The Oil and Gas Industry in Brazil

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Outline

01 UPSTREAM
What we did, the results and what’s next

02 REFINING
What is ongoing in Brazil and the need for competition

03 GAS MARKET
The current scenario

04 FINAL REMARKS
A lot has been achieved…

**Main Adopted Measures**

**Late 2016**
- Petrobras: no longer sole operator for the pre-salt play (Law 13,365/2016)

**2017**
- Bidding Rounds Schedule until 2019 (CNPE Resolution 10/2017)
- New Local Content Policy – future rounds (CNPE Resolution 07/2017)
- New E&P Policies (CNPE Resolution 17/2017)
- Exploratory Phase Extension (BID 11 and BID 12) (CNPE Resolution 708/2017)
- REPETRO Extension – fiscal regime (Law 13,586/2017)

**2018**
- LC waiver for contracts up to the 13th bidding round (ANP Ordinance 726/2018)

**Bidding Rounds**
- (in 2017/2018)
### Bidding rounds results

<table>
<thead>
<tr>
<th>Bidding Round</th>
<th>Acquired Blocks</th>
<th>Signature Bonuses (R$ billion)</th>
<th>Registered Companies</th>
<th>Winners Companies</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brasil 14th Round</td>
<td>37 (24 onshore and 13 offshore)</td>
<td>3.84</td>
<td>32</td>
<td>17</td>
<td>1,556%</td>
</tr>
<tr>
<td>Round Brazil 15</td>
<td>22</td>
<td>8.01</td>
<td>17</td>
<td>12</td>
<td>622%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 2</td>
<td>3</td>
<td>3.3</td>
<td>10</td>
<td>7</td>
<td>261%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 3</td>
<td>3</td>
<td>2.85</td>
<td>14</td>
<td>6</td>
<td>202%</td>
</tr>
<tr>
<td>PRE-SALT Brazil 4</td>
<td>3</td>
<td>3.15</td>
<td>16</td>
<td>7</td>
<td>202%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>68</strong></td>
<td><strong>R$ 21.15</strong></td>
<td></td>
<td></td>
<td><strong>High competition and record results!</strong></td>
</tr>
</tbody>
</table>
A great diversity winners in the last auctions

15th Bidding Round

4th Pre-Salt Bidding Round
The new pre-salt exploratory scenario

**Before**

**After** (up to 2019)
And the potential results are...

- **US$ 80B**
- **R$ 300B**
  - New Investments

- **US$ 334B**
- **R$ 1.240B**
  - Tax Revenues

- 2 Million bpd
  - (peak production)

- 15 New Platforms

- Hundreds of Wells

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Potential results for the following bidding rounds:

*Brasil 14th Round Oil & Gas Bidding Rounds*

*Round Brazil 15 Oil and Gas Concessions*

*Pre-Salt Brazil 2 Production Share*

*Pre-Salt Brazil 3 Production Share*

*Pre-Salt Brazil 4 Production Share*

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*Brent = US$ 70/bbl
Exchange Rate = R$ 3.70/US$*
The potential results for new LC Policy

Improvements to Brazil’s local content (LC) rules in 2018 will unlock investment in 36 FPSOs to develop 21 billion barrels until 2027.

A significant reduction in LC fines will debunk the domestic supply chain. FPSO hulls can be built internationally while selected modules are built and integrated locally.

Better utilization of the supply chain allows a faster development of the 21 billion boe of discovered resources, boosting royalty collection and job creation.

Brazil’s oil production potential from discovered resources

Associated job creation and royalties through 2027

Royalties collected (US$ billion)

Total shipyard positions needed (thousands)

Production is based on visible development projects. No adjustment has been made for unforeseen project delays and shutdowns. It also excludes additional production from reserves growth and yet-to-find reserves. Please refer to our Macro Oils and Oil Supply Tool for a fully risked view of oil supply.

Source: Wood Mackenzie
Much more must be addressed…

Future: a high speed of transition and an increase of competition

- Competitive pressures within global energy markets will intensify
- The global energy mix will the most diverse the world has ever seen by 2040, with oil, gas, coal and non-fossil fuels each contributing around 25%
- Demand for oil grows before plateauing in the late 2030s
- Renewables are by far the fastest-growing fuel source, increasing five-fold and providing around 14% of primary energy

Brazil: the numbers do not reflect our potential

- 15 Bboe of proven reserves
- Less than 5% of the sedimentary areas are contracted
- Only 30k wells were drilled
- 1 M bpd of crude oil exports
- 3.3 M boe/d of O&G production
- 26 M bpd of oil

Brazil has to boost O&G activities to generate economic growth while they have value
Three different E&P environments

**Onshore**
Mature Basins and New Frontier Basins (mostly gas prone). Potential for unconventional to be unleashed.

Production: 7%

**Conventional Offshore**
All the East Margin besides the pre-salt region and Equatorial Margin, including new frontier areas and a significant number of large mature fields.

Production: 39%

**Pre-Salt**
One of the World’s hottest oil play, home to the largest offshore oil discoveries in the last decade.

Production: 54%

Average oil production per well:
- Onshore: 16,547 bpd
- Conventional Offshore: 1,654 bpd
- Pre-Salt: 17 bpd
Increasing exploration and revitalizing activities

Onshore oil Production
(May, 2018)

111,192

Development Wells Concluded

Exploratory Wells Concluded

Pre-Salt Oil Production

Northeast Basins Offshore Oil Production

Pos-Salt Campos Basin Oil Production

Onshore oil Production (May, 2018)

111,192

*Updated (06/21/18)
Maximizing the recovery factor

- **Campos Basin**
  - Current O&G Recovery Factor: 14%

- **Brazil**
  - Final O&G Recovery Factor: 21%

- **Campos Basin**
  - Final O&G Recovery Factor: 23%

- **World**
  - Average Final O&G Recovery Factor: 35%

*Source: Annual Reserves Bulletin (12/31/2017)*

- 1% addition in Campos Basin: 985 Mboe
- 1% addition in Onshore: 200 Mboe

*Source: Annual Reserves Bulletin (12/31/2017)*
Attracting the right players

Pre-Salt

Conventional Offshore

Onshore

01 Supermajors
    Major Operators

02 Major Operators
    Exploration Specialists
    Mature Field Players

03 Small and Medium Companies

Supported by oilfield service companies, suppliers and financial institutions
Our potential

5.5M bpd
Potential forecast production in 10 years

>50 New FPSOs
The most prominent deep water environment

Mature fields/basins
Low recovery rate in average. 1% addition in the Brazilian recovery factor: 2.2Bboe of new reserves and US$18B in new investments

New Frontier Basins
We barely know our potential. Unconventional resources discussion should progress

Contracted or in progress

Need to be unlocked
We need a diversified industry to unlock our full potential.

According to our analysts, the E&P sector has potential to attract R$ 1.8 trillion of investments in the next 10 years. But we still have half of this value estimated under contracts.

To double it, we need a diversified oil industry with a significant number of players in each environment. Nowadays, we only have around 100 E&P companies and 9 production operators. Petrobras still operates 94% of the production.
Ongoing measures...

01. Bidding Rounds
   Open Acreage
   (more attractive contracts)

02. New ANP Ordinance:
    Royalties reduction
    for the incremental
    production in mature fields
    (Public Hearing – 29th June)

03. New ANP Ordinance:
    Reserve Based Lending
    (July/2018)

04. ANP Ordinance Update:
    R&D – a new strategy
    (2nd S/2018)

05. ANP Ordinance Update:
    LC measurement and
    certification (2nd S/2018)

06. Petrobras’ Divestment Plan
Bidding rounds schedule

- **2018**: September 28th
- **1st Wave**: As from November
- **2019**: November 29th
- **2nd Wave**: 1st Semester
- **3rd Q**: To be confirmed

**2020/2021**: Round Brazil 17, Round Brazil 18
Open Acreage 1st Wave

346,035 Km² area
14 Mature fields
884 Blocks
15 Sedimentary basins
Blocks not awarded in the 15th Bidding Round are included
722 blocks in 9 onshore basins
162 blocks in 6 offshore basins
Open Acreage 2nd Wave

Deadline for the disclosure of parameters and rules: December/2018

1,054 Blocks
441,400 Km² area
20 Sedimentary basins

85 blocks in 7 onshore basins
969 blocks in 13 offshore basins
5th Pre-Salt Bidding Round

Estimated unrisked oil in place volumes (P50)

17 Bbbl

4 areas

Legend
- SP Pre-Salt Round
- Field
- Pre-Salt Polygon
- Offshore Basin
Sectors for the future concession bidding rounds

Legend
- Round 16 – Sector
- Round 16 – Area for Study
- Round 17 - Sector
- Round 17 - Area for Study
- Round 18 - Sector
- Round 18 - Area for Study
- Pre-salt Polygon
- State limit
- Offshore basins
- Onshore basins
- Basement
Transfer of Rights Surplus Opportunities

- 10 Fields
- R$1.809B Tax Revenues
- 10.8 Billion boe (GCA P50 recoverable volumes)
- 17 New Platforms

Legend
- Transfer of Rights Fields

*Brent = US$ 70/bbl
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Outlining

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04 FINAL REMARKS
National Sales of Oil Products (2017) ~2,3 Million bpd
National Sales of Biofuels (2017) 515 Thousand bpd
Imports (2017) (ethanol, naphtha, QAV, LPG, Gasoline e Diesel) 538 Thousand bpd
Largest oil products consumer

Strong and growing participation of biofuels
51 Biodiesel Plants
Capacity: ~140 thousand bpd
383 Ethanol Mills
Capacity: ~570 thousand bpd (33 billion liters)
Petrobras' monopoly

End of monopoly (Oil Act)
Remains Petrobras' dominant

1953

Petrobras' monopoly

Start of practicing International Prices (import parity)

1997

Interference in fuel prices

2002

Petrobras's new pricing policy (October): monthly adjustments for diesel and gasoline prices

2003

Increase in exchange rate and oil price

2016

Petrobras's new pricing policy (July): daily adjustments for diesel and gasoline prices

2017

Truckers Strike (may)

2018

Government's subsidies (R0,46/l)

ANP announced a public hearing in order to discuss the frequency of transfer of fuel price adjustments (5th of June)
Brazilian society has questioned Petrobras’ price volatility. There are no room for investment in a country when the society is questioning the pricing policy.

There is only one way to ensure that the fuel prices offered to the consumer are fair and adequate: when they are established in an open, diversified and competitive market.

Concentrated refining market in a single large company + current fuel taxation system = need of regulatory measures that protect the consumer and preserve the key values of a market economy.

The public hearing proposes to build a joint and transparent solution with the companies and the society, stabilizing the scenario for staid discussions. There is NO intention to interfere in the freedom of price formation, which is established in the Brazilian legislation.
Creating an open and competitive market

PAST
- Interference in Petrobras’s pricing policy
- Investment needs
- Import dependency

PRESENT
- Import Parity
- Risk of new price controls or adoption of anticompetitive practices
- Investment needs
- Increase in import dependency

EXPECTED FUTURE
- Market Price
- New Investments
- Increase in national production and reduction in import dependency

Monopoly

De facto monopoly

An open, diversified and competitive market with multiple players
Refining: perspectives

Increase of competitiveness and capacity by:
- gradual increase in third-party participation with the market’s growth or
- process acceleration through Petrobras’ partnerships / divestments

Conclusion of stopped projects / new refineries

Small refineries

RIOGRANDENSE (RS)
RLAM (BA)
RECAP (SP)
RPBC (SP)
REMAN (AM)
REDUC (RJ)
LUBNOR (CE)
REGAP (MG)
REFAP (RS)
REPLAN (SP)
REPAR (PR)
REVAP (SP)
RPCC (RN)
UNIVEN (SP)
DAX OIL (BA)
RNEST (PE)

RIEST 2nd Unit
COMPERJ (RJ)
Small refineries
New Projects

Increase of competitiveness and capacity by:
- gradual increase in third-party participation with the market’s growth or
- process acceleration through Petrobras’ partnerships / divestments

Conclusion of stopped projects / new refineries

Small refineries
Opportunities for investments in refining involve the demand growth and Petrobras’ divestment plan. They depend on the practice of market prices and can benefit from the cost of the logistical tour.

**Petrobras proposed model consists in partnerships in 2 regional blocks of relevant size**

<table>
<thead>
<tr>
<th>Region</th>
<th>Northeast</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refineries</td>
<td>RNEST and RLAM</td>
<td>REPAR and REFAP</td>
</tr>
<tr>
<td>Processing capacity</td>
<td>430 kbd</td>
<td>416 kbd</td>
</tr>
<tr>
<td>% of total refining capacity</td>
<td>19%</td>
<td>18%</td>
</tr>
<tr>
<td>Pipelines</td>
<td>2 of crude oil</td>
<td>9 pipelines</td>
</tr>
<tr>
<td>Terminals</td>
<td>3 inland</td>
<td>3 inland</td>
</tr>
<tr>
<td></td>
<td>2 waterway</td>
<td>4 waterway</td>
</tr>
<tr>
<td>Other aspects</td>
<td>RNEST 2nd unit</td>
<td>Mature market</td>
</tr>
</tbody>
</table>

*Source: Petrobras*

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**Opportunities in the refining sector**

**Petrobras’ divestment plan**

**International prices**

**Demand growth**

**Logistics inefficiency**

Gasoline/diesel imports: ~4 to 6 US$/bbl
Oil exports: ~2 to 4 US$/bbl
Total potential by barrel of oil product: ~6 to 10 US$
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04 FINAL REMARKS
The gas market in Brazil

**Supply**

<table>
<thead>
<tr>
<th>Source</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Supply</td>
<td>52</td>
</tr>
<tr>
<td>Imports from Bolivia</td>
<td>25</td>
</tr>
<tr>
<td>LNG Imports</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Total Supply: 80 Million m³/d

**Demand**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industrial</td>
<td>38.9</td>
</tr>
<tr>
<td>Power Generation</td>
<td>23.4</td>
</tr>
<tr>
<td>Automotive</td>
<td>6</td>
</tr>
<tr>
<td>Cogeneration</td>
<td>2.8</td>
</tr>
<tr>
<td>Others</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Total Demand: 73.5 Million m³/d

Consumption by Sector:

- **Industrial**: 53%
- **Power Generation**: 32%
- **Automotive**: 8%
- **Cogeneration**: 4%
- **Others**: 3%

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March 2018
Gas market scenario

The driving forces

- Petrobras' repositioning
- Development of pre-salt fields and new gas areas, increasing the natural gas domestic production in the future
- Increase of renewable in the electricity generation, demanding natural gas thermal power plants as back up systems

In progress...

Gas to Grow

The draft bill proposed in 2017 sets a "Market Design", aiming a liquid, diversified and competitive natural gas market

The transition is already being implemented: 2018 Open-season for Bolívia-Brasil Pipeline capacity offering (entry-exit regime)

Regardless of the gas bill approval, the ANP will continue to implement regulatory measures to modernize and open the gas market.
Opportunities for LNG in Brazil will continue to exist

**The LNG market**

- **01** Opening of LNG terminals for third parties
- **02** Project Opportunities with combined supplies (LNG, domestic gas)
- **03** LNG terminals: Pecem-CE, Bahia de Guanabara-RJ and Bahia

LNG shall be used as a bridge until domestic natural gas is available. In the future, natural gas abundance can turn Brazil into a LNG exporter.
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01 UPSTREAM
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## Potential Investments in the O&G Industry

<table>
<thead>
<tr>
<th>Sector</th>
<th>Investments (US$ billion)</th>
<th>Investments (R$ billion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E&amp;P</td>
<td>490</td>
<td>1.813</td>
</tr>
<tr>
<td>Refining, Processing and Petrochemical Plants</td>
<td>58</td>
<td>216</td>
</tr>
<tr>
<td>Biofuels</td>
<td>28</td>
<td>105</td>
</tr>
<tr>
<td>Pipelines</td>
<td>10</td>
<td>35</td>
</tr>
<tr>
<td>Logistics Supply</td>
<td>8</td>
<td>31</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>594</strong></td>
<td><strong>2.200</strong></td>
</tr>
</tbody>
</table>

*Exchange rate – R$3.70/US$*

How much investments in the Oil, Gas & Biofuels Industry would be necessary to develop all the Brazilian potential in the next 10 years?
The greatest transformation in the Brazilian E&P sector, completing the opening which started in 1997.