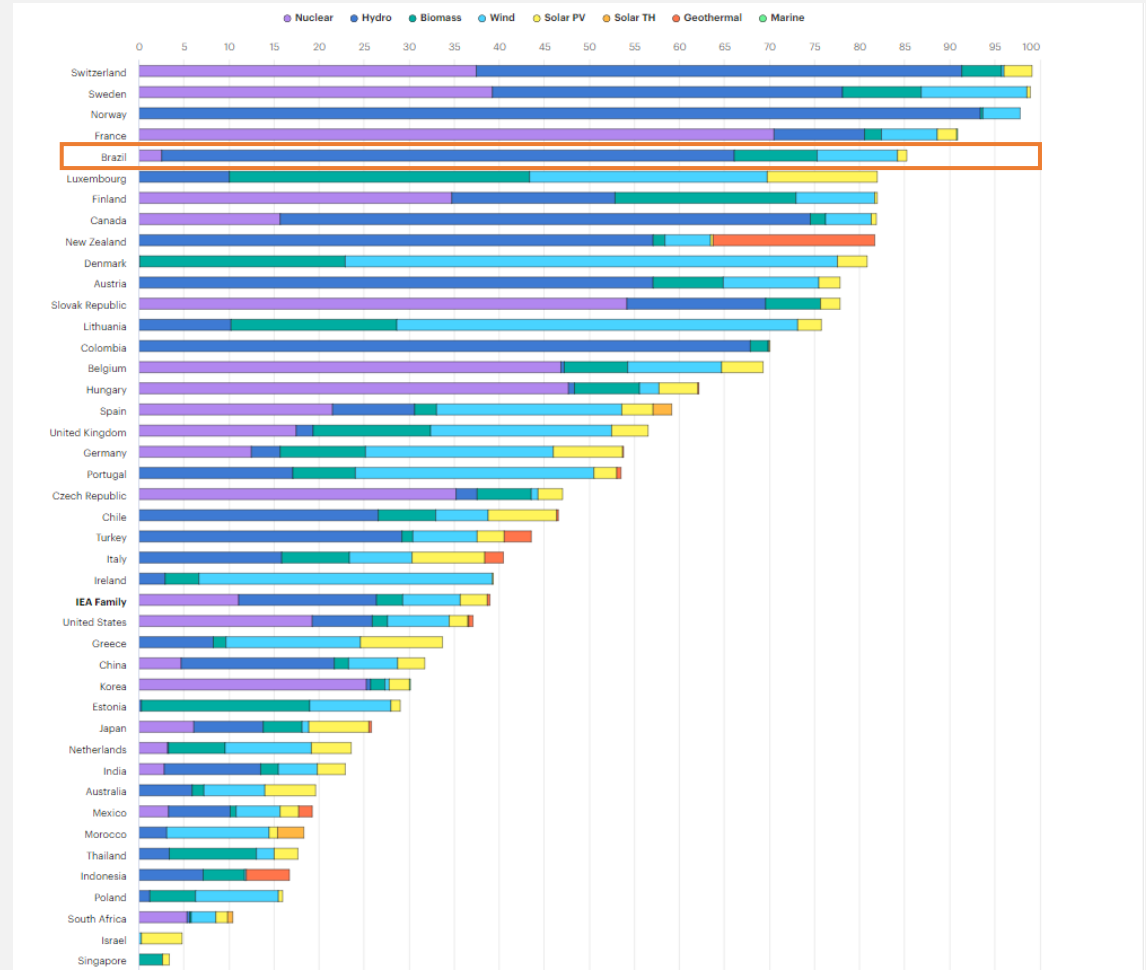
Source: EPE; Our World In Data

Brazil has one of the cleanest energy mix in the world

CO2 intensity of energy mix, 2019 – TCO2/TJ



Low-carbon electricity generation share by source, 2019



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 ₂ 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 (CO₂)

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)

CO₂ 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 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.



#6

Final Remarks

Brazil is a country of great opportunities



Our Strengths

Sanctity of Contract

Geological potential

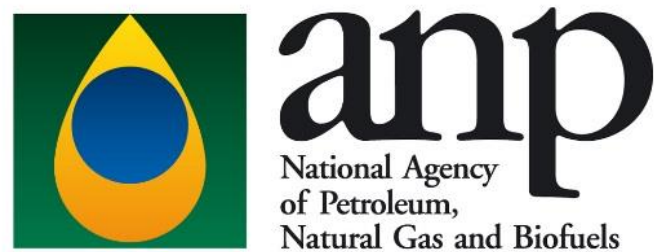
Pre-salt: world-class assets with low carbon intensity

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/>

www.gov.br/anp/pt-br

Av. Rio Branco 65, 21st floor - Rio de Janeiro – Brazil
Phone: +55 21 2112-8100